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UNIVERSITY OF TRENTO - Italy  
Faculty of Sociology

# Practicing science and technology, performing the social



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# EASST 2010

## BOOK of ABSTRACTS

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## **TRACK 1**

# **ARTificial Life? Performativity between Science, Media and Art**

**Convenors:**

**Priska Gisler (University of the Arts in Berne, Switzerland)**

**Silke Schicktanz (University of Göttingen, Germany)**

## **"A countries new dawn" - lessons about the ephemeral of Arts and Science**

*Seibt Claus (Austrian Institute of Technology)*

*Schäfer Sandra (Mazefilm)*

The starting point of the presentation and paper is the experimental film "A countries new dawn" which was produced by the authors in an arts project in 2000/ 2001 at the Center for Arts and Media Technology (ZKM) and the University of Applied Arts in Karlsruhe, Germany. "A countries new dawn" (7 minutes) shows the London Millenium Exhibition of 2000, seen as the major forward looking science, media and arts events at the turn of the century proclaiming a new era for UK and Europe. The London Millenium Dome was initially built solely for this purpose.

One of the major themes of the millennium exhibition was the vision of a new composition of life and the artificial and the artificial and life. The film material gained during the exhibition and found footage material was cut for the film in a way to show by example the examination of science and arts with the theme, but as well the intercourse of the broad public during the exhibition duration. The perspectives in the film – although initially not planned in this way – are full of subtle irony and do finally unmask the whole millennium undertaking.

However, the best of the film comes abrupt. As well for us it was unexpected that the exhibition initially planned to last as the largest European science and arts event was suddenly closed down for reason of failing interest of the public to visit the dome. So we travelled ad hoc to London to film the largest auction United Kingdom has ever seen during its history: the sold out of all exhibition pieces and to film the complete deconstruction of the whole interior of the Millenium Dome.

The character of the Millenium Exhibition gives a good metaphor on the ephemeral of science and art constructions in this case engaged for the political to claim the "dawn of a new century" or a new era of human life. Science and arts are complementary to each other in these undertakings. Finally the public demasks the whole construction by ignoring to visit the event. The largest auction with an exhibition UK has seen *takes* place to ban the pieces of the construction in the archive of history.

The experimental film "A countries New Dawn"(7 minutes) will be shown in the presentation.

## **Between Presentation and Research: The Lecture as Performance**

*Peters Sibylle (Zentrum für Medien und Interaktivität, Universität Gießen, Germany)*

Science Studies have argued that the material, the social and the performative aspects of knowledge production are not secondary but crucial to the process of innovation and insight. Does this also apply to forms of knowledge presentation?

From the viewpoint of scientific tradition research itself and the public presentation of its outcomes are two different things – research first, presentation second. In the performing arts this is different; here, research is deeply intertwined with presentation: Artistic research is part of the process of preparing a public presentation. And vice versa the presentation itself is a main part of the research process, a test-scenario.

As long as ‚the lab‘ and ‚the experiment‘ have been the main terms and forms ‚borrowed‘ from science to describe artistic research, this difference caused misunderstandings: Artistic research necessarily falls short compared to scientific research, if the inner relation between presentation and research, that is crucial to research in the performing arts, isn't acknowledged.

This makes it an important shift that in recent years the lecture has become a format of artistic investigation and intervention. From the viewpoint of science the lecture is not a form of knowledge production but merely a form of knowledge presentation. To investigate the lecture as performance means to question this traditional gap between research and presentation. Concentrating on the lecture artistic research can show that the presentation of knowledge re-enters knowledge production. By means of performance studies and performative intervention these re-entries can be specified and modulated.

So, what is at stake in the emergence of the lecture performance between art and science? Lecture performance should not be about improving the performance of scientists as lecturers. Neither should it be about artists making scientific matters understandable and popular through lecture performances. It should be about the part presentation plays within knowledge production itself.

The daily practice of lecturing is subject to change. Why not make these changes a common focus of attention for art and science? Currently many of these changes are related to the web 2.0: On web-2.0-platforms we find huge amounts of lectures documented not as texts but as performances. At the same time the web is becoming a tool for the production of lectures. Online-chats or services like twitter enable audiences to give live-feedback within the lecture-setting; co-lecturers can contribute online to live-lectures; transitions between ‚live-lectures‘ and ‚online-lectures‘ are evolving.

Regarding the lecture as performance artists and scientists together can try to transform lectures into an interactive setting of collective knowledge production.

## **Elegans wormity-humanity Installation**

*Streuli Jürg C. (Universität Zürich, Switzerland)*

*Plangg Cyril (Universität Zürich, Switzerland)*

Sometimes mind and matter are transformed into art or science, through human thought, act and perception.

Interaction between art and science is always a collaborative project where artist, scientist and observer as well, manifest themselves in the product.

There is always a dynamic between the original purpose and the realization process. In realizing parallels within perception and performance, during development of the product, the result will always be unknown, surprising or disappointing.

What if we could break down the barriers between watching and doing something, what if scientists, artists and observers lose their role in the interactive process, lose their vocabulary and their fundamental interest with the evolved identity of the object itself?

The installation

On a 60 x 70 x 1000 cm convex cuboid we present up to 100 LED-illuminated 12 x 17 cm plates of plaster, loaded with one specimen of the famous and fruitful object of science, a 50 to 300  $\mu\text{m}$  worm, *Caenorhabditis Elegans*, with a short text about origin, purpose and death.

Understanding the installation as an axis between product and producer, artist's and scientist's interest reach ultimate performativity.

The worm looks on its humanity - as much as the human observer looks on his wormity.



## **Fixing a sulfurous compound: Science, Technology, Sicily**

*Pedrazzi Michele (University of Trento, Italy)*

In 2009 our studio was commissioned to carry out a new exhibition near Caltanissetta, Sicily. The initial task definition was explicit and concise: we were to design from scratch a small Science and Technology Museum. But what we found on the spot was much more complex than expected, as the museum site was a former *solfatara*, a sulfur mining district that was still open until the 1970s. Our exhibition was to be staged in the premises of a power plant serving the mines. While inspecting the site, stories and memories from the past emerged still alive and poignant, mostly about incredible hard working conditions, with controversial technological equipment.

Is it possible to ignore such circumstances in favor of anonymous science exhibits? As we later understood, official memorials of the mining epos already exist in Sicily, and, above all, our purchasers wanted us to go beyond the commemorative approach. But in the end, as we got fascinated by the context, our exhibition became a hybrid show, in which interactive scientific explorations lived together with documentary audiovisuals and art installations. Quickly, an apt metaphor emerged: a museum like a sulfurous compound, linking different elements ("science, sulfur, society") that interfere and interconnect to each other. How these ingredients should be mixed is a methodological and theoretical challenge, which exceeds exhibition design alone.

*Which facts?* Problems arise when comparing different kind of facts. Science shows present evidences, apparently beyond human mediation. Artistic treatments produce artifacts, with traces of human hand all over them. In the middle of them, documentary audiovisuals can become a sort of glue, adjusting with convenience between the two edges, but also a veil, randomly mystifying the hegemonic rhetoric.

*Which objects?* For us, the most interesting museum findings were technological (for example, three huge electricity generators). Technical objects turned to be more fertile than geological samples, allowing us to disclose complex entanglements behind them, but again posing the problem of an unclear focus.

*Which voice?* After having gathered scientists' remarks, former workers' narratives, artists' commentaries, which was the emerging collective voice? Furthermore, what was our authorial status after, as invisible curators, we actually created the videos, the display panels, the texts?

On March 2010 the exhibition opened. Science, sulfur and society discreetly cohabited, as if a mysterious regime of invisibility interwove all three elements. The dome-like space of the central power plant, where we chose to stage our work, assembled everything under the same roof. Visitors walked around the exhibits, forced to compare different types of representation. The chemical bonds seemed temporarily fixed, hopefully preparing to engage new attractions and repulsions in the cultural practice.

## **Invisible Lines and Parallel Practice: Drawing connections bewteen studio, site and laboratory**

*Casey Sarah (Lancaster University, UK)*

This paper discusses a series of artworks arising from a current research project exploring relationships between the experimental tools and ideas of Art and the investigative procedures of Science. The project responds to both concerns within the drawing research community over disciplinary introspection (Garner 2008) and to what would appear to be a revived interest in collaborative relationships between art and science (Arends 2005, Latour & Weibel 2005, Lyons 2008) within an academic climate of interdisciplinarity and knowledge transfer.

This research has been conducted through strategically focussed collaborative field visits, bringing studio practice into close alignment with scientific enquiry in conservation, archaeology and medicine. Its ultimate intention is to explore if such a methodology, and its outputs, can begin to map 'hidden geographies' (Latour 2005): areas of shared concern between what CP Snow, in his now infamous lecture, would have us believe to be two distinct and incompatible cultures (Snow 1957).

The focus is on drawing, a medium historically intimate with knowledge in the sciences (Versalius, Stubbs, Hooke). The research hinges on the premise: if drawing is now said to have the capacity to mimic commonplace acts of touching (Godfrey 2006) and blur distinctions between art and the everyday (Petherbridge 2006), as a tool of experiment, organisation and analysis, does drawing perform activities which are shared with science in the investigation of the unseen or elusive? Placed in collaborative proximity, how might drawing be able to appropriate contemporary scientific practices (e.g. specimen preparation or x-ray) to extend its own means of experimentation?

This paper specifically focuses on a series of hybrid artworks that have emerged from this inquiry, shown alongside some of the epistemic objects (Rhineberger 1987) generated in this process using these to inform critical discussion of the validity and potential of such a methodology.

## **Producing chimeras - imagine the existential change**

*Badura-Lotter Gisela (Institute of the History, Philosophy and Ethics of Medicine, Ulm University, Germany)*

Since antiquity, the chimera haunts our imagination. Child of the terrible Thyphon with Echidna, the snake-woman, it resembles a mixture between a lion, a goat and a snake (or dragon). However, the original chimera plays a surprisingly marginal role in the ancient myths. Some of its broader representations in arts (especially film, and fine arts) as well as the manifold meanings of the term are the material investigated to approach the question of the significance of human-animal mixtures for our self-understanding and the understanding of the driving forces for the scientific choice of action: producing chimeras.

Within the semantic horizon of the term chimera, it also represents a judgment: A chimera cannot be something real, nor anything that could come into existence. In this sense, it is used, e.g. to disqualify someone's ideas. Producing chimeras is just a wretched attempt to impress others – a chimera is a chimera. In our imagination, however, it is also the representation of a great taboo – the fearful longing to unify the different, to overcome separateness, to become one with the other. The 'métissage' or 'hybridity' with the ultimate other should serve to identify the self in the assumed difference – which shies away the closer we approach.

In my presentation, I will address the significance of different meanings of "becoming an animal", or an animal-human. Pursuing this question, I will follow three mayor lines: Becoming an animal (or humanimal) could be: 1. a relief, a kind of salvation. In the course of dissolving and de-confining human nature, there is a movement of 'becoming one' or, post-modern speaking 'get in the flow' (romantic approach). 2. It could signify a sort of usurpation, to gain power over formerly un-governed nature (modern approach). 3. It could also be seen as a liberation, like in classical psychoanalytic approaches (e.g. in the image of the were-wolf). Furthermore, in all three approaches, one might distinguish different degrees of radicalism in the way, the mixing with the animal is perceived: it could be existential or 'purely' imaginative, say touristic. The visitor thinks he can return to his former state after having tried being another for a short while. It remains to be shown, however, if the little changes that come along with a seemingly save, temporarily 'becoming different' – e.g. when we regard a movie – influence our relation to our body in a persisting manner. By contrast, the radical view sees human nature at stake – to the good or the bad, respectively.

In the scientific approach to human-animal mixtures, it seems that the 'touristic usurpation' approach is predominant: we want to use real animal parts to enhance our possibilities (e.g. to cure diseases or to incorporate desired animal traits via genes or body parts) without crossing the 'dangerous' limits. However, I will argue that there are hints of more existential phantasms underneath scientific action, and that the critical conservative position clearly represents existential fears concerning human nature. Finally, the question is, if the scientific chimera is a chimera.

### **Cancerous (P)arts: art objects as pieces of experience, knowledge and action**

*Noronha Susana (Center for Social Studies, School of Economics, University of Coimbra, Portugal)*

This communication presents a visceral and reflective analysis of twenty four art projects shaped around the feminine experience of breast cancer. Exhibited on the Internet, these creations allow us to follow the multiple uses and meanings accumulated by the art objects between the initial motivations of their creators and the purpose behind their display on public and digital space. Contradicting the simplistic concept that defines art as a representation or reproduction of reality, we'll understand these objects and projects as a constitutive part of experience itself, immersed on the way these women live, understand and take action on cancer. It also redefines art as a form of knowledge and transformative practice, not only as a way to objectify and give personal meaning and form to inner experiences of disease, but also as an emancipative exercise of activism infused with social ambitions.

The essay also seeks to understand the continuities and antagonisms that exist between art, biomedical science and embodied knowledge, looking at their crossing points, hybrid configurations and conceptual conflicts while dealing with breast cancer. Between the unmaking and remaking of breasts, body and life, these female artists shape and activate hybrid and eclectic objects. While some projects can be interpreted as corrosive comments about the technological, pharmacological and relational insufficiencies of biomedical science, others are exercises of dialogue and interchange between the embodied, medical and artistic resources and understandings made possible by the experience and treatment of cancer.

Departing from an epistemological conception of art and a dialogical conception of social science, this investigation also carries the purpose of presenting itself as a product of conversation. Questioning and testing the possibility of a translation between embodied, artistic, anthropological and sociological understandings, it intends to redefine cancer as an external social construct against the notion of its spontaneous, corporal and internal reproduction.

The communication summarizes the results of the monograph winner ex aequo of the "CES Award for Young Social Scientists from Portuguese-speaking Countries 2007" (International and Intercontinental award for the best research project/monograph written by young researchers from any of the countries, of the four Continents (Europe, Africa, America and Asia), having Portuguese as their official language). The resulting book was published in Portuguese (October 2009) by Edicoes Afrontamento.

## Care, Creativity and Consciousness. The Case of Electronic Health Records

*Botin Lars Kørnøv (Aalborg University, Denmark)*

The paper deals with how we could think artistic enterprise as we design electronic health records. (EHR) It is the assumption that representation, communication and visualization within the current editions of EHRs (on a global scale) are based on instrumental and mechanical rationality that reflects the communication and visualization of the professional fields (computer science and medicine). How can art and cultural assessments be of use in order to bridge the gap between professions and clients, making the EHR a meaningful and truly interactive tool for improvement of health and understanding of health?

The paper stresses the importance of Care, Creativity and Consciousness (CCC) as we approach the architecture of EHRs. It is the assumption that the evolution of EHRs during the last three decades is turning evermore a focus on technical, administrative and systemic control, which is of course a vital part of the 'fungibility' of EHRs, but if focus and attention are kept on these controlling, monitoring and survey qualities of the Record then there will be no place or space for care and sparing.

The paper is based on the writings of Martin Heidegger concerning *Building, Dwelling, Thinking* (Heidegger 1977), and the development and critique of these thoughts by Bruno Latour in his recent discussion and writings on *matters of concern*. (Latour 2004)

On the empirical level the paper will analyze and discuss the works of the American artist and civil engineer Natalie Jeremijenko and the Danish art-cooperation Superflex, who both tries to set art and creativity in relation to society and technology. For what concern Superflex this is made through both analogous and digital art-pieces that through interactivity and interdependency make people reflect on justice and democracy. Natalie Jeremijenko on the other hand points in a direction where artistic technological intervention, on various levels, can make things happen in social settings.

It is the assumption that Superflex and Jeremijenko are emblematic representatives of what can be coined as hybrid imagination of technology, where myriads of folds are present as the technology is designed. It is this hybrid imagination that is needed if care, creativity and consciousness (CCC) can have any meaning and impact in the gathering of folds that constitutes a meaningful object. (Latour 2004)

The conclusions of the analyses will be used and applied on hypothetical discussions of what could be made in relation to Electronic Health Records. How do we infuse care, creativity and consciousness (CCC) into a 'machine' that is such an intimate representation of ourselves and of our bodies?

## Bioart Footprints

*Gomes Jorge (Iscte)*

It seems agreed that the relationship between Science and Art has been sufficiently mysterious to the pole "Art": "in bio-art" practices the artist's studio is quickly changed to a "laboratory". The paint and brushes are now computers, human and non-human tissue, DNA and many other things that make the separation of the fields an impossible task and perhaps unnecessary (really?): what is natural vs. artificial or "what is built" and "what is given" seem to conflict with the "romantic" or "modern" idea of what is the "artist". The paper discusses not ethical / moral (eg bio-ethical discourse) and / or aesthetics (eg, the notion of value) issues, but rather reflects on the context of exposure vs. the context of bio-artwork composition. *Who creates "what" in the bio-artwork practices?* Thus, the handling practices of animal life (both human and nonhuman) are discussed through the concepts of "hybrid" and "symmetry" of Bruno Latour and the concept of "network world" from Howard Becker. The discussion will be carried and illustrated from the works of Marcel Duchamp (1887-1968) and Marta de Menezes (portuguese bio-artist) and also supported by the contributions of the anthropologist Viveiros de Castro ("symmetric anthropology"). We thus contribute to a reflection on the practices and objects of bio-art and point at the same time, clues to future theoretical discussion about the relationship between culture and nature.

## **The Dawn of Man: Picturing hominization**

*Gómez-Soriano Rubén (Universidad Autónoma de Madrid, Spain)*

As is well known, in 1968 Stanley Kubrick revolutionized science-fiction films with *2001: A Space Odyssey*. In the first part of the motion picture, which is called *The Dawn of Man*, Kubrick relates the process by which a group of *Australopithecus* becomes *Homo sapiens* through the mastery of tools used against a group of relatives. The ideas that involved the apes achievement of humanity through an educational (e.g. Hobbes' or Rousseau ideas) or evolutionary process (Darwinian-like theories), still remain in some commonplace depictions of hominization and have made its way into novels or films in countless occasions and in different ways. This work is an attempt to explore this issue through the analysis of some films and novels that neatly show ideas and concepts which, although in an exaggerated way, are not that far away from well-known and recognized primatological positions within psychological, anthropological and biological sciences. These examples are also of some use to highlight the boundaries between art products and scientific research or human nature conceptions.

## **Can they be ignored? Publics formation through Climate Change movies**

*Crespo Inês (Joint Research Centre - European Commission)*

*Guimarães Pereira Ângela (Joint Research Centre - European Commission)*

This paper is a contribution to explore alternative tools for science communication, in particular for controversial issues such as climate change, where high stakes, diverse values and politics intertwine with the science produced and communicated to the publics. The perceptions generated and appropriation of the issue by the publics becomes strongly dependent on the content and format of the communication. Given that movies reach millions of people, we find important to explore what publics become formed through these types of mass media entertainment.

We explore climate change movies from different genres. We will focus on the following ones: *An Inconvenient Truth* (Al Gore, 2006) which was defined by the authors as a documentary with scientific evidence for the anthropogenic climate change although it includes stories from Al Gore's personal life; *Home* (Yann Arthus-Bertrand, 2009) a photographic documentary composed of aerial pictures of several places on Earth showing the over-occupation and exploration of resources; and on the science fiction movie *The Day After Tomorrow* (Roland Emmerich, 2004) that includes a warning for climate change. These movies not only belong to different genres but also have different approaches to present the climate change consequences. We evaluate the message they contain, and the image codes they have used; specifically regarding the climate change consequences we explore the different approaches used such as future predictions or present and past reflections, and the plausibility of the scenarios exposed. As method we perform a news analysis for the years of these movies releases of online newspapers from Portugal – the project case study - France – an European country where climate change movies with a broad reach have been produced in 2009 – and UK – that has been presenting the climate change problem with impartiality. The content analysis of the media coverage of these movies helped us to unveil different channels through which these movies were distributed and presented to the publics as well as to explore the perceptions evoked by each genre and message presented. Furthermore, we review the filmmaking processes and their distribution. From the results of this first phase of our analysis emerge that these movies were actually used to introduce debate within the political, public and scientific spheres, efforts being made by some governments of their wide distribution, including events with free movie screenings. So, the function of these movies was well beyond entertainment. We have looked at online press articles, finding differences on how the message was presented in the news with regards to how the movies present climate change and how dependent that was on the movie genre. These facts lead us to reflect on the role climate change movies have as an information and awareness raising tool that cannot be dismissed as it seems to influence perceptions and appropriation of the issue by the publics. The fact that the scientific and political spheres use these movies to debate climate change, together with the producers' efforts to widely distribute them, makes movies a potential powerful tool to influence publics' attitudes towards climate change.



## **Narrative Bioethics: The Role of Fictional Stories in Moral Reasoning**

*Hansen Solveig Lena (Department of Medical Ethics and History of Medicine, Göttingen, Germany)*

**BACKGROUND:** Ever since *Bioethics* has been established in the 1970s and 1980s, narratives have played an important role in it. Students and scientists have been confronted with *illness narratives* and *case studies* to train and show judgement concerning bioethical questions. Moreover, newspaper articles have since been analysed so as to trace and evaluate public debates on bioethical issues. Scholars of the arts and humanities have also interpreted the bioethical dimensions of various artworks and artifacts.

**PROBLEMS:** Still, even if all these various types of research deal with narratives, the fact remains that the manifold relations between ethics and media have as yet not been fully explored. It is still unclear whether the interpreter reads the ethical dimension into the plot, or alternatively, whether it is already to be found in the narration itself or whether even moral reasoning as such should be understood as a narrative. Furthermore, it is debatable whether fictional texts can count as arguments in bioethical debates and whether one may obtain knowledge by reading them.

**TOPICS:** The core of my presentation consists of an analysis of one particular bioethical novel, namely Kazuo Ishiguro's (2005) *Never Let Me Go*, which deals with both organ transplantation and human cloning. This is interesting because the human clone is one of the best examples for *fiction in science*. Indeed its use as human spare parts has been suggested by researches (Lederberg 1963) as well as its real existence has already been announced 30 years ago (Rorvik 1978). But up to the present, the human clone is still fictive in both science and art. Novels about human cloning and organ transplantation, raising questions of autonomy, justice or the worth and essence of the man can therefore in the form of *thought experiments* as well as instruments for *impact assessment* serve the same purpose as scientific research.

**METHODS:** Following the methodology of Genette (1990), I shall first analyse the novel's story. I shall then give an own interpretation and compare my findings with various reviews from scientific journals and public newspapers.

**FINDINGS:** I shall show how reviewers describe and evaluate the *fictive objects* in the novel as *real objects* and accordingly, how the analysis of novels and their reviews can be an analysis of public discourses on bioethical issues. In doing so, I will refer to a theory of fiction building upon studies by analytical philosophers, such as Currie (1990) and Lamarque/Olsen (1994). I shall argue that the fictional status of a work of art does not lie in its inherent features, such as semantic properties or aesthetic style, but instead in the *fictional intention* of the artist, the *fictive stance* of the recipient, and in the fact that a work of art is *communicated as fictional*. I shall propose that fictional media can, at least under certain circumstances, be *true* and therefore can be regarded as a contribution to (moral) reasoning and can be used to gain (bioethical) knowledge.

## **Genomic horizons: mapping the biopolitical implications of genomics with science fiction novels**

*Idema Tom (Radboud University, Centre for Society and Genomics, The Netherlands)*

While many scholars agree that genomics brings forth a range of knowledges and technologies that are biopolitically significant in the sense that they intervene in the production of life itself, be it human, animal, plant, viral, bacterial, or otherwise, the future implications of this research field remain largely unclear. Research in ELSA (Ethical, Legal and Social Aspects) and STS has mainly dealt with existing practices in genomics; the field 'sociology of expectations' has yielded important insights about the expectations, speculations and claims about genomics, but much less about its *implications*. In this paper I argue that by reifying divisions between present realities and expectations about the future, scholars fail to engage with a continuous unfolding potential of genomics, in other words, the ways in which the future is implicated in the present. Thinking in terms of a rift between immediate realities and future expectations often comes with other divisions: between scholarship and genres of imagination, between science and society, as well as between the life sciences and the human sciences. Together, these divisions can obscure the ways in which various forms of scholarship, art, and media are implicated in one another. I want to suggest that to analyse the unfolding potential of genomics is to *become implicated* in its very development by experimentally thinking scientific, theoretical and literary problems together.

In order to develop a conceptual framework for the study of biopolitical implications of genomics (as well as other fields), the concept of horizon, understood as a virtual (non-local) spatio-temporal border, may be of use. Significantly, a horizon is never simply 'here' or 'elsewhere,' 'now' or 'then': its potential animates the past and present in an emergent, cyclic and continuous movement. I will elucidate the concept of horizon by showing its affinity with the notion of 'becoming' developed by philosopher Gilles Deleuze. 'Becoming' also suggests a spatio-temporal mode of bordering or in-betweenness. Thinking the implications genomics as an assemblage of becomings may contribute to the task of detecting and creating productive connections across spatio-temporal, epistemological, cultural, and other dimensions.

Another site where the division between presentism ('let's stick to the here and now') and wild speculation is displaced is *hard science fiction*. Through substantial research, novelists in this genre engage real scientific, social and ethical problems. An excellent example is Octavia Butler's science fiction novel *Dawn* (1989), which deals with genetic engineering and transgenic species in relation to issues of health, race, sexuality and ecology. The strength of this novel, I propose, is its experimental nature: apart from exploring techno-scientific problems that have already crystallized to a certain extent, it elaborates emergent and complex problems existing on the fringes of what we can perceive, imagine and understand. Analysing these 'literary problems' together with problems from philosophical and scientific texts may enrich our understanding of the past and present of genomics and contribute to more sustainable scientific and societal practices in the future.



## **TRACK 2**

# **Design, Performativity, STS**

### **Convenors:**

**Julien McHardy (Lancaster University, UK)**

**Trevor Pinch (Cornell University, USA)**

**Nina Wakeford (Goldsmiths, University of London, UK)**

## **Explorations in Performativity and Enactment: Ethnography and Art as Subjects of Inquiry for STS**

*Balka Ellen (Simon Fraser University)*

As an ethnographer who engages in action oriented STS studies, we perform multiple roles (e.g., that of a researcher, problem solver, fund raiser, planner, designer, etc.). We perform as ethnographers to gain access to our field sites, and in and through those performances we gain access to insights about design, and often may experience the conditions for which we design. At times fieldwork may demand other kinds of performances as well, where access to field sites and legitimacy as a researcher within those field sites may be tied to demonstrating competency in the domains where fieldwork is occurring. Once in the field, we may experience some of the conditions for which a design solution is sought. Hence in several senses, as an ethnographer, our success may depend upon our ability to enact, as well as our ability to negotiate material realities, and to perform varied roles.

To be a successful artist requires, arguably, interactions with what Becker has called artworlds. Being an artist requires making art, but also performing artist in artworlds \getting work into shows and galleries, going to gallery openings, etc. Producing art requires an awareness of affordances and constraints of materials, engagement with those materials, and performance or enactment as artist. Affordances and constraints of the materials of artistic production are learned through processes of enactment, and the representations we create as artists are explicitly brought into a world where we recognize some aspects of their performative character. Implicit in our creation of art are notions of representation (or abstraction), audience, reception and interpretation \concepts which may or may not be explicitly present in the minds of designers or STS scholars as they carry out their work.

In this paper/ presentation, I reflect on two quite different ethnographic projects in order to explore notions of performativity and enactment as they relate to the performance or achievement of technological systems. Through analysis of an action oriented STS project that has as its focus the improvement of data collection during pre-hospital emergency care, I explore notions of enactment and performativity in relation to our roles as ethnographers in design situations. I use reflections on my own participation in art worlds, which I have increasingly approached as both an ethnographer and as an artist, to further explore notions of enactment and performativity through exploration of the creation of art as a subject of study within STS.

Through narrative and image, I consider several questions, including:

- what insights can be gained by thinking about performativity in relation to art?
- can these insights be useful as we think about our roles as interventionist STS scholars?
- can notions of performativity which emerge from engagement with artistic practice enhance our understanding of the role of materials and representations in performing the social in our work as STS scholars?

## Rehearsing the future

*Binder Thomas (The Danish Design School, Denmark)*

Two older women, Lillian and Ulla are cordially hugging Allan, the owner of a hardware store in the Copenhagen suburb. We are in the middle of the store on a thursday morning. We are a mixed group of researchers, designers, local caretakers and employees from the municipality gathered all around the three people, who have now moved to a cardboard box decorated with tape and markers to fake a new in-shop recycling station for batteries. We have been together in different constellation many times over the last two months. Now we are here to bring it all together in a number of small videos about a future of better recycling. Lillian has brought batteries from her apartment and Allan tells her about the discount he offers in return for the used batteries. The tone is getting more serious as he has to show her how to wipe her credit card over the imaginary card reader. As she gets it right they relax and finish off with a sign to the camera man. We applaud and everyone are all smiles.

This small vignette is an attempt to convey one among many key moments where the committed work of designers and non-designers to envision new systems or new things seem to reach a sense of completion. An account of a possible future everyday has been made and the story may now travel in the networks of those who took part or in screenings of the video that the researchers recorded. But what is it that has been produced and what kind of a performance is it that the three actors have been part of?

There is a very specific genealogy to the methodology brought into play by the participating researchers. Since the 1980'ties participatory design has been a strong current in mainly Scandinavian systems design. Designers and non-designers have engaged collaboratively in the prototyping of new systems in what Ehn with a loan from Wittgenstein has called a meeting of language games. Influences from anthropology, STS and ethnomethodology have been appropriated through a concern for everyday innovation and a growing awareness that everyday practices are not only a resource but also an emergent outcome of design collaboration.

What is however left largely untouched in this genealogy is how a collaborative design practice gets established in the first place and what status to attach to what is performed in this practice. Taking cues from recent research that address these issues we suggest to employ a performance theory perspective to collaborative design, and we will in this presentation argue that the collaborative enactment of scenarios such as in the opening vignette can be seen as rehearsals in a long chain of transformative preformances. We will further propose that the particularity and the non-representational character of what is rehearsed in such subjunctively completed accounts is precisely what makes them strong and convincing as design proposals.

## **Designing respectful distances: or can a coffee table change the world?**

*Charalampia Kerasidou (Lancaster University, UK)*

Interestingly, the beginning of the 21st century has been a particularly good time for coffee tables. But coffee tables with a computational twist and ambition. This paper will be looking at two of these objects which have originated from a particular interest in academic and industrial circles on the ways the digital and the physical can be brought together; that is the Microsoft Surface, and the Drift Table designed and prototyped by the Interaction Research Studio at Goldsmiths College, University of London. Admittedly, my focus on these two objects will not be even nor innocent, for that matter. Instead, I will focus on the Drift Table using the Microsoft Surface as the other against which my main performance will take place. Drawing from materials, representations, prototypes, demos and publications and weaving them with theoretical reflections coming from the feminist STS literature, I read the Drift Table performance as a good example of design as a human-machine reconfiguration (Suchman 2007). A simple material artefact that reifies a reconceptualisation of the social and the material and the boundary between them (Suchman 2007: 259) challenging the traditional oppositions of designer-user, human-machine, expert-layman without, at the same time, erasing (or better, seeking to erase) their differences. This paper seeks to argue that the Drift Table not only is a sociomaterial assemblage, as the work of the STS and technoscience theorists have taught us, but, unlike the Microsoft Surface, it is designed, performed and celebrated as such furthering the argument that such a shift in design matters since it has real and identifiable effects on the material object itself.

Finally, I propose the concept of respectful distances as a way of (re)thinking human-machine intra-actions (Barad 2007). By respectful I mean that each actor/agent participating in each intra-action is given space to manifest his/her/its agency in each intra-action without anyone or anything being privileged or silenced. I take a respectful distance to be a positioning that renders all the participants equal, that is, not equivalent or symmetrical, but equal through their diversity.

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## Performing Domestic Temporalities

*Drazin Adam (Trinity College Dublin, Ireland)*

It has been a long-standing truism in anthropology that objects have social lives, and temporality. However, much research methodologies, through focussing on spoken aspects of conscious meaning, the performance of bodily practices (as against static environments), and historical memory and remembering, have not managed to unlock senses of change in the material world, especially the domestic material world. This is a problem in approaches to ageing, in which the reification of the home as a locus of living out a category of lifestyle is difficult to unpack. Performative methods are potentially one way to challenge (Dunne) the apparent contemporaneity of objects and homes, and develop their potential as temporal vectors.

This paper presents collaborative ethnographic research conducted with Intel Digital Health Group, which aimed to inform design and engineering work to support independent living in later life. An initial stage of the research aimed to develop a traditional ethnographic perspective on informants' domestic lives, routines, and values, to inform and critique technological design work. A second phase of the research deployed a range of artistic and performative approaches which aimed to achieve insight into different informants' situations. Some work aimed to develop an understanding of multiple senses of temporality in the home. Rather than ask what informants' plans or intentions were with regard to different rooms and objects, we asked informants to place coloured labels on elements of the home which were seen as transient, long-term or permanent fixtures. Through this exercise, the research intended to develop an understanding of which elements of the home might be seen as appropriate locales for a changing design input, expanding notions of user-as-designer; so as to question the potentially problematic relationship with design and change mediated by the home, and characterise the temporal changes associated with design as routinised or routine rather than the fragmentation of a modernist moment.

This performatic approach draws on notions of affect, and suggests a spatiality of feeling within the home (Thrift). In its implementation, it proves very problematic in a number of ways (Dilley), and provides a space for thinking about the role of performative methodologies in design ethnography work. Invariably read as texts, or temporal maps, the performances we evoked suggest representations without having referents. In some senses, an engaged anthropology presumes that informants, and their material worlds, will be affected by design and institutions engaged in design; and there is a need to engage collaboratively more closely in ethnographic practice. The design exercise involves the suggestion of and delineation of voids in social life, characterised as needs or 'design spaces', which is to say not spaces at all. The characterisation of the material forms of ageing homes in terms of temporal flows still risks ascribing such voids within social life and experience.

## **Leavening objects: dispositional performativity and subtractive design in social housing projects**

*Farías Ignacio (Social Science Research Center Berlin, Germany)*

Since 2001 the Chilean architectural 'do-tank' Elemental has been designing and building social housing projects. These projects are based on the idea that the best investment governments can make on the area of housing provision for low-income population is to build half (or the core) of a good house rather than a finished house of a lesser standard, in the understanding that the rest of the house will be completed by its owners. Accordingly, in each of the more than 20 projects built so far, central design decisions have been concerned with, first, which half of the housing units should be built and, second, how that half relates to the unbuilt one. Elemental proposes two answers: "we build the half that users cannot build" and "each unit has the DNA of a middle-class home". Thus, Elemental social housing projects radically challenge the ontological status of architectural objects and raise questions about the performative nature of designed objects.

Relying on ethnographic research at Elemental and STS literature, I will address three related questions: (1) How can the built halves of the homes be understood as objects? (2) How, once built, do they perform the 'worlds' inscribed in their design? (3) What kind of design processes are required to produce one half effectively?

(1) The built housing units (or rather halves) rely on a vast network of heterogeneous elements which, aside from construction materials, transportation, electricity or sewage infrastructures, also involve policy instruments, urban location, community participation, future investments, etc. In that the assemblage of these heterogeneous elements varies from site to site, the housing units might be understood as fluid objects, that is, as being capable of maintaining their identity despite (or actually because) of their fluid local adaptability. But Elemental housing units depend on fluid relations so as not to remain the same, but rather to materially expand, to transform their identity and increase their value. In order to grasp these fluid but developmental dynamics, I propose understanding Elemental social housing projects as 'leavening objects' or agents which, when introduced into larger networks of elements, become capable of triggering processes of expansion and growth, which might end up altering or transforming the nature of the whole assemblage.

(2) Now, taking Elemental's metaphor regarding the middle-class DNA of these homes seriously, I would suggest that leavening objects rely on a form of 'dispositional performativity'. Dispositions define inscribed tendencies towards the actualization of sets of practices and processes. Now, the performative character of non-human dispositions relies on the fact that these are not given, but designed, as the etymological roots of disposition (dis-ponere "to set in different places") suggest. Elemental housing units indeed involve from a careful arrangement of elements, ie., a design process, aimed at the production of a whole world. The notion of 'dispositional performativity' thus allows us to understand how architectural designs and spatial arrangements contribute to the actualization of not-yet existing 'worlds'.

Interestingly, designing leavening objects therefore involves a distributed process of 'subtractive design'. In most cases design processes involve the active participation of future users. However, this participation is not simply aimed at adding more perspectives, but rather at identifying the minimal set of core elements that housing units (or rather halves) at a certain place and time need to have, in order to acquire these leavening or performative effects.



## **Cultural Archaeology of Concrete**

*Gafijczuk Dariusz (Lancaster University, UK)*

The paper looks at the materiality and the technology of concrete as construction material, from the perspective of its techno-social history. Just as iron was the defining element of the 19th century, nothing defines architecture and the urban spaces of the 20th century more than its many concrete paths and enclosures, which stand out against the urban environment like 'polished solitudes' (Valery). In one sense, one could say that concrete was to social landscapes in the 20th century what the ego was to the psyche – a defining element.

In a collaborative effort, the paper will examine the theory and visibility of concrete aiming to capture its diverse material and social textures in their interactive or performative reality. It attempts to do so, by stylistically treating these textures as 'inhabited ruins'. The latter concept comes from the theory of aesthetic perception introduced by the sociologist Georg Simmel at the turn of the last century. It is a space of transitions and suspended tensions, of material decay but also stability that according to Simmel, express a genuine moment of lived, bio-material and cultural harmony: "The ruin creates a present form of a past life not according to the contents or remnants of that life, but according to its past as such...with its extreme intensification and fulfilment of the present form of the past [there is] no longer any sharp division between perception and thought" (Simmel).

We argue that such an evacuation of the division between thought and perception is precisely where the moment of enactment rather than description of the social through materiality takes place. That moment speaks through an aesthetics of disappearance, where "the pursuit of form is only a technical pursuit of time" (Virilio).

Building on this foundation, the practical space of exploration becomes the present day city of Montreal, Canada, and a photography project that explores concrete as a canvas on which an exhibition of misplaced objects is on temporary display. We focus on their hesitant acts of disappearance, which create "the present form of a past life" that each object is now able to express openly.

It is in this relationship between concrete and the ruins of mislaid objects where we will look for an object-based agency which, loosened from the restraints of an overly psychologised focus, offers crisp insights into a host of contemporary socio-cultural interactions. It is Latour's notion of network-actor theory that provides the impetus for such an arrival. For, "the meandering path through which most of the ingredients of action reach any given interaction is traced by the multiplication, enrolment, and folding of non-human actors" (Latour).

## **What Can Design Learn from Improvisation: RePlay Exploring Creative Process**

*Gongora Layda (Lancaster University, UK)*

The use of improvisation in the creative process as a type of body storming is an area that has shown potential in terms of exploring co-creation, collaboration, creativity and embodiment. Similar to sketching improvisation can be utilized in the early conceptual stages and perhaps later in the design process. Through a brief literature review of how improvisation is used in both academic as well as applied industrial settings theoretical underpinnings are explored. Examples from IDEO are considered as well as others (Simsarian 2003; Brandt 2006). As a backdrop for this type of research the work of Keith Sawyer who has researched for a number of years how improvisation impacts the creative process in both theatre, jazz improvisation as well as other cross- disciplinary industrial settings is also considered. Examples are also taken from HCI in which improvisation functions as a kind of participatory design methodology (Carroll, Tobin, 2007).

The contribution of this research is to reflect on a series of visual mapping exercises conducted in Eindhoven at Philips research where by participants discussed their design process and the use of role play as well as other methods as part of the design process. The paper also reflects upon an initial pilot study involving young Improv actors testing out a technique of improvisation that encourages reflection, divergent thinking, context as well as scenario building called RePLay. RePlay utilizes improvisation as well as engages participants in a reflection regarding the dynamics of their collaborative creative process. This type of research approach facilitates not only the exploration of improvisation as a design method but also allows one to document the creative process as action based research. The impetus for this type of enquiry is based upon a phenomenological approach to studying creative processes where by one looks for descriptors and variables as opposed to formulas regarding the creative process.

## **Shifting Agencies: Toward an STS Method Assemblage for Performative Scenography**

*Grand Simon (RISE Management Research, University of St. Gallen & Institute for Design and Art Research, Basel, Switzerland)*

*von Arx Serge (Norwegian Theatre Academy & Stadtgestalt, Berlin, Germany)*

**Main Idea:** In such diverse areas as theatre and acting, exhibition design, dance performance, music and composing, architecture, and art, we observe the emergence of multiple new hybrid approaches, which are difficult to categorize: Peter Brook is talking of "recherches théâtrales" in his experimental exploration of Oliver Sacks, William Forsythe is exploring the human rights in a performative dance installation, Anna Viebrock is exhibiting her theatre scenography in an architecture museum, Heiner Goebbels is composing a music-theatre performance enacted by a machine, Robert Wilson is working in, on, with his international, multi-disciplinary Watermill Center. In our contribution, we will explore the processuality and heterogeneity of such "performative scenographies", by assembling approaches and methods from the science and technology studies, architecture, performance and scenography.

**Purpose:** Thereby, we particularly focus on what we learn about "agency" in such contexts, meaning that instead of pre-assuming that agency is "inherently" and "naturally" with the performing actor on a passive stage, supported by materialized artifacts, we describe and explore how agency is shifting and moving between light and space, artifacts and actors, machines and audiences, sound and images.

**Theoretical Background:** We benefit from new perspectives on agency in the science and technology studies, and in particular in actor-network theory (after having been recalled Latour 2005), current research in the area of scenography and performance, in relation to architecture-related approaches to theatre and exhibition design, leading to new method assemblages (Law 2004).

**Research Gap:** On the one hand, we contribute to the current interest of the science and technology studies to move into new empirical contexts, studying performative scenography as an experimental system (Rheinberger 1997); on the other hand, we contribute to the recent debates in scenography, exploring possible languages to describe and analyze new emerging creative processes and formats.

**Approach:** Our contribution studies two performative scenographies by Serge von Arx, one related to his long-standing collaboration as stage designer with Robert Wilson, the other related to his work as an independent performative scenographer. Thereby, we explore the creation process of these two projects as evolving from and being enacted and shaped by an experimental system.

**Analytical Methods:** We work with a method assemblage, linking ethnographic approaches (including visual ethnography) with performative approaches (by actually building and using the experimental system), as well as relating the creation process of these performative scenographies with their actual performance "on stage", thus studying the translation processes between the two.

**Main Findings:** We describe the multiple ways in which agency is moving in the creation process from sketches to models, simulation technologies to space, rehearsing actors to artifacts (and how an artistic experimental system enacts and shapes those processes), as well as the heterogeneous strategies used to make agency shifting in the final performance.

## **Researching experience: engineering 'synergetic prosperity'**

*Gunnarsdóttir Kristrún (CESAGen, Lancaster University, UK)*

*Arribas-Ayllon Michael (CESAGen, Cardiff University, UK)*

This paper is based on research undertaken by partners to the EU-FP7 project, ICTethics. We review the current role of experience research in design, development and deployment of embedded and socially intelligent computing, and suggest a programme of enquiry and participation. The European vision for Ambient Intelligence (Aml), developed in the late 90s, came under scrutiny during the first decade of this century. In particular, critiques by ELSA researchers in Europe have been aimed at "Scenarios for Ambient Intelligence in 2010" and other work of the Information Society Technologies Advisory Group (ISTAG) at the European Commission, manifesting Aml research perspectives and paradigms. While the scenarios served an important strategic purpose of identifying necessary research and development in order to make Aml 'technically' possible, Aml visionaries and research leaders have accepted that the social-cultural contents of the 90s vision failed to be realistic, let alone acceptable. Our point of departure in this paper, are the new Aml perspectives and paradigms that still stand to be tried. The early vision argued for interactive environments that should be unobtrusive and supportive from an end-user perspective but their prominent purpose, as stated by visionaries, was to increase effectiveness and productivity. The requirements of unobtrusiveness and support remain, however, there has been a shift of purpose towards supporting care, well-being, creativity and social connectedness. We take a look at the concepts used by Aml visionaries and research leaders, in particular concepts associated with a vision of truly user-centred approach to design by way of experience research which, the visionaries suggest, will lead to synergetic prosperity. Rather than asking what experience research can or cannot realise in terms of acceptability and reception, we examine its premise as articulated by engineers. We review what they tell us about design for everyday sociality, how they construct venues for semi-realistic experiences, and what they expect from interdisciplinary teamwork, involving psychologists, anthropologists and the creative industries. We review their arguments, who works in their experience labs, and what they anticipate to discover about social intelligence, social connectedness and other phenomena of current interest among Aml researchers. Finally, we explore what the role of STS and ELSA researchers could be in experience research. We suggest an approach to enquiry and participation which coincides with the key objective of the ICTethics project to develop embedded and operational participation within the Aml research community.

## **How to engage users in design? On the construction of use and users being decentred and framed by institutions**

*Jørgensen Ulrik (Technical University of Denmark)*

User driven innovation, co-creation and user involvement are emphasised in contemporary discussion on approaches to design. This paper will present the challenges and experiences from a Danish innovation project supporting the creation of healing staff and patient environments at hospitals using new types of textiles for hospital rooms and interiors.

One of the crucial observations from the project is that the different core and intermediary users involved in hospital planning and operations including patients are all characterised by a varying degree of decentred role in relation to the core aim of the hospitals of being a medical treatment facility (machine and organism). When broadening the scope to focus not only on 'cure' but also 'care' by offering an environment that supports patients healing and staff support new designs are demanded. From the discussions of evidence based medicine, architecture and design a lot of rather particular and specialised arguments are presented to argue for the role of patient environments in the process of healing, but the translation of these into robust design strategies is quite difficult and contested. This process is framed by the already existing knowledge and the taken for granted rationales for e.g. hygiene and cleaning practices as well as for the assessments of materials used. This framing also defines how different professional user groups consider their role and contribute to the overall process at hospitals and does at the end lead to a loss of core insights which could have been used to redesign hospitals and produce innovative new materials and procedures. The framing of knowledge and reproduction of existing rationales is closely related to a crucial decentring of the groups of users produced by the institutionalised hospital hierarchy and the resulting stylised parts the groups play. The design challenge is not only to get a variety of users involved in the design process but also to create situations in which they can take up new perspectives and leave aside their established and framed practices. Experiences from organising design laboratories engaging different groups of users in design games, experiencing stories and working with scenarios will be presented together with a framework to analyse the positions and framings of users to be involved.

## One Night With Rats in the Service of Art

*Kimbell Lucy (Saïd Business School, Oxford, UK)*

This contribution to the conference will take Performing Domestic Temporalities the form of a performance lecture, a format from contemporary art practice that mimics, but often undermines the conventional academic lecture or paper. Through this live event I will present an account of my attempt to explore two contemporary domains in which rats and humans encounter one another in the mundane practices of fancy rat shows and scientific laboratories. The work began when I conceived of a new gallery piece involving live rats, the Rat Evaluated Artwork or REA. Over around 18 months I did research into rats in order to try to make this piece, visiting several laboratories in which rats are used, and also many rat shows which resemble dog and cat shows. Conceived of as research through arts practice, this study took the form of an aesthetic enquiry by the artist-researcher in which not-knowing became an important resource, rather than any claims to knowledge.

Having given up trying to make the REA, this research – if this is what it was – culminated in a one-day live art event that I designed and organised at a London venue in 2005. Attended by 50 rats and 450 people, the Rat Fair re-assembled key artefacts and practices from both domains studied and brought people and rats into different ways of encountering one another in the flesh. Key artefacts included: RoboRat racing; Rat face painting; A T-maze for memory testing; A rat beauty parlour including nail clipping, and The world premier of the "Is Your Rat an Artist?" assemblage in which rats/humans/software created drawings, of which one was picked to be the winner.

Throughout this research, questions of ethics and aesthetics were held in tension. The research process and resulting event foregrounded the politics of working, playing and experimenting with animals. As kind of live experiment, the event offered an example of how (not) to go about conducting an aesthetic enquiry, which will be of interest to scholars resisting claims attempts to legitimize research by adopting the natural sciences as a model of knowledge production.

## **It's the making that matters: Performing (im)possible futures**

*McHardy Julien (Lancaster University, UK)*

*Jungnickel Katrina (University of East London, UK)*

Making processes are alive with mess. They are rich material, social, physical and imaginative investments in multiple future ways of being. This paper focuses on the dynamic nature of making to explore how (im)possible futures are opened up, negotiated and contained in the making of things. It questions how it is that such performances simultaneously transcend and are limited by the specific and multiple conditions of their production. To do this, it dually explores the performative in the production of technological innovation and in the presentation of sociological knowledge.

Within STS there is a growing concern with the multiple and messy processes of becoming and how it is that some realities become foregrounded at the cost of others. Law (2004) most prominently has written about mess in social research, Mol (2002) tells stories in parallel and Thrift (2007) draws on the Deleuzian (1994) tradition of non-representation..The methods explored by these writers who are concerned in their different ways with modes of becoming break mess down into boxes, multiple voices, lists and modes of justification \ they circle in on mess but they do not do mess. It might well be that these rhetoric devices demarcate the limits of sociological writing but this paper deliberately sets out to explore in how far a conference presentation can accommodate the mess in-between the boxes, and thus to challenge what it means to represent it sociologically.

This paper examines the tensions between messy becomings and necessarily stabilised representations. It draws on the organisation and documentation of a freakbike making and riding workshop in Manchester, set up as an ethnographic intervention that will be co-performed and observed by the authors. Freakbikes are reinvigorated rubbish. Discarded and abandoned bikes are rescued, dismantled, rebuilt and crafted into new and fantastic human powered future visions that deliberately challenge the very nature of cycling and the possibilities of the body in motion.

This investigation will explore how far you can push the idea that sociological enquiries make a difference to their subject (Mol 1996). It does this through (1) the building and riding of freakbikes as experimental performances that create and restrict possible future assemblies and (2) the ways in which the multiple emerging realities involved in such processes can be represented (through the very performance of this paper at EASST).

The second part of the experiment, which is explicitly concerned with the possibility of non-representation (Deleuze 1994; Thrift 2007) and many-voiced modes of presenting (Mol 2002; Watts 2008) consist of an installation at the EASST conference. Featuring selected freakbikes and a pedal-powered video projection, the installation will invite the audience to take part in the re-enactment of the freakbike workshop and ride. In many respects, the paper will be made in the moment of its enactment as a performative experiment.

## **Dealing with Mess – (De)Stabilizing Performances**

*Passoth Jan-H. (University of Bielefeld, Germany)*

Social Practice is a mess! Although some of it seem ordered and regulated sometimes (by a habitus, a normative proposal or by an apparatus of dispositives), recent approaches to non-representational and „messy“ approaches to social and collective practice highlight that even this regulations are always instable, unfixed and ready to break down. And they stress that exactly because of this catastrophe, failure and things going terribly wrong are far more common phenomena than usually expected. It seems that this double characteristic of social practices has to be worked out in more detail: practices are ordered and messy, they enactments they produce are non-representational patterns and including the impression that they represent. How can STS deal with this double characteristic?

In this paper I argue that one way of trying to deal with this is to start with sociological practice theory and extend it with a focus on symmetry. With such an operational, relational and material view on "the social", one can understand "practices" as the basic unit of social phenomena that are materially realized, relational (to other practices) structured and unstably established, reestablished and changed in an ongoing and ever open process of temporal unfolding. In short: practices are enacted nexuses of material activity (and passivity), agency without actors, assemblages of bodies and things. Sociological research with this shifts from analyzing practices as specific doings (and sayings as doings) as in the various classical practice theories from Bourdieu to Ethnomethodology to analyzing practices as the performance of attempt, projects or techniques to stabilize and destabilize various heterogeneous relations. Machines, techniques, algorithms, buildings, settings, streets, books, speeches and pictures can be understood as such performances of stabilizations and destabilizations of practice, different forms of projects of making volatile relations between bodies and things more and less durable. Doings and sayings are therefore no longer what actors do or say but established, reestablished and ever shifting forms of temporary stable relations.

The proposed paper therefore argues in three steps: in a first part the problem of order and mess is outlined in detail and its consequences for theory and research. In the main part I in a second step draw on findings from two ongoing ethnographic research projects on Internet Standards land on Content Recommending Systems for visual and audio data to show how this problem of order and mess is not only a problem for theory, but also a, if not the most pressing problem for enacting the practices we try to analyze. In the case of RSS for example (an Internet Standard for Content Syndication) various attempts to stabilize the practice of real-time content distribution failed, not because they were badly planned, but because they (and other attempts) succeeded. In a third concluding step at last I try to outline some of the conceptual consequences of these findings building on the concept of practice I outlined above.



## **Affective Urbanism – How the camera lens performs urban reality**

*Samson Kristine (Department of Environmental, Social and Spatial Change, Roskilde Universit / JUULFROST Architects, Denmark)*

In recent planning and urban design, there has been a shift in perspective from a functionalistic to a performative approach. Thus urban space has increasingly become a stage where the social performs and enacts their perspective of the city. Thus affects (Thrift: 2008) and urban assemblages (Fariás & Bender 2010) have become new spatial forms relying on the mediation between the aesthetics of space and the social enactments of it.

In recent urban design, we see examples of how designers in close cooperation with communications officers design for this kind of affective urbanism (Andersen & Holden: 2008).

Through a spatial analysis of the Highline Park in Chelsea New York I will show how urban space is framed, assembled and enacted. The design by urban designers Diller Scofidio + Renfro frames and assembles urbanity in certain ways. For instance in the 10<sup>th</sup> ave plaza which literally attracts the visitor's attention through a iron frame installed over the traffic flows of 10<sup>th</sup> ave.

But the framing of space is twofold: On the one hand, by designing frameworks and by using performative aesthetics, the designers have created an urban space for visitors to engage with. On the other hand, visitors influence and reassemble these urban spaces for instance by using photography to reframe the designed space.

I will discuss what is being mediated through the framing of urban space. If, as I suggest, the city is already being mediated and strategically communicated in the design, the visitor's enactments show how design affects the collective urban imaginary. But it also shows how the collective urban imaginary counteracts to the way the city is being framed through design.

The Highline is in many ways a hyper-mediated site. And it was even before its opening in June 2009. The highly mediating Highline design is thus a thought-provokingly example of how aesthetics and politics of design increasingly are embedded in the city in an affective urbanism.

Methodologically, I tend to perform an aesthetical analysis using own visual material and other visitor's visual enactments of The Highline found on youtube, Flickr and on the Friends of the Highline homepage.

Thus haptic and visual methodologies (Crang: 2003, Rose: 2007, 2003) will be combined with aesthetical spatial analysis (Oxvig & Bek 1997.) Showing, rather than telling I hope to illustrate that you may not be able to separate the dancer from the dance, the media from what is being mediated. Which may be exactly how an affective urbanism works.

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On the design process: [http://www.youtube.com/watch?v=9o\\_5cbPDQoY&feature=related](http://www.youtube.com/watch?v=9o_5cbPDQoY&feature=related)

Video framings of the Highline <http://www.thehighline.org/galleries/videos>

Visitor's framing of the Highline: <http://www.flickr.com/groups/friendsofthehighline/pool/>

**Telecare installations: when installing “devices” entails “installing users”**

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*López Daniel (Universitat Oberta de Catalunya, Spain)*

Some telecare managers' commonplace depictions of their devices' installations picture those processes as "mere" technical procedures. 'There is nothing special about them', we might hear them say, 'you just have to go to the dwelling of the older person who has asked for it and place the device, and that's all'. From that moment on telecare will be working. Of course there are problems, but nothing that cannot be solved.

Nevertheless, after having shadowed different telecare technicians performing installations in Madrid and Barcelona for a few months, we could argue that a different story must be told: installations can –and they do- become very messy activities in which a lot of very important things are at stake. In fact, through some ethnographic examples of those processes, in this paper we would like to show that a lot of things had to be shaped, negotiated and configured in the installation settings we observed: from the very bureaucratic shape of the 'end user' to his or her material entanglements with the dwelling and the features (quantity, quality, frequency) of the care-bonds.

We would like to show how telecare installations could be accounted as performances where very specific socio-material arrangements are put in place through which 'users', 'dwellings' and 'care-bonds' are being configured in very specific ways.

## **Improvisation practices in a Living Lab-setting**

*Sauer Sabrina (Twente University, The Netherlands)*

In order to better understand the relationship between users and technological artefacts so as to enhance ICT innovation, Living Laboratories have been set up. Living Laboratories facilitate a setting that affords "experimentation environments in which technology is given shape in real life context and in which (end) users are considered co-producers" (Ballon, Pierson & Delaere, 2005:13).

In a Living Lab, design takes place across different settings. The "laboratory" as such is extended and becomes subjected to the "vagueness" of daily life. In addition to this, Living Labs promise to include "real" users in a co-creative manner. In terms of actor network theory, this suggests that users are to become "co-writers" of technological scripts (Akrich, 1992). Including users in design is not a new practice. The call to focus on situated innovation echoes Suchman's ideas on situated action and plans; "the vagueness of plans is ideally suited to the fact that the detail of intent and action must be contingent on the circumstantial and interactional particulars of actual situations" (Suchman, 2006: 183).

Added to the ideas on performance, and the vagueness of plans, is the concept of improvisation (Montuori, 2003). To what extent do Living Lab-practices afford users to improvise uses of technologies; what kind of co-scription methods are facilitated and what kind of roles are enacted by users in Living Labs?

This paper concentrates on the empirical findings of qualitative research that has been carried out in a project facilitated by Amsterdam Living Lab, namely the Fabrication Laboratory (FabLab) project. In FabLabs, users/citizens have access to high tech machines to "make almost anything". Citizens are positioned as designers in the context of the FabLab; machines are used to create a material artefact and blue prints are collectively shared in an online database. According to MIT's Neil Gershenfeld, FabLabs provide the next step after the digital revolution: that of personal fabrication.

The main question that the paper deals with is how FabLabs allow room for messy improvisation, who the real life users of FabLabs are and what the empirical findings suggest in terms of the material relationships enacted by users/citizens and technological artefacts. On the conceptual level, the empirical findings inform and interrogate the use that can be made of the idea of "improvisation" with technological scripts. Does the term oversimplify the complexity of design practices, or does this proposed turn to the "theatrical" provide an adequate handle to translate "messiness" into a framed enactment?

## Enacting the Social through Mobile Lighting

*Seitinger Susanne (Smart Cities, MIT Media lab)*

In many Western cities, we take regular street lighting for granted. We assume that the most appropriate form of urban illumination consists of lights mounted on regularly spaced posts. This configuration dates back to the late 17th century when the first broad attempts were made in Western Europe to illuminate city streets. (Schivelbusch 1988) Though some ancient cities do record oil lamps (Antioch in 4AD) or gas lighting (Cordoba in 15th century), the wide-spread adoption and acceptance of a fixed-in-place public street lighting infrastructure did not take hold until the 18th and 19th centuries. Instead, people carried lanterns of all sorts to light their way and make their presence known. Schivelbusch (1988) compellingly describes how lanterns served both as illumination and more importantly as communication. Carrying a lantern signaled to others that one was legitimately moving about the city at night. This view on a historical moment before brightly lit urban environments reminds us of the ephemeral and temporally-bound nature of nighttime and mobile illumination devices. This exploration attempts to take seriously the proposition of mobile lighting in the city today to recapture some of the dynamic and performative aspects of an earlier era. The aim is not to recreate a dark city, but to explore how illumination allows people to shape their experience of social, public spaces. The paper juxtaposes an analysis of existing hand-held lighting artifacts with a design exploration of hand-held mobile lights called "light bodies" (Seitinger, Taub, Taylor 2010) and subsequent design iterations for evocative hand-held lighting devices.

After a brief historical introduction, I first analyze a series of existing mobile lighting artifacts. Some of these are off-the-grid lighting devices such as new types of solar-lanterns. In many developing country contexts, these lights are the primary source of indoor and outdoor illumination. I also describe cases when we use mobile phones for illumination as individuals (for example, to find something) or as groups (for example, at large concerts). How do these uses enact different social settings through and with illumination devices? What type of performative public space arises from the use of the mobile lights?

The second half of the paper juxtaposes the existing lights with design explorations of mobile, hand-held lighting artifacts. I reflect on a design project called "light bodies" (Seitinger, Taub, Taylor 2010) which evolved into a series of hand-held illumination objects for the urban public space. Light bodies are responsive hand-held lighting devices that were designed as ambient light props for a series of performances. (Seitinger, Taub, Taylor 2010) The units modulate the color and intensity of their light based on vibration as well as different audio frequencies. I reflect on the tension between designing for scripted performance, ad-hoc performance and enactments in public space.

**Healthcare technology: tracking, expertise and scripts. Researchers, families and physicians on the definition of epileptic seizure**

*Soler Julien (CEA-Leti, LITUS/Université de Grenoble, Laboratoire PACTE, France)*

*Trompette Pascale (Université de Grenoble, Laboratoire PACTE, France)*

This paper stems from a sociological research conducted in a scientific and technological centre, especially within laboratories working on microelectronics technical systems developments. It is concerned about how emerging technologies, more precisely in the field of monitoring and wearable devices, lead to new interactions between human being and the socio-technical environment. In this paper, we focus on a healthcare technology worn on the body. We have investigated an experimental situation developed by engineers: a device for epileptic seizures detection. As part of a wider project run by a parents association which targets the opening of a socio-medical institution, the aim of this technology is to provide epilepsy sufferers autonomy and intimacy. For the researchers, the objective is to transfer a technological device initially designed for medical applications to the field of healthcare, taking into account the daily life with epilepsy rather than the activity of medical diagnosis.

The investigation focuses on the technological device experimentation carried out in the epileptic person residence. Testing the system first on the family environment brings together different types of expertise collaborating to improve the seizure detection algorithm. Referring to pragmatic approaches, we suggest analysing this activity through a symmetrical conceptualization of "sensor": it qualifies parent's experiential expertise – the ability of detecting seizures by perceptive "grasps" [2] – as the technological system's measurements built on body motor classifications. The analysis develops a micro-sociology of interactions between engineers and families in their confrontation about the heterogeneous measurements and detections. We observe how the technology emerges as a crossroads of expertise by producing multiple definitions [4] of epileptic seizures. As a debate emerges, it reveals the seizure as an elusive object [3]. Stakeholders produce tracks that sometimes coincide and feed the algorithm improvement but sometimes contradict and produce uncertainty about the object-in-practice. Thus, it shows variable ways of enacting body manifestations [5]. The paper examines how a stabilized definition concerning the epileptic seizure as a single object can be enacted. It shows how the confrontation between expertise performs the continuous revising of the "script" [1]: initially intended for epileptic person autonomy, the technical device progressively integrates the interaction between the person and the caregivers, and moreover the responsibility of socio-medical institution in the event of a seizure. Furthermore, this analysis questions the legitimacy of this heterogeneous expertise – professional / experiential – in the healthcare technological design process.

Our research is based on an ethnographical study of design activities. It combines observations of the experimental activity with interviews of its whole participants, engineers, families, epileptic people and physicians. Concurrently, our study collects a set of technical documents regarding the design process. We observe how healthcare technologies emerge as a way of enacting the disease, putting in tension the experiential expertise, but also as a way of fitting with the activity of taking in hand the disease.

**Track 2**  
**Design, Performativity, STS**

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## Entanglement for two

*Southern Jen (Lancaster University, UK)*

*Speed Chris (Edinburgh College of Art, UK)*

In 1983/4 the artists Linda Montana and Tehching Hsieh made 'Rope Piece', a performative artwork in which they spent an entire year joined together by an 8ft rope. For Easst 2010 we will invite conference delegates to be joined to each other throughout the conference, using 'comob' software on their own iphones/Nokia's rather than an 8ft rope. (Participants are free to continue participating in the research by linking to each other over an entire year).

At the centre of this research is the artists project 'comob', an iphone app and Nokia N96 software made to explore what happens if you can see a link between your own location and other participants in a group. These relationships are visible as nodes and lines on a google map seen on the phone screen, and move as participants move about the city. How might it be used to negotiate co-location? How is it used in workshops to explore the negotiation of social understandings of action on the ground? How does it feel to be tethered to another person? This work uses social processes of art making (Kester, Southworth, Lacy) as a method of creating participatory experiences for an audience in which meaning is produced through non-representational practices of movement or action (Thrift), that also become parts of a network of practice (Suchman) in which art work, design work and field work are entangled together.

During the conference participants movements will be projected onto a wall and traced in reflective paint. The amount of light that is seen reflecting off this silver drawing is dependant on the viewers spatial relationship to the light source, so only partial and situated views (Haraway) of this mapping will ever be available as it seems to shimmer in the light. In past work (e.g. 'Running Stitch' 2006-2009, Hamilton, Southern & St Amand [www.satellitebureau.net](http://www.satellitebureau.net)) the live transposing of GPS data from a participants walk was a catalyst for participants to imagine what was happening at the exhibition. In imagining their walk as a line as well as a path participants combined plan view and situated action (Suchman) as they added their walk to a collaborative map, performing their own relationship to place through the live GPS technology, simultaneously both reading and writing the city (De Certeau).

The work will culminate in a short workshop at the end of the conference when participants will be invited to reflect on their use and awareness of the comob connection, and how social links might be performed through GPS.

Comob is a digital arts project that explores the potential for collaborative mapping with GPS technology. Comob was developed as a research tool to explore social and spatial relationships between people in motion. has been used in workshops throughout 2009/10 at Futuresonic 09, ISEA 09, Edinburgh College of Art and Designing Environments for Life exhibition, Dundee.

[www.comob.org.uk](http://www.comob.org.uk) (project website)

[www.theportable.tv](http://www.theportable.tv) (Jen Southern's artists website)

## **Rain on the screen: situating GPS in hiking, fieldwork and art practice**

*Speed Chris (Edinburgh College of Art, UK)*

*Southern Jen (Lancaster University, UK)*

This paper explores how the combination of art practice and STS can use messy (Law) and multiple methods (Marcus) to engage more deeply with situating technologies. The paper focuses on the performance of place through the design and use of GPS (Global positioning systems) enabled applications. Using the art practice of the authors the research explores the performance of situated practices from everyday use of 'off the shelf' devices such as hikers GPS to custom made and designed art experiences. We engage with the design methods and technical configurations that make these experiences available to explore how situating technologies are themselves situated.

The multiple methods of this research include: ethnographic observation of the GPS practices of walkers and pilots as fieldwork for an artists commission; speculative software design exploring the social negotiation of action on the ground for use in art practice; a case study of reindeer tracking in Sweden, a project that uses GPS to reconfigure relationships between human and non-human social and spatial frameworks.

At the centre of this research is the artists project 'comob', an iphone app made to explore what happens if you can see a link between your own location and other participants in a group. How might it be used to negotiate co-location? How is it used in workshops to explore the negotiation of social understandings of action on the ground? How can it be used in a more contemplative artwork? This work uses social processes of art making (Kester, Lacy) as a method of creating participatory experiences for an audience in which meaning is produced through non-representational practices of movement or action (Thrift), that also become parts of a network of practice (Suchman) in which art work, design work and field work are entangled together.

Working closely with audiences, participants and programmers allows the research to explore the specifics of practices around GPS technology. In technical development every test needs a GPS signal from outside the building, where rain and cloud change relationships to place. Despite its reputation for inaccuracy and misleading directions the GPS is also used as proof of spatial location. This supposedly modest witness (Shaper & Shafin) turns out to be highly situated and partial (Haraway), technically operating in a very specific spatial relationship with satellites, buildings, mountains, clouds, the sun, trees and vehicles. Development processes include programmers putting devices on windowsills, in gardens, or calling up artists to nip out onto the street to test, it matters where you are and how you find your situation.

The mess in this research process exists in part around a mixed methods approach that feeds in and out of art practice, but is also due to elements of the fieldwork taking place through explicitly designed art experiences in which fieldwork as intervention becomes overt. In a field where software and hardware development happens rapidly there's a tension between studying existing practices in action and being critically involved in shaping new practices.



## **‘Experience Modelling’**

*Wakeford Nina (Goldsmiths, University of London, UK)*

The development of ‘user-centred’ and ‘experience-based’ design in the high technology sector has led to a proliferation of ways of representing the user. Experience models – constructions of graphical elements, sometimes accompanied by photos and case studies – have become a mode by which technological innovation is believed to move forward. In this paper I will explore the ways in which experience models function in relation to anticipation of ‘what happens next’, and their function in terms of an openness to the future – but also consider a non-representational model of experience modelling. Taking up Sloterdijk’s project of a history of atmospheres, I will explore the liveness of innovation as it happens in corporate encounters – taking two cases from my fieldwork as examples. The first is a design meeting in which an experience model is created. The second is a short 16mm (celluloid) film loop “Untitled (Inside Intel with Bolex H16) (2009)” which I made as a way of exploring the dilemmas of visualization, temporal politics and the STS-researcher/corporate encounter.

## **Designing and standardising objects of energy consumption: three performative ontologies**

*Wallenborn Greg (Université Libre de Bruxelles, Belgium)*

The paper comes at the end of a research about both the role of objects in household energy consumption and the standardisation of energy-using products. The main hypothesis states that the necessary change in energy consumption patterns could be brought by objects and, in particular, through the object/user interfaces. Material agencies are considered as moralising behaviours (Foucault 1977, Verbeek & Slob 2006), for instance in scripting some practices into the objects or in delegating some functions to machines (Latour 1993, Shove 2003). Moralising means here that mores (i.e. the way people behave) are changed through objects. Material agencies induce certain mores and prevent others.

The research has explored how design may change habits and how standards can shift social norms. The implementation of the ecodesign directive is also an excellent opportunity to analyse how energy-using products are redefined through standards. Fieldwork includes the experimentation of electricity meters by households, co-design sessions with 'friendly users' for inventing new interfaces, with designers and manufacturers and analysis of the representation of users in consumer's magazines. Five product categories have been selected: the regulation of heating, domestic lighting, computers, washing machines, electricity meters.

One result of the research is the plurality of "performative ontologies". The idea behind the use of the word "ontology" is to avoid reductions: ontologies are not only representations; they allow to mix humans and objects. Behaviours and attitudes of users, appliances, rules, skills, bodies, standards, energy networks, symbols, all are beings taken on the same plane. An ontology is a mix of objects, users, policies, and ways to conceptualize the world, the beings in the world and their mutual relations and interactions. An ontology is performative because it creates coherent relations between selected beings. To understand household energy consumption, we need at least three ontologies.

The hedonist ontology describes how households are currently consuming their energy, as is revealed in different studies. In this ontology, consumers are mainly moved by their search for pleasure and comfort. Energy-using products are seen as devices providing enjoyable services: in their daily practices, households do not realise they are consuming energy.

The rational ontology describes well the idea behind many current policies on energy efficiency: in order to reduce energy consumption, one must encourage manufacturers to produce energy efficient appliances and inform consumers that they have an advantage to buy them, notably through the energy labelling scheme. In the rational ontology, the individuals are considered as rational actors that act on the basis of a valuation of their actions. In this perspective, the role of policy is to organize the conditions for this rationality to be effective.

The third ontology I propose is found in the literature on design or learning, for instance, and I call it an experimental or relational ontology. The sufficiency issue can only be addressed in this ontology because humans are not predetermined, they are relational, they change when they get in relation with objects. Humans and their desires are produced in their relationship with the objects they have. The reality of this ontology emerges from action, from practices, and can be discovered only in the concrete relation with the appliances.

## Chatbot Liveness: Designing Re-enactments in Audio

*Windle Amanda (London College of Communication, University of the Arts, UK)*

*A Provocation Pick-Up With Eliza (19th April 2009)*

*[Pick-up] You: Forgot to masturbate*

*[Pick-up] Eliza: Please go on.*

A pick-up technique is an experimental procedure designed by chatbot developers to attract users to talk to bots. It replicates part or parts of the reply and response couplet with the aim of the user to engage with the content and tone of the pick-up script. The ambiguity of liveness that takes place in a chatbot pick-up involves hidden actants (developers, and interlocutors) in a pretense of a meaningful exchange. It is the imagined hidden interlocutors that create odd affects in what might be considered to be live chat. I focus on the pick-up as a consequence of when my own research interventions got caught up in another's pick-up experiment, to elucidate on why liveness still matters.

Live interaction begins with online chatbots at the juncture between pick-up and the following reciprocity of user and chatbot. This paper looks at the relationship between liveness (Auslander, 2008) and reenactment (Dickenson, 2003 & 2009) from the areas of human-machine interaction and the performance arts. Philip Auslander, considers that chatbots reframe the question of liveness at a rudimentary level, that chatbots potentially transform "the ontology of the performer" (Auslander, 2008: 71). Auslander sets this up as a proposal of research of which I aim to pursue by focusing on the pick-up techniques used by one anonymous online Elizabot. To address this research gap I will focus on how the user listens or imagines hearing the enactment of speech (Wittig, 1992). I will ask how does this performative technique affect ways of listening to consider how online, liveness is interrupted by the use of pick-up techniques? As a part of the delivery of the paper presentation, audio recordings will be re-performed as a re-enactment by advertising voice-over specialists.

Findings have shown that chatbot interactions are dually shaped by researchers interacting as users, and developers making readymade pick-up scripts. Both sides of the interaction shape the use and reuse of future pick-ups. Playful interventions can interrupt both inside and outside the frame of the pick-up which affect interactions to come. Discussions with Robitron (the main chatbot online group) will be used to further interpret the technical aspects of the pick-up technique.



## **TRACK 3**

# **Digital Game-Play as Socio-Technical Practice**

### **Convenors:**

**Aphra Kerr (National University of Ireland Maynooth)**

**Helen W. Kennedy (University of the West of England, UK)**

**Jennifer Jenson (York University, UK)**

**Stefano De Paoli (National University of Ireland Maynooth)**

## Knowing play. Epistemic cultures in online games

*Ask Kristine (Norwegian University of Science and Technology)*

The public debate around computer games has been marked by an understanding of play as a barren and wasteful activity, something that will dull both mind and social aptness. As a response to this, research done in the game studies field has shown that a multitude of intellectual activities are central to successful play. Some examples include the possibility for learning and construction of identities (Gee 2007), collaborative problem-solving, increasing literacy as well as fostering scientific habits of mind (Steinkuehler & Chmiel 2006). These contributions show users that are active, evolving and contributing. It is my goal to add to these studies of knowledge and gaming by focusing on what these characteristics mean for the game community and the gaming experience in the Massive Multiplayer Online Roleplaying Game World of Warcraft, by discussing in what ways players create and share knowledge.

I will look at practices of knowing in the light of *epistemic cultures*; cultures that create and warrant knowledge. The paper will look at what epistemic machineries are put in place in and about online games, making me concerned with finding out “how we know what we now” (Knorr-Cetina 1999). This include both identifying game mechanics that support the “knowing player”, as well as studying places outside the game that are important to creation and sharing of knowledge. In this context knowledge is not scientific, but the community in question has several features marking them as a society of knowledge. It has locations where it is gathered (in game), tools to gather it with (logs and user programmed software), it has experts (famous players), peer discussion (as ideas and opinions get discussed in public forums) and means to publish it (blogs, movies etc.). Players build systems to facilitate the making and sharing of knowledge and embed these into gameplay. These aspects of learning and knowing are not bi-products of gaming, but are in fact defining features of online game culture.

The paper will be based on ethnographic work in the game World of Warcraft over a one year period, including in-depth interviews with players at varying levels of the game; from casual players to top end gamers.

By highlighting knowledge in this paper I attempt to bridge some of the overlapping interests that have occurred between the Science and Technology Studies and Game Studies fields, and show what potential the growing.

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## De-scribing Tamagotchi: A changing relationship over time

*Balslev Nielsen Camilla (The Danish School of Education, Aarhus University, Denmark)*

This paper will explore how the community of STS and the research field of games can benefit from engaging in a relationship with each other. I explore how Tamagotchi, who normally is categorized as both a digital game and a virtual pet, is enacted through sociotechnical assemblages. I call this process *tamagochi-ing*. The purpose of this paper is therefore to explore Tamagotchi by describing the sociology of technology adopting the approach of inscription and de-scription (Akrich). In conclusion, I will describe the benefit of the relationship by discussing how the inscription of one standardized relationship between the user and the context is transformed into a changing relationship over time when it is being de-scripted.

The explorations are based on the empirical data from a field study in 2007-2008. I spent six months observing, interviewing and talking to children from 9-10 years old while they were spending time in a youth centre and during their lunch breaks at a school in Copenhagen. During the field study I met the Tamagotchi that at one point was all over the places. Children were standing close together, pushing buttons, talking and pointing their Tamagotchis at each other. Tamagotchis were being shifted around and some of the children received the title "Babysitters". It went on like this for weeks and it made me wonder: "what is going on here?" I could have approached the complexity by defining Tamagotchi as a game and there by relating it to the field of game research where there is a tendency to conceptualize games through unsustainable formalism, exceptionalism and by associating games with play (Malaby 2007). These approaches offers a way of organizing the complexity by a prior definition of what toys and games are which often is far away from how they are being enacted in everyday life. Therefore I approached the field asking: "What happens when games are not associated with play but instead heterogeneous assemblages that are in the process of becoming?" The purpose of the field study was to explore how play is enacted through different orderings of toys without approaching the heterogeneous assemblages with a prior definition of what toys and games are. The introduction of the symmetry doctrine (Latour 1993) offers the possibility to follow and explore the relationship between human and non-human actors. I explore how Tamagotchi *works* as toys because the inscription of the designed user and context can be enacted in a relationship that is changing over time with the users and the contexts.

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## The songlines of media harm

*Benjaminsen Nana (Roskilde University, Denmark)*

*Sørensen Estrid (Humboldt Universität, Berlin, Germany)*

Public debates of the risks for children of playing violent computer games are by game scholars most often analysed as 'moral regulation' (e.g. Drotner 1999; Otto 2007). There is no doubt that such debates contribute to forming the possible ways to think of and deal with violent computer games in contemporary society. However, such discursive approaches tend to produce the similar results concerning moral regulation regardless of the 'risky object'.

By approaching risks as 'songlines' Sheila Jasanoff (2003) points to the cultural variety of objects' existences, and thus of the risk they constitute. 'Songlines' of risk are deeply embodied cultural values and beliefs on the basis of which objects are articulated. Depending on the specific character of these culturally and historically variable 'songlines' in relation to which a certain object is articulated, the specific risk of this object comes into being. According to Jasanoff, assessing risk of violent computer games is thus necessarily a social and political exercise.

With the notion of 'songlines' the paper analyses the press debates on violent computer games following a school shooting in 2006. Discussions of the risk of harm to children caused by violent computer games are as old as the games themselves. Such debates indeed seem to follow the same 'melody' whenever they reoccur. Focusing on the 'risky object' the paper follows the 'songlines' of violent computer games through the German press coverage over six months following the 2006 school shooting in the town Emsdetten.

The analysis shows how violent computer games were 'sung' as 'sports games', as 'objects of politics' and as 'technical and civic objects'. The different ways of 'singing' violent computer games were not due to different interpretations of such games by the press. Rather, the analysis shows that the violent computer games was material semiotically enacted (Mol 2002) by being entangled in different socio-material practices already established with their own routinised 'songlines'. Only socio-material practices that were in 'harmony' with the 'songlines' of the press could be articulated here. Much more than a matter of cultural values and beliefs the violent computer games enacted through the German press coverage were results of the coming together of very specific socio-material arrangements. The violent computer games that came into being through the German press depended on a) the point in times of the debate they are articulated and on b) the material semiotic practices with whom they become entangled in the press coverage. The paper thus demonstrates the material semiotic, multiple and variable character of the risk of violent computer games.

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### **Attributions of meaning on digital games in the primary school**

*Buch Tasha (School of Education, Aarhus University, Denmark)*

Among various actors of politicians, researchers and developers, there are many who emphasise the essential function of Information and Communication Technology (ICT) as tool and supplement to pupils' learning in school. ICT is considered an important co-player in part because of the global competitiveness and in part due to children's 'natural' flair for computers in general as due to the fact that they grow up with digital technology, and which on top of that can motivate and engage children according to the curriculum. Digital games lie end to end to the arguments for using ICT in the primary school in order to benefit the learning of the pupils – a dominating argument is especially the argument about 'play and learning' when wanting to legitimize digital games in school work.

With material from a five month ethnographic everyday study on digital games in primary schools (children aged 7-10), this talk will focus on how various understandings of ICT mark how digital games are dealt with in school. Don Ihde and Bruno Latour are used to discuss how artefacts such as digital games mediate perceptions and actions. I will present an idea on how digital games 'borrow' seriousness from a general notion about how ICT plays a significant role in children's schooling. This notion marks how teachers, pupils and parents understand and deal with games as tool for school work. Among other things the distinction between play and learning is challenged – a central point of discussion within research on games for educational use.

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## **Neurofeedback Technology in Digital Gaming: (Non)Users in Mind**

*Cloyd Tristan (Virginia Tech)*

This paper explores the attempt by companies to incorporate neurofeedback technology into digital gaming systems in order to develop new forms of user control; a technology initially utilized in medical and behavioral sciences. This technology utilizes electrical activity of the brain to enhance the interactivity of users in gaming. I analyze the development of this technology in order to answer one primary question: how have social values and practices from designers and users shaped this technology and conversely, how does this technology shape social and individual practice? In order to answer this question this paper traces how and why this technology was developed. As such, this case builds on and contributes to recent research in technology studies which has revealed how users and non-users values contribute to development of technology. In addition, this paper links STS theories of technological development to the recent academic interest in game studies which focus on the meaning attached to games by players. By focusing on certain material characteristics of this gaming technology an analysis of what social and cultural values are being inscribed in the technology can be revealed. And further, whether these values and material characteristics are translated and appropriated into user play and practice allows for a second level analysis. Overall, this case offers an opportunity expand our understanding of how the relations between society and the individual are both shaped by and shaping of digital technology.

## **“All Our Relations”: Re-theorizing ‘Networked’ Play**

*de Castell Suzanne (Faculty of Education, York University, UK)*

*Jenson Jennifer (Faculty of Education, York University, UK)*

*Taylor Nicholas (Faculty of Education, York University, UK)*

To date, research on networked virtual environments, from socializing sites like *Second Life* and *Habbo Hotel* to massively-multiplayer online games like *World of Warcraft* and *Lineage*, has typically under-reported or under-analyzed the ways different games ‘stage’ and make im/possible certain forms of identity, engagement, interaction, and play.

This paper is generated from a multi-site, multi-methods collaborative research project that explores the connections between ‘real life’ virtual world users and their in-game avatars, actions, behaviors and practices. For our methodological approach, we use actor-network theory (Latour, 1997, 2005) to illustrate how play is enabled and constrained by the array of non-human, virtual ‘actants’ involved in co-operative, co-situated play. Following this perspective, we first identify the kinds of choices of rules, roles and relations made available across different games. The challenge this paper tackles is how to ‘subtract’ from what avatars look like and do, those elements of in-game/avatar-related appearance and behavior that are in actuality imposed upon a player by the game. The ‘remainder’ represents the domain of freely-chosen significant player decisions about who they are, what they do, and how they do it, with regards to the virtual worlds they participate in. Failure to attend to this essential calculation makes indecipherable every attempt to ‘read off’ from virtual world characters and behaviors, the ‘real world’ identities and activities of their players.

We borrow Bruno Latour’s notion of “infralanguage” to encode, represent and analyze our efforts to create a complex ontology that meaningfully identifies and differentiates the affordances of different virtual worlds. An infralanguage, following Latour, is a “voluntarily poor vocabulary” (Latour, 1997): a willing sacrifice of semantic precision on the part of the researcher in order to maximize the range of potential interlocutors and communicative contexts and interactants, in other words, to let the widest possible range of actors ‘speak for themselves’ within a shared semantic structure. Accordingly, we named and supplied the categories for describing the range of action possible in each game in as minimal a form as possible.

To test out this ‘infralanguage’, we asked expert players of *World of Warcraft* and *Second Life* to fill in an “affordances chart” that we developed (and refined) with their help. As much as and where possible, these experts filled out the charts “blind”, that is without knowing that or what their colleagues were filling out. This, we reasoned would enable us to test whether we had in place a suitably flexible vocabulary for describing what is doable/be-able and not, within and across different virtual worlds.

This exercise has generated a preliminary framework that we will continue to develop, in order to compile a widely-usable taxonomy of game resources. We therefore see the criteria for this ‘infralanguage’ in terms of its “performative validity” (Sorenson, 2007) – the extent to which it can be used in (online) games-related research as an empirical basis for better-grounded, more nuanced and therefore more significant inquiries and responses with respect to the real world significance of virtual world behavior and choices.

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## **Web 2.0 as a User Activity System: a theorization and analysis of the interaction order of Second Life**

*Grant Eryn (Brownlow PR)*

Much of the literature on the promise of Web 2.0 focuses on the potential for it to facilitate new forms of engagement, interaction and collaboration (Birdsall 2007; Abdelnour-Nocera and Mørch 2009; Baird and Fisher 2009). However, from a sociological perspective, Web 2.0 as a web based environment for interaction and content, does not simply generate “engaging user interactions” as part of its design. It presents a set of relationships between the social and technical world that when activated by users *produce* collaborative interaction (Beer and Burrows 2007). In this way, the participants are as much involved in the production of Web 2.0 as the technology that underwrites it. Christian Fuchs’ in his study of *Myspace* (2008: 16) made the following observation:

The system is complex there are millions of human actors and interactions. The system is dynamic; it is permanently produced and reproduced by human actions. *MySpace* is only a system as long as it is actively used by humans who act and interact in order to produce meaning and social relations.

his raises the question, what is collaboration in Web 2.0? What is the significance of collaboration for users and how is such collaboration done?

The following paper is a sociological enquiry of Web 2.0, which theorizes and investigates the social context of interaction within the technological domain. A broad set of studies have examined the intersection between Web 2.0 and the social world. However, this paper will demonstrate that the majority of these studies are more concerned with its social function in enabling and facilitating “user generated content” (Borgne-Bachschmidt, Girieud et al. 2008; Bruns 2008; Banks and Deuze 2009) or the nature of interaction for the purposes of directly informing the design of these environments for a range of purposes; economic, pedagogical or play (Kumar, Chhugani et al. 2008; Crabtree, Rodden et al. 2009; Harris and Rea 2009). This study complements these studies through a sociological examination of the interaction order of second life. In this respect it raises questions of the importance of symbolic interaction as a component of the “content” generated by users. Further, while a study of this nature may have implications for design, informing design is not its primary purpose. Prior to questions of design, the study seeks to open up the nature of the reflexive relationships between participants and their environment that may influence the nature of future environments, but also the nature of the interactional adaptations the participants themselves continue to produce.

## **Feminist Technoscience and Gendered Networks of Gaming**

*Harvey Alison (York University, UK)*

Some of the most interesting and complex analyses of gender and gaming stem from approaches that consider the networked nature of games as sociotechnical systems (see for example Taylor 2008, Dovey & Kennedy 2006, Jensen & de Castell 2008). This presentation considers and extends some of these observations on the complex networks of gendered gaming in light of some of the insights of a branch of STS known as feminist technoscience, which attempts to understand the way sciences and technologies are made, circulated, and consumed beyond dominant discourses without recourse to the “social” as an stable explanatory concept. Mobilizing in particular the work of Susan Leigh Starr (1991) and Annemarie Mol (1999), this paper considers the value of feminist technoscience concepts such as monsters, ontological politics, and enactment in examinations of the gendered nature of gameplay. Can we better understand the ways in which technological knowledge are assumed in play through ontological politics? How does the figure of the monster account for the tension produced by visible feminine play? Can we better understand dominant discourses of hardcore and masculine video game play through the everyday enactment of normative video game play? This paper attempts to connect these theories to current work in video games and gender in order to provide further avenues of investigation and inquiry.

It has been compelling argued that game studies needs to move beyond any understand of gendered preferences, play, content, culture, and mechanics separately or through either fixed gender norms or textual determinism. Instead, as all of these dimensions of play are as mutually constituted as gender, technology, and power, we need to conceive of play as an assemblage, formed by content, marketing, competency, experiences, access, situation, and milieu (T.L. Taylor, 2008). This paper considers whether feminist technoscience, which understands gender as relational, contestable, and in constant flux, can contribute to the study of contexts and practices over reified categories of gendered preferences. In what ways can this area of critical inquiry provide future directions for a more complex conception of preferences, interests, interactions, and play in video game studies? I will show how these approaches and concepts can help consider how the structural order of gender is regulated and maintained in the construction of video games and their study, and highlight some of their current limitations.

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## Gender in Play: Re-tooling Girls and Gaming

*Jenson Jennifer (Faculty of Education, York University, UK)*

*de Castell Suzanne (Faculty of Education, York University, UK)*

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Girls and women are still very much outsiders to the forms of entertainment and knowledge-building that digital games make possible, notwithstanding recent studies of what remain a minority population of female players (Beavis, 2005; Bryce and Rutter, 2005; Carr, 2007; Taylor, 2006). Certainly, women have made some measurable gains with regards to their participation in gaming cultures, but these remain, nevertheless, largely masculinized and male-dominated domains.

Part of the continued marginalization of women from gaming, we argue, is in how the problem itself is represented. Academic studies in this area – broadly framed around questions of “why don’t girls play”, and what can or ought to be done - has moved little beyond the “pink boxes” analysis propounded in the late 1990’s (Laurel, 1998; Graner-Ray, 2004), where boys are positioned as more ‘naturally’ inclined, and more able to attain technological expertise than girls (de Castell and Bryson, 1998). As a result, girls’ relations to technologies continue to be largely defined in terms of what they ‘lack’: skills, interest, inclination, ‘competitive spirit’ and so on.

This paper comes out of an attempt to de-stabilize normative gender divisions – and attendant modes of analysis – with regards to digital play, through the organization and documentation of a school-based, gender-divided gaming club. In our organization of the club, as well as our audio-visual analysis, we use gender as just one of the lenses to understand participants’ embodied play, and re-appoint skill as a basis for analysis. Rather than regard it as a property of players’ differently-sexed bodies, gender is viewed instead as both producing, and re-produced through contingent assemblages of socio-technical relations (Wajcman, 2004). In this analysis, informed by the works of both Donna Haraway (1991) and Bruno Latour (1992, 2005), non-normative configurations of agents and technologies – a club where girls are allowed to ‘skill up’ with games and gaming technologies that they do not normally have access to – becomes a site where gender itself is ‘re-tooled’. Specifically, we are able to read gender as enacted not through the simple ‘possession’ or ‘lack’ of game-based expertise, but through ways participants make visible their growing levels of technological competence, to other students as well as to us researchers/ educators.

### **'Serious gaming' on a 'global' market place?**

*Meyer Bente (Department of Curriculum Research, Denmark)*

*Hansbøl Mikala (Department of Curriculum Research, Denmark)*

How can 'we' research educational software/technologies and their agencies? Where to begin and how to end? This paper discusses how comparative methodologies can be conceptualised in learning contexts where times and spaces for engagement in learning are shifting and multiply situated. The boundaries of education and materials for educational activities as well as their relevance is becoming more and more blurred, and it is in a sense something historically new, that teaching/learning materials developed in one country become marketed and distributed internationally. In the paper data are analysed in the context of an ongoing project in *Serious Games on a Global Market Place* that was originally formulated as a comparative education project aiming to investigate examples of serious games in a diversity of cultural contexts. Overall the purpose of the project was to generate knowledge about basic and general educational design principles that need to be taken into consideration when developing and designing serious games for a global market place. Being formulated as a comparative education project meant that it involved a primary focus on general educational programs and connected with these various national approaches to curriculum.

The Serious Games on a Global Market Place project researches circulations and establishments of an example of a so-called serious game called Mingoville. Mingoville is marketed in 32 languages and developed for beginner's English learning. Currently there are more than 1.000.000 registered Mingoville users across the world. In a sense it is possible to investigate engagements with Mingoville and English teaching in various primary schools in a number of selected countries. However, when trying to understand the agencies of a resource with more than 1.000.000 registered users across the world, one is quickly stricken by the obvious limitations of any collation of empirical materials. So how is it possible to say something about the agencies of a concept like Mingoville? Inspired by STS/ANT a different approach may be to try to grasp the phenomenon Mingoville, its various sites of construction, and thus also the manifolded processes of agentization, shifting platformations and agencies 'of' Mingoville.

In the paper we shall focus on how comparative studies can be carried out and reconceptualised to better grasp a moving and ephemeral phenomenon like Mingoville. This reconceptualisation involves a multi-sited approach to studying serious games in the world. This paper addresses the paradox of claiming to research the agencies of a serious game on a global market place, and different solutions to this problem, as well as their different results.



## **Describing the environment of soft- and hardware interfaces in digital games through actor network theory**

*Nemec Tom (Maastricht University, the Netherlands)*

The assumption of a change in assemblage/paradigm/technology resulting in different social groups using an artefact can be widened to several concepts, such as the widespread browser-based games on social platforms such as *Facebook*, which experience a massive growth in players from audiences which were previously atypical for the industry, which may be attributed both to the simplicity of the concepts and control schemes and the introduction of social factors through the existing platform.

In parallel we can observe a massive boom of Nintendo's *Wii* gaming console, which brought with it the *Casual Revolution* as described by Jesper Juul and published by MIT press. The mimetic interface, Juul argues, lies at the centre of the high grade of acceptance and success of this console amongst all layers of society, due to its accessibility and again the social possibilities.

My personal interest in this broad topic is to find out what role control interfaces and innovations in digital games play in respect to social groups and communities, further how they enable and disable certain groups to participate and what their importance in this process is. The aim of my paper will consequently provide the reader with an overview of the innovations in the field, an analysis of the processes of (dis)integration of social groups and the influence of software and hardware control interfaces have on games, players, developers and vice versa. As a methodological framework I will use actor network theory.

**The material production of virtuality: processes and trials of explication in the design and development of computer games**

*Panourgias Nikiforos (Knowledge and Organisational Networks Research Centre, Warwick Business School, University of Warwick, UK)*

The proposed article seeks to contribute to the stream's aim of developing the relationship between digital game studies and STS, by examining the design and development of computer games at three leading UK studios in the light of what MacKenzie calls in relation to financial derivatives as "the material production of virtuality" (MacKenzie 2007).

By the "material production of virtuality" MacKenzie refers to how abstract or virtual entities are brought into being, illustrating in the process how "virtuality is a material effect, indeed an elaborate, sophisticated, and expensive one" (MacKenzie 2007) and how "immateriality can only be expressed through materiality" (Miller 2005)

The paper shows how an approach such as that developed by MacKenzie to analyse the workings of financial derivatives can be extended to study the production of computer games as a sociotechnical phenomenon and to surface the heterogeneous practices involved in the production of the virtuality of those games.

The article draws on an empirical study of three leading UK computer games developers. Through a combination of interviews, observations, and the study of shared artefacts involved in the development of computer games, the research aims to capture, through the tracing of the interactions of the developers both with these objects and with one another, an in-depth picture of the way the developers studied assemble a computer game out of human and non-human entities.

While across all the three sites studied a great deal of effort and attention was clearly directed towards the organisation and management of the production process – both in terms of time (meeting of deadlines), but also in terms of reducing the likelihood of the failure of a project and ensuring as unproblematic as possible delivery of the final product – the research also found a great deal of effort being directed towards capturing and developing certain emergent and difficult to represent sensory, aesthetic, and experiential aspects of the games. Focusing in particular on the practices and trials through which such non-explicit or under-determined features of the computer game being developed are rendered explicit and knowable during the development process, the article also seeks to highlight the contribution that the study of digital games can make back to STS. The contribution in this case is attempted by showing how a nascent concept such as that of 'explication', described by Muniesa as the "radically inventive work" that goes into making something explicit, but not in the sense of "clarifying or implementing something that is already prefigured as a potential reality, but rather about putting that thing to the test of variable, often conflicting and unanticipated forms of actualization" (Muniesa 2010), can not only be successfully deployed analytically in such an empirical research setting, but also how, out of this deployment, the concept itself can be extended, illuminated, and shaped.

## **The Battle for Wesnoth and the role of users in the development of FOSS games**

*Poderi Giacomo (University of Trento, Italy)*

The PhD project I am currently developing investigate users' participation in Free and Open Source Software (FOSS). In this paper, I will discuss the objectives and the general frame that constitute the foundations of the research.

In the tradition of Science and Technology Studies (STS), a proper understanding of technological development can be achieved only if the *users* are considered relevant actors taking part in this process (Oudshoorn & Pinch, 2003). Developers working on the technology, inscribe and configure the ideal user in the technological object which they are developing. At the same time, users engage with the development of the technology in several ways such as: resisting to its adoption or appropriating its use in ways that were not previously envisaged by the developers.

Through an in-depth investigation of a FOSS game – *Battle for Wesnoth* (BfW) – the concept of “user” is problematised. Indeed, the meaning of the term “user” becomes rather fuzzy when applied to the phenomenon of FOSS, which is a way of developing software that relies on the sharing of the software among members of communities. The use, sharing, modification and redistribution rights over the software are achieved by using specific software licenses. This allows the users to take part directly to the development of the technology (Amant & Still, 2007). The study of FOSS raises interesting questions in relation to the role of users. How can the process of technological development be understood in a situation where the developers are users themselves, and where users' participation is deeply routinised within the process itself? Do developers stop ‘configuring’ the user? Does users' participation unbalance relationship of power amongst actors, as they are usually conceived? By conducting a case study on BfW, this research engages with these theoretical puzzles and provide an empirically grounded account of the meaning of “users' involvement” within FOSS.

The choice of the case rests on various reasons: the BfW project is in active development; it is cross-platform; it is a community-based project; and the ‘user-made-content’ is an important component of the project. BfW is a strategy game set in a fantasy environment where players build armies made up of units from various races (humans, elves, orcs...). The players' goal is to accomplish the tasks provided by the selected ‘campaign’, or to defeat other players (within the multi-player game-mode). BfW users can engage with the project development at two levels: development *of* the software (reporting bugs, providing support to new-users, creating artworks), and development *in* the game (creating new scenarios, campaigns, maps and races). The research investigates the users' involvement at both levels of participation. More importantly, it focuses on the relationships existing between these two areas of development.

The cyberethnography (Teli et al., 2007) of the BfW community will be the main method for conducting the research. This approach adapts traditional ethnographic epistemology to fields of research where face-to-face interaction and ‘physical immersion’ cannot be achieved, since the ‘object of research’ exists mainly on-line and the interactions are mainly mediated by computer. Participant observation of the (cyber)places where the community

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interact (forums, IRC) together with unstructured interviews (to developers and users), will be the primary means of data collection. I will analyse the data iteratively, during the collection period, through critical reading and coding of ethnographic notes and interview texts.

## Game Design as Socio-Technical Engineering in a Cultural Heritage Context

*Roque Liciniio (University of Coimbra, Portugal)*

The theme of sociotechnical analysis of multiplayer game design has been previously approached in the digital games research community. E.g., Roque (2005) uses Actor-Network Theory to conjecture multiplayer game design as a special case of socio-technical engineering, whereby the game designer translates design goals into action programs that she (or a team) then inscribes in the game artifact as a way to influence player actions. Yet, players retain a certain level of interpretive flexibility as they translate the designer's will expressed through the mediator artifact into their own interpretations, deciding what to do. This leads the author to consider multiplayer games as an intrinsically participatory media as the game player ultimately results as an emergence of the complex interaction between players, mediated by the game artifacts. Also, Alves and Roque (2007) notice that business models behind multiplayer games are beginning to influence the game design itself as specific game characteristics are better aligned with such revenue methods as, for instance, item-selling, pay as you go or subscription-based approaches, eliciting behaviors from players that are more or less economically interesting. The theme of design has been approached by ANT studies since their inception, notably in works by Akrich that first introduced the translation-inscription duality as the basis for its interpretation. Socio-technical engineering is also a relatively significant theme in the Information Systems community (e.g. Roque 2004) also under designations such as social engineering or heterogeneous engineering, with the common notion of information systems development as a form of promoting or modifying social or organizational behaviors or associations.

This paper will discuss a concrete design case where a project attempts a revitalization of the touristic relation with a Cultural Heritage site (a Templar's Monastery) through a socio-technical engineering exercise. A mobile alternate reality game is designed to promote a serendipitous exploration of the site and interaction between visitors. Visitor interactions are mobilized through the use of an augmented reality mobile game inspired on concrete historical phenomena and events taking place at the site at various times and locations. Several narrative explorations become possible through the use of physical and virtual actors superimposed on actual physical locations. The visitor is invited to explore these contextual cues. Visitor roles are structured or mobilized around proposed action programs through heterogeneous actor-networks involving local citizens, virtual superimposed interactive objects/icons, other visitors, and short narrative pieces. The proposed design is critically discussed from a social engineering or interventionist change perspective.

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## Play for the Camera: Audio-visual Research with 'Pro' Gamers

*Taylor Nicholas (Faculty of Education, York University, UK)*

This paper reports on an ethnographic study of elite-level competitive players as they moved from local, national and international LAN (Local Area Network) tournaments in their pursuit of the lucrative rewards – prize money, 'professional' designation, and in a small number of cases, lucrative sponsorship contracts – offered by an emergent North American e-Sports industry. IN particular, I look at how my video-based fieldwork within a community of competitive *Halo 3* players became transformed as promotional videography, as both the event organizers and aspiring professional gamers performed their digitally-mediated 'sport' for the camera. Here, in keeping with actor-network theory (Latour, 1992, 2005; Law, 2007), the camera is read as an active *agent* in the re-configuration of relations between researcher, participants, and 'gatekeepers'.

The North American e-Sports industry, as Michael Kane repeatedly asserts in his journalistic account of professional Counterstrike play (2008), is heavily invested in framing digital play as spectator 'sport' and in developing a market for the televised consumption of competitive gaming tournaments. As part of its strategy for promoting e-Sports, Major League Gaming (MLG), the largest e-Sports organization in North America, publishes promotional videos and tournament broadcasts of 'pro' players and events. During this ethnographic research with aspiring Halo 3 pro's, some of whom had participated in and attained a measure of success at MLG tournaments, players constantly referenced these videos and the young (exclusively male) 'cyber athletes' they featured.

I use actor-network theory to schematize the interconnectedness of agents, tools and practices within the pro-gaming community I worked with. With this framework, I plot how my activities and obligations as videographer differed from those of a conventional audio-visual researcher, and I examine how and where these roles came into tension. I take up these considerations in order to examine how my role as videographer not only affected what kinds of fieldwork I was able (and *unable*) to carry out, but also when and how participants actually performed professional play for the camera. The analysis offered here casts the camera itself in the role of co-actor in the production of the team performance that won 'gold' for Canada with their first place victory at the World Cyber Games.

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## **Machinima as Social Construct**

*Wenz Karin (Maastricht University, The Netherlands)*

Machinima (game videos) are based on the recording of game footage as a real-time video. This video is then edited and used to tell a story, which is not necessarily related to the background story the digital game is based upon. The term *machinima* has been introduced by Hugh Hancock und Paul Marino in 2004. They emphasize the importance of this new form as an example of media convergence. The media convergence is also central in Katie Salen's concept of emergent play (2002, 99). She shows that emergent play –with her example *machinima* – is partly theatrical performance, partly film, partly digital game. Salen points to the intermediality of the format which has its source in digital games but uses filmic as well as theatrical techniques. Additionally important are its low production costs, which makes it an ideal playfield for students of film schools as well as laymen who want to create a movie with a low budget. As Tasajärvi (2004) has shown, machinima has its origin in the hacker- and demoscene, whose programmers created graphical “extravaganzas”. Programmers who created highly elaborate graphical new forms either made demo versions of games or used game engines of existing games for their modification. This means that the graphics have to be created and rendered procedurally, while the game is running. In the same way 3-D game engines such as *Quake* are based on procedural rendering and are therefore highly interesting for players or artists for modification. Modifying games is much easier than coding a demo from scratch and was (and still is) therefore an option also used by artists as well as players for their work. Instead of coding the game themselves (like the demo programmers did), players started to use and modify existing game engines. The term mod is the short form for “modification” and refers to different layers of a game and even external hardware constraints that can be changed. As Nitsche (2007) puts it: Hackers, modders (who modify existing game engines for customized use), and game artists created their machinima pieces in tuned game engines, often tweaking them further to achieve specific effects. Machinima evolved not as a clearly industry-defined media format but from the practices of an underground art production that playfully embraced any media format that offered itself for their artistic practice. Based on SCOT (Social Construction of Technology) this presentation will describe the development of machinima. The social groups participating in the production, distribution and consumption of machinima as well as the technological changes will be taken into consideration to describe the change from a niche product to a mainstream movement.

## **Innovation Wars in Digital Game Development**

*Yannakakis Georgios (IT University of Copenhagen, Center for Computer Games Research, Denmark)*

*Kaniadakis Antonios (London School of Economics and Political Science, UK)*

The digital game industry (DGI) is a complex array of different actors, some of which are more established and central to the production and distribution of games (i.e. game developers) while others are more peripheral and attempt to penetrate the industry and increase their influence on game development (i.e. academics). Not all of such actors and relationships between them have received the same attention.

Recent work on the DGI focuses on the formal market while tending to ignore the more peripheral actors like academics, artists and user/fan groups; also current studies do not provide an adequate understanding of the industry structures, the relationship between different actors and with other industries (Kerr, 2006). This is resulting to incomplete accounts of the innovation processes and mechanisms in game development. A more systematic attention to new actors, we argue, will help explore possibilities for dynamism and further evolution of the industry and in consequence of the gaming experience through innovation.

An authors' study of the relationship between a game development firm in Denmark with academics from a Games Research Laboratory at a Danish University reveals an ongoing dispute between game developers and academics working in the area of "nouvelle artificial intelligence (AI)" (e.g. fuzzy control, artificial neural networks, evolutionary algorithms, temporal difference learning) for digital games. More particularly, AI academics are approaching game developers to promote their techniques and finance their research arguing that modern AI will enhance gaming experience, encourage learning and make games more appealing to both hard-core and soft-core gamers (Nareyek, 2002). On the other hand, game developers are reluctant in using nouvelle AI techniques, as they still meet their needs with less sophisticated, 20-year old AI (e.g. expert knowledge systems, finite state-machines, A\* search) but with brand new graphic engines (Woodcock, 2001). They argue that nouvelle AI requires large computational power and is extremely difficult to control while they focus their innovative activities on graphic design, animation, more realistic facial and body character expression.

Drawing on theories and concepts from the Science & Technology Studies literature, and more particularly from the Social Shaping of Technology approach (MacKenzie & Wajcman, 1999; Williams & Edge, 1996), preliminary research findings point to the following conclusions:

- 1) There are different interpretations of what nouvelle AI is, how it can be used and what are its benefits, which also reflects a 'practice gap' between academic and practitioner AI.
- 2) Academics and practitioners have different visions of digital game innovation and the future of the industry. Practitioners focus on small-scale, short-term scope of change which is perceived as safer, while academics have a vision of longer-term transformations.
- 4) Industry practitioners and academics project different representations of end-users (gamers).



**Track 3**  
**Digital Game-Play as Socio-Technical Practice**

5) Finally, we provide a theorisation of the structure and constituents of the game industry and relevant markets as a complex configuration of socio-technical elements (including different actors) in which AI academics are trying to penetrate as important transformative agents, change the nature and character of the industry, its innovation mechanisms and the gaming experience.

**What is a 'virtual world' made of? Game developers, technologies, players: the sharing of an online fantasy**

*Zabban Vinciane (Paris-Est University, France)*

The first multiplayer online role playing games appeared along with a new perception of information technology as a communication and cooperation medium. In the last years, so-called 'virtual worlds' have become favoured objects of study for some researchers, who believe there is an urge, through them, to take new ways of being and acting together into account. Game studies has recently emphasized the fact that MMORPGs have to be addressed both as related to ordinary world objects – an invitation to “forget” the concept of *magic circle* (Consalvo 2009) – and as sociotechnical artefacts (Crogan & Kennedy 2008). This approach highlights the productive organisations, systems of rules, technical infrastructures, audiences, and practices that sustain MMORPGs.

In keeping with the study of sociotechnical aspects of MMORPGs, our investigation articulates the different dimensions of interaction between developers, technologies and users. *Age of Utopia* (AoU) is an online multiplayer role playing game universe, which went into development in 2000 and was released in 2004. AoU was studied through participant observation (2006-2008), as an operational member of the community management team inside the company. We also set up an online survey directed to the French community of players, and interviewed some of the 208 respondents. This ethnography allowed the collection of qualitative data about what we may call *Age of Utopia's* 'shared fantasy' (Fine 2002), covering a period starting at the beginning of the project and ending when the servers were officially shut down in 2008.

Our contribution aims at highlighting how the history of the development team, the technical assets of the game, and player's practices, relate to one another. This invites us to envision *Age of Utopia* not as a complex amount of social and technical elements, but as a singular and dynamic *agencement* (or *assemblage*) of these components. Thus, we propose to approach MMORPGs as less virtual than social worlds (Strauss 1992). Through *Age of Utopia's* case, we particularly aim at highlighting the ways humans and technologies are involved in a permanent negotiation of boundaries. We address these activities of boundary work as a necessary process in which heterogeneous actors elaborate frameworks for their practices of a *shared fantasy* and, eventually, as what defines MMORPGs' virtuality.

## **VirtualWorlds. Translating Beliefs and Desires into Prescriptions for Participation**

*Zackariasson Peter (Gothenburg Research Institute, University of Gothenburg, Sweden)*

In 2001 the Norwegian developer Funcom launched the video game Anarchy Online. This was yet another game in the genre Massively Multiplayer Online Role-Playing Games (MMORPG) that found a growing popularity at the end of the 1990s, with such well-known titles as Ultima Online (Origin) and EverQuest (SOE). Games in this genre provide a virtual world where hundreds, if not thousands, interact with each other and the world; these are indeed synthetic worlds (i.e. Castronova 2005), where everything has been constructed. Every act in such a world is prescribed by the developers, who have projected their beliefs and desires into the actors and actants in this virtual world.

In this paper I intend to use the Actor-Network vocabulary developed by Akrich and Latour (1992), and Latour (1996, 1999, 2007), to describe the development of the MMORPG Anarchy Online. Building a virtual world, the developers translate their desires and beliefs into the software, thereby distilling the social fabric in their own ways. The participants in this game, and their avatars, can only act within the rules defined by the developers. The morality of the developer thus permeates the whole of this virtual world, redistributed to virtual actors in the game.

The empirical material for this paper was collected between 2004 and 2006 for my doctoral dissertation (Zackariasson 2007). During this period I interviewed persons who had been involved in the development of Anarchy Online. I was also granted access to development documents from that period. Since the launch I had also participated in this virtual world, as a player and researcher, for about two thousand hours.

The study shows clearly that the virtual world – the result of the development – is a distilled copy of the specific understandings of the world by the persons involved in its development.

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## **TRACK 4**

# **What Objects Do: Design, Consumption and Social Practices**

### **Convenors:**

**Paolo Magaudda (University of Padova, Italy)**

**Mika Pantzar (Helsinki School of Economics, Finland)**

**Paolo Volonté (Politecnico di Milano, Italy)**

**Albena Yaneva (University of Manchester, UK)**

## **Performativity, hegemony and silenced contradictions: enacting difference in software design**

*Allhutter Doris (Austrian Academy of Sciences, Institute of Technology Assessment)*

STS scholars such as Haraway, Suchman and Barad have suggested different conceptions of discursive performativity to elaborate how entangled scientific/technological/societal processes reconfigure materialized relationalities. Against this background, software design can be described as a material-discursive construction process in a sense that considers the co-construction of software artefacts and societal hegemonies (i.e., the normativity that is inscribed) as well as the identity-informing character of reiterated everyday design (and use) practices (i.e., the collective 'becoming' of designers and users). Based on a discussion of different notions of performativity, I elaborate on how to make use of the concept in understanding and intervening into the reproduction of hegemonies in software design.

Inspired by Haug et al. (1999) and Barad (2003), I focus on collective processes of enacting difference through hidden processes of meaning construction in design practice. Barad's (2003:814) materialistic elaboration of performativity advocates "a causal relationship between specific exclusionary practices embodied as specific material configurations of the world (i.e., discursive practices/(con)figurations rather than 'words') and specific material phenomena (i.e., relations rather than 'things')". Barad refers to the materialization of "human" and "nonhuman" bodies and to the material-discursive practices by which their differential constitutions are marked. This approach frames human and nonhuman agency as the ongoing reconfigurings of relations of exteriority, connectivity and exclusion.

Haug's Marxist concept of subjectification describes the process by which individuals appropriate society ('Vergesellschaftung') and focuses on the sociality ('Gesellschaftlichkeit') of subjects. This approach centres on how autonomy and heteronomy frame the subject's capacity for action within society and allows for conceiving of its active participation in heteronomy.

While Barad's extensive work is extremely valuable as a basis for theorizing the differential enactments of boundaries that leave their traces in material-discursive practices, Haug has provided an utmost useful methodological approach to disclosing how societal contradictions are silenced through collective processes of reframing memories.

My theoretical and methodological considerations are supported by examples of empirical design research to show how silenced contradictions and the reproduction of ontological dichotomies re-enact difference and thereby reproduce societal hegemonies.

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## **Football on the web: Messageboards, humour, and masculinity**

*Bella Vivat (Brunel University)*

Millwall is my local football team, with a longstanding reputation for the violence of their fans, which is intimately tied up with intense loyalty to their team and rivalry towards other teams, particularly, but not exclusively, other local London teams, notably (for a range of historical reasons) West Ham and Charlton Athletic. The motto of Millwall fans is: "No one likes us, we don't care."

The presentation will consider a recent thread on a Millwall message board, looking at the interweaving of humour, masculinities and identities, particularly identities associated with football loyalties, and how these were played out both within this specific thread and across the net.

The thread began in late February 2010, when a fan posted a message regarding the forthcoming home game against Charlton. Local rivalries mean there is a high demand for tickets. He had tried to get his season ticket seat and been told that it had been sold, so he had bought himself another seat and was complaining that he didn't have his season ticket.

I will trace the thread and how it developed from this point until it was closed 10 days later, at which point there had been 183 contributions. These contributions were from other Millwall fans, and also from fans of other football teams, who picked up on the thread, registered on the message board and made comments, and/or exported links to the message board to other fan sites.

Before the net, this discussion would have been limited to a few people, but the technology enabled a much wider audience, not only of Millwall fans, but also including fans of other teams, and people otherwise uninterested in football. The attention to this thread grew rapidly and almost exponentially (a search for "stupid Millwall fan" brought 38,400 hits on March 15 and 40,300 hits on March 21, with most of the hits on the first 4 or 5 pages of hits relating to this specific thread), and this of itself became a focus of discussion within the thread itself.

I will examine how interactions on the message board reinforced fan identities, and associated masculinities, frequently through the use of humour. More broadly, I will explore how longstanding, pre-existing allegiances and antagonisms were played out in a comparatively new technological arena, including how technological resources were also recruited to amplify and reinforce those allegiances and antagonisms. I will consider the interplay between pre-existing sets of relationships and practices and the new opportunities for interaction offered by the net, and discuss how this technology mediates tensions and alliances which were previously only enacted via direct contact.

## **Consumption emotions in ICT: the emotional performance**

*Belli Simone (Universitat Autònoma de Barcelona, Spain)*

In recent years, the topic of emotions has been influenced by postconstructionist research (Íñiguez, 2005), particularly by the use of performativity as a key concept. According to Judith Butler (1993) the construction of emotions is a process open to constant changes and redefinitions (Butler, 1997). In this vein, the ultimate effect of the “natural” evolution of emotion and language is the appearance of Technoscience. New ways of naming emotions have emerged from the viewpoint of Technoscience (Belli, S., Harré, R., Íñiguez, L., in press). Due to Information and Communication Technologies (ICT) there exist new emotional aspects in which philosophers, psychologists, and epistemologists have zeroed in their common interests, for instance, the affective machine (Rose, 1983, Brown 2005, Brown, Stenner, 2001, Michael, 2000, 2006), the notions of cyborg and techno-disembodiment (Haraway, 1989, 1995, James, Carkeek, 1997, Gibbs, 2006, Hollinger, 2000), or the notion of “disclosure”, fuzzy phenomenon meaning the expression of emotions through a screen.

In our research on the use of Information and Communication Technologies (ICT) by Cyber-Cafés and Call Shops users, we came to understand how these technologies are significant in those users’ daily life. The emphasis has been on analyzing emotions related to the use of these technologies in these specific settings. Using the concept of performance (Butler, 1990), we explore how discourse constructs a need for particular emotions, which did not exist before their performance. These events or “acts” are seen as natural through their repetition over time. They are a set of multiple everyday social interactions. To understand this performance in discourse, it is necessary to use a “tool”. In our case the tool is called Membership Categorization Analysis (MCA), as it is used by the School of Manchester (Leudar, 1995, 1998). The particularity of this approach is that it recognizes emotions as a performance continuously changing in language, that is, they are iterative and progressive. This particular symbiosis between emotions and ICT opens up a new area of study in which emotion is understood as a symbolic process depicted by discourse at its best. For this reason it is fundamental to see emotion as a process linked to the way people face and use ICT. Analysis has revealed velocity as a salient membership category. It is constructed by users through discourse as a performative and primarily emotional process. Thus, discursively produced ‘velocity’ seems to follow the “natural” evolution of Technoscience in Social Sciences, such as it is understood through the concept of cyborg (Haraway, 1990) and the concept of mutant (Baricco, 2008).

Haraway’s concept of cyborg helps us understand why the relationship between the individual and the machine is like an extension of the person herself, created by discursive performance. This relationship constructed through discourse helps us to introduce what we will talking about in this chapter, that is, an analysis of ICT users’ interviews in which a new emotional performance, i.e., velocity, emerges. As already asserted, we believe the use of ICT as an extension of one’s own body, as stated by the concept of cyborg, is constructed through language. Hence, its use is always discursive. Regarding the relationship, or conflict, between individual and society, the discursively performative use of ICT constructs the former as well as the latter in a continual iteration of speech acts.

## **Things do all kinds of things. Agency of artefacts, built environment, materiality**

*Brand Ralf (University of Manchester, UK)*

This talk will present a model in the making that attempts to contextualise the role of materiality for the enactment of various social practices. It starts from the assumption that physical settings around us (cities, buildings, bridges, showers and tea pots) co-shape our conscious and unconscious behaviours, social practices and routines. In other words: artefacts have agency. They do not, however, determine our social practice.

Of course, there is a degree of free choice, an option for heroic action and a role for attitudes, financial hurdles and incentives, cultural taboos, social expectations etc. This makes it necessary to put the role of materiality in a wider context with these other factors. The key argument in this presentation is that there is a systematic relationship between these material, cultural, financial, reputational and other factors that can be understood for specific situations.

In addition, this paper develops the argument that any social practice is always just one element in a series or chain of practices, some of which precede, others follow the social practice in question. This, too, can be understood, mapped and represented for a specific situation. A third core argument of this paper is an attempt to categorise different types of material agency, such as socio-fugal, socio-petal, affective, reflective, enforcing, enabling etc.

By far not all of these thoughts are genuinely new but their systematic synopsis in a matrix might be. It allows to see the bigger, but still nuanced, picture of the role of things (in some cases of their absence) as socialiser, normaliser, solidifier, mediator, conditioner or, in Latour's terms, assembler of our human existence; but also as potential point of intervention for the facilitation of desired social practices in the sense of *things as extension of politics by other means* – of course with all kinds of ethical implications.

The arguments put forward in this paper are illustrated with numerous empirical examples, collected during a recent ESRC funded comparative project about the role of urban artefacts in Belfast, Beirut, Berlin and Amsterdam where friendly encounters between different ethnic, religious and political groups are considered 'desired social practice' as mentioned above. In addition, the notion of facilitating sustainable social practices (cycling, walking, installing loft insulation, etc.) is another source of empirical evidence that informs and probes the proposed conceptual framework.



## Fire fighting through work tools

*Bruzzone Silvia (Curapp/CNRS, France)*

The contribution explores the way in which objects mediate among different communities to define an expert practice such as forest-fire fighting. A training course for volunteer fire fighters informs of the specific alignment of humans and non-humans to give shape to a complex practice involving different professionals, competences, tools in a very dynamic setting.

In Italy, volunteers organized on local level mainly execute fire-fighting operations. This is the particular case of the Region of Liguria where volunteers are coordinated by the Forest Service and the Fire Brigade. Civil security associations devoted to fire fighting are in charge of recruiting volunteers. Until recently new fire fighters were trained by expert volunteers on the fieldwork and no formal training was provided. In the very last years, the professionalization of this personnel has become a priority in order to enhance coordination among the different corps, to introduce some sort of protocols for action, to reinforce the “chain of command” and to guarantee safe operations for personnel at work.

The contribution is based on the author's participation to one of these pilot courses. The training was mainly focused on the presentation and instruction of work tools, mainly DPI (Personal Protection Dispositive), maps/Gps, fire- extinction devices, and other items defining the practice – fire as combustion and physical reaction, vegetation species. As most participants had already some sort of experience in fire fighting, they were familiar to the devices and objects presented during the training hours.

The mobilization of these already known work tools within the framework of a training course let emerge the different meaning that those ones acquired for volunteers and Foresters/Firemen. For the first ones, these devices are part of what can be called as their “body competence” on fire and physical skills and endurance on the field, whereas for Foresters, and Firemen, these objects mainly mediate their coordination role whereby the use of a shared vocabulary and language among the different actors becomes a crucial factor. During the course, these two main meanings and frameworks emerge and shed light on the conflict, stress and gaps in the understanding of these same work tools as well as the practice of fire fighting itself. At the same by naming and contextualizing works tools within the framework of the training course – through the presentation by professional trainers, a formal vocabulary, and a training book - volunteers' informal expertise becomes visible and accountable as “competent work”. Through this process, volunteers emerge as “orps” together with foresters and firemen in the complex practice of fire fighting.

The encouragement of a shared language on work tools become a first form of coordination among different communities of practice involved in fire fighting. At the same time divergences and conflicting understanding of these tools allows the acknowledgement of different competences defining of a complex expert practice.

#### **Track 4**

**What objects do: design, consumption and social practices**

## **Technology (Or Society) Killed The Pop Stars? A Journey along Three Objects and among Technology, Society and Pop Music**

*Bucchi Massimiano (University of Trento, Italy)*

The current crisis of the recording industry and pop music at large is quite often attributed to technological factors and the diffusion of related behaviours (mp3, downloading, cd copying). But is this really the case? Reviewing the history of pop and of its social uses along three key technological steps (namely the record player, the Sony walkman and the cd player) and related societal changes, the paper argues that the decline of both pop music and the recording industry has to be understood within broader and equally significant (demographic, social and cultural) transformations in society during the last half century; furthermore, that some of those transformations itself can be described as changes in *the culture of technology* rather than in technology diffusion itself.

The paper also challenges the conventional view by looking back at the social, demographic and cultural dynamics underlying the rise itself of pop music and of the related industry in the second half of the XXth century, showing how technological and social factors uniquely combined in fostering its spectacular exceptionally rapid growth – which to some extent could be described as the pop ‘speculative bubble’ – and thereby making the recording industry explosion no less amenable to sociotechnical analysis than its current decline. The paper eventually looks at possible future scenarios of pop music consumption, particularly in connection with the widespread diffusion of digital and web technologies. Throughout the narrative and the examples mentioned, the case of listening practices in the area of pop music is used to show that broader socio-historical transformations provide the context for what objects and technologies for listening to music could do.

**The role of devices in the configuration of innovative processes. Front End Innovation as object for management and staging**

*Clausen Christian (University of Southern Denmark)*

*Yoshinaka Yutaka (Technical University of Denmark)*

This paper addresses Front End Innovation as an object for the management and staging of innovative processes. The paper's aim is to improve an understanding of the role of devices (as objects) in the framing of innovative ideas at 'the front end'. This is pursued through the examination of the roles which objects, on the whole, play (or are brought to play) in the constitution and configuration of heterogeneous networks of relations. Focus on the paper lies in the possibility of re-framing, and thus redefining, objects, qualifying how they may perform in the staging and management of innovation. Through STS the aim is to sensitize towards the notion of 'the front end' as a construction and a space which may be managed and amenable to shaping. Hereby our claim is that relevant concerns toward focusing, organizing and facilitating design and innovation across organizational and disciplinary boundaries may be further addressed, through objects, and particularly, through a focus on front end devices.

Whether traditional technology-driven or more anthropologically-oriented market approaches, the front end yields itself as a special space where a range of challenges for concept development and product innovation is expected to be grappled with. The processes of transforming knowledge and ideas concerning technology, users and markets may be guided by methods, practices and rules of thumb entrenched in established and sustained practices within and across organizational set-ups. Such 'ordering devices' (Suchman 2007) may be construed, and by the same token, indeed, also problematized, as taken-for-granted forms of knowledge, brought into circulation in the innovation process. Front end devices may be examined as boundary objects in the transformation of knowledge practices, opening up for the situated character of organizational complexity (Carlile 2002, Zeiss & Groenewegen 2009).

The paper is grounded empirically in insight derived from industry practices, examining how particular devices serve to configure heterogeneous networks to facilitate, or hamper, mobilization of ideas and visions into realizations in use practices of the market (Akrich 1995). In this light two cases are explored in the paper. One case deals with the role of an industrial product concept in the product and market co-configuration for low energy consuming domestic circulators; and the other, with user representations by way of design anthropological studies of users and through personas in the innovative process.

The element of agency with respect to devices has been elaborated in works by Muniesa et al. (2007). Here, agency entails not a set of pre-defined sets of interaction among persons and objects, but collective agencements, bearing open to exploration as to how products, services and market actors are framed, and undergo translation and displacement. The paper elaborates on the repertoires of knowing that enter into, and help articulate, the workings and enactment of objects in and through the staging of front end innovation, and the difference which front end devices hold, for the heterogeneous enactment of distributed agency.

#### **Track 4**

**What objects do: design, consumption and social practices**

## **The Meaning of Objects in an Internet-of-Things World**

*Criel Johan (Alcatel-Lucent Bell Labs/University of Ghent, Belgium)*

*Claeys Laurence (Alcatel-Lucent Bell Labs, Belgium)*

The upcoming of Internet-of-Things (IoT) objects will change the way we engage with objects in our everyday life. Internet-of-Things objects are physical objects networked and imbued with informatic capabilities (sometimes called spims (Greenfield, 2005) or blogjects (Bleeker, 2006)). In general we can say that every thing will get a unique identifier and can be augmented in a certain way. Things will for exemple have the capability to sense and communicate their noise level, their temperature, their distance to another thing or the amount of times they are being touched by a person. An interesting question is in what way this augmentation of objects will change the 'being' of objects and their enactment in the world.

The first steps in the Internet-of-Things world are that objects generate data by sensing. This sensing creates a huge amount of data. This data is kept personal or shared for all. What will people do with this data, how will they give meaning to these sensing objects? And how does it change their enactment in the world? Are their links with the current trend of gathering own generated data as seen in personal informatics applications (e.g. Daytum, Impact, CureTogether, DailyBurn,...)?

Relaying on Object-Oriented Philosophical concepts of Graham Harman we seek for an answer on this question by combining the work of Martin Heidegger and Bruno Latour, grounded in a speculative research on the Internet of Things world.

## **Objects, 'Instrumentalities' and the expansion of social practices: an investigation of organisational development in an UK NHS Emergency Department**

*Crump Norman (Lancaster University Management School, UK)*

*Latham Yvonne (Lancaster University Management School, UK)*

The role that objects play within the social world has been recognised as an important area of discussion within social science. Within sociological studies for example, Law (2001) suggests that, social networks are 'composed not only of people, but also of machines, animals, texts, money, architectures - - any material that you care to mention.'(p2) Indeed, he argues, 'we wouldn't have a society at all if it weren't for the heterogeneity of the networks of the social.'(p3) Drawing on empirical data generated from an ongoing study of a UK based healthcare initiative this paper seeks to explore the movements and tensions that are occurring within the heterogeneous networks that make up this initiative.

A key government 'quality' measure of health services in the UK is that concerned with the waiting times for people requiring a service from Emergency departments (also referred to as A&E), the current 'gold-standard' is set at four hours. This target, along with the Emergency department's role as a gateway/gate-keeper of hospital beds, situates it as a site of great interest for both managerial and clinical groupings. This paper focuses upon one such intervention/innovation, where a group of experienced General Practitioners (GPs) are working on a sessional basis 'within' an Emergency department, while continuing to work in general practice (this is a radical re-configuration of the division of labour from a UK perspective). The research, whilst in its early stages (3 months at this time, March 2010) is already producing interesting data. A particular area of interest for the researchers is the apparent 'expansion' (Engestrom et al, 2003) of the activities and practices of staff working in the Emergency department. This 'expansion', which appears to have both a managerial and clinical impact, is producing tension within the clinical groupings to shift and alter their views of their work.

Our initial understanding of these empirical happenings is influenced by cultural-historical Activity Theory in organisation studies (Blackler, 1995). Such a view would argue for a close investigation of the construction and maintenance of a shared 'object of activity' within a particular context (in this case the Emergency department) and its wider environments. The managerial impetus for such a development is illustrated by a comment within a recent report produced by the *NHS Emergency Care Intensive Support Team* following an inspection of the Emergency department.

*"It appeared that the focus of this group (management and clinicians) was the delivery of the 4 hour standard. This re-enforces the impression of this standard being solely hospital based rather than more appropriately across the whole system."* (emphasis added)

For the members of the inspection group, 'emergency care' was not something practiced only within the confines of the Emergency department but was to be found 'across the whole system'.

As already indicated, the study is very much a work in progress but by the autumn we will be able to share and reflect with colleagues evidence of the development of new 'objects', new

#### **Track 4**

##### **What objects do: design, consumption and social practices**

mediating 'tools' what Engestrom et al (2003) has called '*instrumentalities*' which emerge out of the 'expansion' of practices within the research setting.



## Turning Laypersons into Experts

*Entwistle Johanne Mose (The Alexandra Institute)*

*Soendergaard Astrid (The Alexandra Institute)*

How do human beings interact with and perceive extensive technologies in the home? And how do these technologies affect their perception of the world surrounding them?

These are some of the critical questions which our anthropological study of a family living in a fully automated house has led us to pose. In this paper we will argue that Giddens' analytical concepts of 'expert systems' and 'layperson' are helpful when shedding light on these questions (Giddens 1990). However we will also argue that we need to challenge Giddens' binary division between laypersons and expert system in order to see the full picture. Conclusively we will explore the potentials of turning the theory upside-down: Turning laypersons into experts and thereby framing their interaction and perception of technologies differently.

Our study deals with a scenario in which technology has invaded a great part of the most intimate sphere of people's lives - their homes. Not surprisingly our study has shown that such a scenario can cause frustration and anxiety in the daily lives of the users. But the picture has turned out to be more complex than that: Our study reveals how the family has very contrasting experiences of their home automation system as both a co-player and opponent in their daily lives and this leads us to investigate further into the consequences of interaction between users and technology.

When conceptualizing home automation systems as expert systems and the family as laypersons, we see how lay-persons don't have full access to or control over their home automation which they are dependent on for banal tasks such as drawing the curtains or opening windows. When the system fails to provide these services, it poses a threat to the family's trust-willingness in the system. We will outline the consequences of this and show how they affect the family's appropriation and use of the system.

Giddens' concepts help frame the family's experiences, but they miss out on the different positions that the so-called lay-persons can hold in relations to the expert system. In order to consider the complexity in our study we therefore need to supplement Giddens' concepts with an anthropological approach where we consider how users' different positions play an important part in their relations to and experience of the expert system and the world around them.

But we still paint a picture of a world made up of experts (systems) and lay-persons and we must ask ourselves what happens when we use these analytical concepts to represent our world? How are these concepts underpinning the construction of home automation as an expert system and users as lay-persons i.e. non-experts? If we want to develop a home automation system for the users, it might be helpful to turn the concepts upside-down. The paper will thus discuss what we gain if we consider users as experts; experts in terms of their own lives and use of technology in it. This discussion will shed new light on how users can perceive and use technology.

## Curbing stubborn objects: How functional foods challenge regulatory borders

*Janasik Nina (Aalto University School of Science and Technology, Finland)*

*Niva Mari (National Consumer Research Centre, Helsinki, Finland)*

*Jauh Mikko o (National Consumer Research Centre, Helsinki, Finland)*

*Hukkinen Janne (University of Helsinki, Helsinki, Finland)*

As objects, so-called functional foods pose special challenges for producers, consumers and regulators. In particular, questions have been raised about the safety of the products and the credibility of the claimed health effect as well as the medicalization and technologization of food that functional foods imply. These challenges have often been attributed to the peculiar nature of functional foods as 'hybrids' between food and medicine (e.g., Lehenkari 2003; Jauho and Niva 2010). However, less attention has been paid to what we here coin the 'double nature' of functional food objects, i.e., the fact that such foods belong simultaneously to the categories of conventional foods such as yoghurts, and to the hybrid category of health-enhancing foods (e.g., Lähteenmäki and Urala 2003). Due to this double nature, the domestication of functional foods has typically progressed through a two-stage process of, first, category *subsumation* (the new product is familiarized by showing how it is similar yet different when compared with conventional foods) and, then, category *expansion* (due to the addition of the new product, the category itself transforms). Such a process can be identified for instance in Finland starting from the early 1990s (Urala and Lähteenmäki 2003; Niva 2008).

In terms of recent thinking on institutional change (e.g., North 1990; Seo 2002), these categorical expansions represent *informal* institutions, whereas the formal regulations that were later to follow represent *formal* institutions. From this perspective, a delay in the regulation of the novel products is to be expected, since institutional change results from a friction between informal and formal institutions (North 1990; Seo 2002) that eventually leads to the modification of formal institutions to better reflect the informal ones. In Finland, although the first functional food product was introduced already in 1990 and the product category made its final breakthrough in 1995, national legislators did not react until 1997, and then too only as a response to deliberate testing of existing regulatory borders by one producer of functional foods (Langlais, Janasik and Bruun 2004). At the level of the EU, the delay has been even greater. A common legislation pertaining to functional foods was introduced as late as 2007 and parts of the regulatory system are still in the making.

Having observed the unfolding of the two-stage (category subsumation and expansion) domestication or *informal* institutionalization process, our paper asks, based on textual analysis of administrative and legislative documents, what kinds of challenges the objects have posed at the level of regulation, or *formal* institutions. Is the double nature of functional foods significant not only in the informal but also in the formal sphere? Our preliminary conclusion is that incorporating functional foods into national and EU legislative systems does indeed replicate the general categorization dynamics (from subsumation to expansion) found at the level of informal institutions. This has had interesting repercussions on the structure of the regulatory system: it focuses on health claims instead of demarcating a

#### **Track 4**

##### **What objects do: design, consumption and social practices**

specific category of functional foods, but simultaneously re-introduces categorization by delineating the conditions in which health claims are allowed.

## The many faces and phases of the Semantic Spider

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*Rimpilainen Sanna (University of Stirling, UK)*

This paper tells a story about a hybrid object known as the 'Semantic Spider' that was born out of need to illustrate the concept of semantic web within Ensemble [1]; a diverse, interdisciplinary research and development project between education and computer sciences. The purpose of the project is to study case based learning across disciplines in higher education and to develop semantic web applications for supporting that learning.

The semantic web is the concept of an internet where all data is stored in machine-readable formats [2], which offers many new possibilities in exploring and reasoning across heterogeneous data sources and types. What began as a simply-drawn diagram depicting the technological complexities required to achieve this vision, has evolved into a complex, multiple, unstable and continually evolving object. This diagram, known informally within the team as the 'Semantic Spider', plays multiple and varied roles within the team: it is being used by the team not only for operationalising aspects of the semantic web in their research and development, but also for enacting these activities in multi-disciplinary settings. It also acts as a thinking tool for the project members in making sense of the complex research settings and data, as well as with helping to theorize the design processes. The diagram is powerful in informing and engaging research participants in the work of the project, helping them to understand the complexities of the project work, and to envisage the possibilities offered by the technology, among others.

The different versions of the Spider are designed purposefully for use in varied contexts, but these also evolve through chance discussions. As an object, it has no original but a lot of copies; it plays a varied role in work of the project, influencing and being influenced by the research activities. It is a conceptual-material-human hybrid. The project work is still on-going for another year. What happens to the Spider after the project is finished remains to be seen - will it be forgotten and become redundant, or will it become an object like Tim Berner-Lee's iconic Layer cake [3] which we started off with?

In this paper we will first trace the different phases of the Spider, and account for how it has evolved and been constructed for different purposes and settings. We will then explore the different faces the Spider shows in order to work in different contexts. The story of this diagram exemplifies the multiple realities of a research project and its practices.

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## **Obdurate Infrastructure as Catalyst for Urban Change**

*Karvonen Andrew (University of Manchester, UK)*

Urban infrastructure mediates the everyday life of urban residents, dictating the use of energy and water resources, facilitating the disposal of liquid and solid wastes, allowing for communication and movement, and sheltering from the elements. These technological networks are frequently interpreted as the naturalized background of the city, comprising a ubiquitous presence that is largely obdurate to change. This inflexibility of infrastructure is often characterized as a barrier to realizing improved urban futures, whether they involve lessened reliance on fossil fuels, greater resilience to changing climatic conditions, higher degrees of neo-liberal capitalization, more equitable social conditions, and so on.

However, the obduracy of urban infrastructure can paradoxically be a catalyst for change. In this paper, I examine this paradox through a case study of the High Line project in New York City. The much publicized project opened in June 2009 after a decade of work by the municipal government and community residents on the west side of Manhattan to transform an abandoned elevated freight train structure into a public park. The storyline of the project frequently centers around the perseverance of a small group of active community members who convinced the municipal government that the elevated structure was worthy of preservation, as well as the genius of two landscape design firms to translate the residents' desires into an achievable project. However, this narrative largely overlooks the most crucial actor: the massive iron structure that looms two stories above street level. The structure is a nonhuman agent of change, inspiring a shared urban imaginary amongst the neighborhood residents through its ubiquitous and enduring presence.

The High Line project reveals infrastructure as an urban intermediary, a relational agent that brings together the past and the future, the subject and the object, the natural and the constructed. Using ideas from actor-network theory, post-structuralist geography, and landscape theory, I argue that infrastructure should not be interpreted as the stage upon which urban residents conduct their everyday lives but as an active participant in the co-production of contextually-specific city experiences. Recognizing infrastructure as a central agent of urban change compels us to begin considering design practices in a different light. Such practices are not merely a means to realize more desirable future conditions but a process of relating the various currents, pressures, and tensions of the contemporary city.

## **A community of objects: How old and new objects form relationships and perform connection and community**

*Liegl Michael (Johannes-Gutenberg University of Mainz)*

Social network sites like myspace, facebook or twitter have probably been the most prominent subject of thematizing technology and community in recent years. These websites are effectively, or at least performatively turning the findings of social network analysis into the construction of technologically enhanced social networks.

In my presentation I explore the inscription of social ideas into technological artifacts and the technologically mediated performance and construction of “community”, albeit on a much more local level. Here, the mediator (Latour 2005) is not a website, but a simple cable, a so-called “audio-snake”, which takes the sound from the participants of a jam session and routes it to an amplification system, which in turn projects the common acoustic output. Really not much more than a kind of audio extension-cord, I will ask how those *snakes* are made into and act as material metaphors with a strong semiotic potential for suggesting and creating feelings of community.

I encountered the snakes while studying the new media collective “Share”, where I explored the notion of the social gathering of humans and laptops as a technoid (cyborg) community. The *laptop community* seems like a contradiction in terms, introducing *interfaces* where humanistic expectations of unmediated *face-to-face* interactions usually prevail, causing problems in accountability not unlike the mobile phone does (Schegloff 2002, 285ff.). This disturbance of the interaction order - a kind of alienation – can be alleviated by for instance organically extending the “collective” and thus integrating these new technical objects as members.

At Share I argue this integration work is done mainly by and through the snakes, which not only effectively *connect* people's activities in the jam session, but which at the same time provide opportunities for *performing* community: they are built in common soldering parties, cared for and talked about a lot (they have to be transported to the event every week, and they give an opportunity to display do-it-yourself ideology). Most importantly, however their semiotic capacities become active, when they are re-introduced in stylized form as a logo symbolizing collectivity and connectedness.

This “old technology” and the discursive and non-discursive practices around them, I argue can be read as attempts of establishing a template for cyborg communities of human-laptop units. An old analog and almost organic feeling technology, the snakes I argue, offer a home, a symbol, and a way of connection to those new technologies, giving them a place in the collective. They work in a way as a socialization agency for those new technologies.

Talking about cables I analyze the material semiotics of community, i.e. how certain objects are turned into objects of community and how they in turn mediate and perform that community.

## The Use of Mediating Artefacts in Design Research

*Light Ann (Sheffield Hallam University)*

Objects are used in diverse ways in design research to elicit information. By looking at the positioning of objects for inspiring reflective and critical discourses around use, we draw attention to the role of the 'artfully' (Suchman 1999) placed artefact and what can be staged with it.

Specifically, we describe the work of artefacts as tools for inspiring reflection on the role of designed objects in everyday life. We explore this in two ways. First, we observe how artefacts perform in engagements between designers and informants. Their introduction permits a change in relations; taking focus from the actors' relative status by creating a common gaze and promoting a collusive relationship as co-producers of the artefact's meaning. In this position, we can liken the performance of the artefact to enacting a question, but unlike verbal questions from the designer, offering a form of enquiry that is simultaneously literal as language cannot be - since it draws attention to embodiment and encourages gesture - and more overtly symbolic, in that it emphasises the openness of the interpretation process.

Second, we can explore the relation of the artfully placed artefact to objects-in-use by the informant and to *future* objects-in-use. Thus, the artefact performs not only a negotiation between designer and informant, but also a reminder of other objects – not artfully placed objects, but objects in the memory. The artefact stands in as a rehearsal for the use of other items, making them strange and knowable, e.g. Ehn & Kyng's (1991) use of "cardboard computers". This rehearsal involves both displacement in location and disruption in time. The artefact stands in for objects-in-use *to come*: informants can project to future uses as well as describe current ones more explicitly. The designer is able to acquire knowledge from observing the informant's use, as symbol for interpretation and as icon for the objects that give shape to the informant's world.

We then explore artfully placed artefacts in different settings, showing how they can perform several types of mediation depending on their deployment by the designer. We draw on Mogenson (1991, 1994) and Bowen (2009) to show how artefacts mediate collective activity and embody assumptions about it and the role of designed objects. In this scheme, instead of using artefacts as prototypes to resolve a final design, the designer/researcher deploys artefacts as:

- Prototypes, to disrupt participants' practice and reveal the assumptions within it;
- Probes (Gaver et al. 1999), to understand and be inspired by participants' perspectives;
- Critical artefacts (artefacts-as-critiques), to enable participants and designer to recognise unwitting assumptions of what is acceptable/possible and consequently envisage new possibilities.

Last, we consider these different settings and the act of artfully placing. Is the artefact distinct from the context in which it occurs (Johnson 2006)? We end with a consideration of figure and ground. Drawing on the notion of performativity (Butler 1990) and the preceding analysis of mediation types, we show how the artefact sits at an intersection of trajectories (Massey 2005), constituted by place and time, its materiality and a legacy of earlier designs, and the expressive work of the human actors.

### **Evaluations of subjects/objects in admission tests**

*Malou Strandvad Sara (Roskilde University, Denmark)*

*Sommerlund Julie (The Danish Design School)*

Currently, both sociology of art and anthropology of art are witnessing a growing interest in what objects do and how objects may be addressed as active agents (e.g. de la Fuente 2009, Pinney and Thomas 2001). In the sociology of art, the work of the French cultural sociologist Antonie Hennion stands out as a STS-informed perspective developed in cases of music lovers (2001, 2007). In the anthropology of art, the British cultural anthropologist Alfred Gell has suggested seeing artworks as mediating social action (1998, 1999). Both perspectives approach the artwork as something different than a bearer of meaning. Moreover, both optics offers to transgress the subject/object distinction by looking into how the subject is produced by the object as well as the object is produced by the subject.

In this paper we re-address the question of what objects do to their creators. Based on empirical observations from admission tests at the Danish Design School, we look into how creators are produced when their objects are evaluated. In the specific case, portfolios are used to discuss and assess whether or not to admit students to the school or not. Approximately 6 – 700 hundred portfolios, marked with numbers rather than names, are assessed by an eight to nine evaluators over the course of four days. On this basis, approximately 200 students are picked out to go through a final round of interviews. This paper will focus on the practice of assessment which centres on the portfolios. This situation presents an extreme case of objects producing subjects, and will thus serve to mirror the traditional subject/object relation.



## Manifestations of the future city: Tracing urban imaginaries

*Michels Christoph (Lancaster University, UK)*

*Kublai Khan had noticed that Marco Polo's cities resembled one another, as if the passage from one to another involved not a journey but a change of elements. Now, from each city Marco described to him, the Great Khan's mind set out on its own, and after dismantling the city piece by piece, he reconstructed it in other ways, substituting components, shifting them, inverting them. (Italo Calvino: Invisible Cities, p.43)*

The paper traces ways of performing cities and their architecture. It explores manifestos and other programmatic texts from the disciplines of architecture and urban planning and reconstructs four narratives which relate "the material" and "the social" of urban life in specific ways. Therein the paper differentiates between a functional, a critical, a deliberative and a situational mode of performing cities and suggests that these modes differ in their specific politics and aesthetics. Each mode creates different object and subject positions and creates its specific atmosphere by translating "the city" into an assemblage of concepts, metaphors and images.

The four narratives describe ways of dismantling the city piece by piece as well as ways of reconstructing it in other ways, substituting components, shifting them, inverting them. By translating urban conditions, new technologies as well as human bodies with their capabilities, routines and desires into new imaginaries of the socio-material order of urban life each manifesto is a design in its own right. Made from ink and paper manifestos can be conceived of as "immutable mobiles" that travel swiftly, enter, transform and are transformed by a variety of contexts.

The paper is theoretical in the sense that it discusses texts and concepts from urban studies and architecture theory. However, it is empirical in that it understands these texts as participants in specific modes of doing or enacting cities and their respective futures. The narratives that are present in these manifestos are understood as resonating in the wider contexts of everyday urban life and its planning. Within this paper, however, I will focus on the "designing of text" since it is here where the inherent logics of the different modes of enacting the city, the tensions between those modes – their politics – and their aesthetics become most obvious and can be contrasted most clearly. It is in the polemic enactment of manifestos where we encounter the ordering principles in their purest form. Manifestos are designed in such a way that they make the actual messiness of urban life invisible and present "ideal" relations between the human and non-human actors in their "utopian" or "theoretical" narratives.

Although some of the planning manifestos claim universal validity I understand them as neither all encompassing nor as independent from each other. Instead I describe them as more or less contesting forms of enacting the "Western" city. However, the aim of the paper is not to debunk the political dimensions of urban design manifestos but to investigate how they are crafted and to encourage the reader to critically reflect upon their politics in order to eventually use manifestos as a method of enacting their own political agendas. As a conclusion of the paper I will present a manifesto for new ways of designing the real and imagined realities of urban life.

## **FabLabs. Interactive Design for Grassroots Innovation**

*Neicu Maria (Maastricht University, The Netherlands)*

*“For the world to become knowable it must become a laboratory” (Latour, Bruno. 1999: 43; cf. Krohn & Weyer, 1994; Bockman & Eyal, 2002; Gross, 2003, Gieryn, 2006).*

This research looks on FabLabs (Fabrication Laboratories) as a pre-defined locus of grassroots innovation, and collective intelligence. The playful exploration offered by FabLabs has a huge impact on how non-experts participate in public debates for policy making in Science and Technology. FabLabs prove that non-expertise is not about 'not knowing', but about bringing on a fresh and open minded approach to Science and Technologies. FabLabs are telling stories, offering living narratives in which non-experts can be engaged. Their learning role is achieved when lay people exercise their innovation skills and critical judgment.

The paper analyses how the innovation process mingles Reality and Virtuality, especially in the relation between Software and Hardware, questioning the role of Computer Simulations (Sherry Turkle, 2009) for making conversational, by creating, tinkering and testing interactive objects. The main role in this new link is played by Simulations, as a rhetorical transitional state of the materiality, connecting humans and objects, by changing materiality and blurring the border between the physical and the virtual world. Here I find relevant Bruno Latour's (1999) principle of symmetry in human and non-human actors: the paper explores how human and artifacts are suspending the notion of materiality, exploring the differences between following experts and “non-experts” in a lab. People with no conventional technical background can hijack machines and the effect is visible in terms of social engineering: Social boundaries and backgrounds fade away in this process. In the same time, they are manufacturing is re-structured manufacturing: within a FabLab, the innovation capabilities of a huge factory can be brought down to an individual level, leading to *one-person markets* (Neil Gershenfeld).

In this context, I see Computer Simulations as narratives. Telling stories has always been important for creating critical reasoning. Just think of the learning role of myths. The paper analyses Computer Simulations as a type of narratives, with normative consequences for citizens decision making in Science and Technologies. FabLabs are just making this practice become real, offering a perfect space for non-experts to exercise their innovation skills and critical judgement, in a form of social engineering.

Interestingly, in the FabLab context, during the ethnographic research, I experienced how predetermined settings are pulverised and users can set up their own scripts for making objects that narrate the world according to their personal views. In a way, social engineering performed in FabLabs are filling up the gap between the “world inscribed in the object and the world described by its displacement” (Akrich: 1992, p.209). Therefore, in a FabLab, re-engineering is performed for commutating and displacing *both* physical artefacts and the representations attached to them. While designing an object, no one is imposing any ‘right frame of mind’. The instrumental limitations are thus lifted up. In this context, we can relate to Winner's view: Winner (1980) argued that some technologies are inherently non-democratic... But is their physical state pursuing against democratic principles, or actually our representations of usages and meanings attached to them?

Open design and re-scaling manufacturing is deeply disturbing for organisations and most of them, even the most innovative ones, are considering grassroots innovation- namely what Raymond (1997) defined as “the bazaar” or the knowledge based economy- as a threat. But is the instrumental empowerment against the democratic principles? Is technology imposing limits on what can be done, or is it ourselves? What are the advantages (for the triple axes) of the recognition of non-experts knowledge and capacity? How can the incidence of this type of recognition be increased, speeding up grassroots innovation? Moreover, how can the FabLabs stimulate more the local knowledge impact on S&T issues?

## **Disrupted by a New Script: Exploring the Meaning of Gestural Video Game Interfaces**

*Nova Nicolas (Geneva University of Arts and Design)*

*Jobert Timothée (Timothée Jobert – CEA)*

Emerging technical objects such as the Nintendo Wii or Sony Move increasingly engage people in bodily interactions to control digital artifacts. In the context of video games, a new "script" has emerged, as players are now required to be physically active. Instead of pushing buttons on "game pads", users of so-called "gestural interfaces" now have to mimic physical activities such as doing tennis movement or turning a steering wheel through the manipulation of a remote control device. On the one hand, this new category of interface was meant to offer direct familiarity for users who may be discouraged by more complex tools. On the other hand, they are expected to generate new avenues to design original games. This recent trend interestingly renewed the quest of the video game industry for realism, seen as the key to bring players a feeling of immersion. For a long time such an agenda has been restrained to the graphic aspects. The advent of gestural interface shifts this interest to the use of bodily movements as a way to be more realistic.

While the experience of the visual realism is well documented, the notion of realism in interactions per se is less addressed. Therefore, we carried out an ethnographic study of the appropriation of this technical object. In order to deal with this issue, we have compared the perceptions and the practices of players with different video game controllers (Wii remote control, a standard game pad and a Body pad). Ten individuals participated and the sampling structure was made of 5 experienced persons and 5 casual players. Adopting an ethnographical perspective, we observed sequences of play and interviewed them after the sessions.

Our observations as well as players comments in this contextual enquiry highlighted two key results concerning how this new technical object generates meaning.

First, we observed that the appreciation of gestural interaction seems to follow a similar pattern as a phenomenon called "The Uncanny Valley". This notion generally used in robotics and computer-generated graphics states that when artificial representations get closer to resembling reality, the slightest inaccuracies can shift our attitudes from empathy to disbelief. Game controller evolution from buttons to gestures seems to generate a better realism. However, the appreciation of so-called more realistic gestures seems to be present until a certain threshold.

Moreover, the perception of realism is complex and related to the level of expertise in video game play. Casual players felt that the use of gestures was a good way to make games realistic and compelling to play. For experienced player, gestures only reflected a dimension of realism. Using the gestural peripheral they lacked the quality of control they had on standard game controllers made of buttons.

This empirical study enabled us to stress to what extent recent video game peripherals based on gestures generated meaning and let us wonder about the complexity of what is perceived as "realistic". Such body of work also enabled us to discuss how to design technical objects that would benefit from this exploration.

## **Car Exhibitions in the 1960s' Greek Culture**

*Papazafeiropoulou Alexia Sofia (National Technical University of Athens, Greece)*

The paper aims at the depiction of the car culture in Greece in the decade of 1960, emphasizing on the car exhibitions that are held for the first time in the country at that time, as spaces of the conform of technological as well as consuming consciousness. The research field is approached through the study and discourse analysis of car representations in Greek magazines and newspapers of that period.

Given the fact that during the recent years, there has been an interest within the international as well as Greek bibliography concerning Car Culture, since it elucidates issues of Consumption and Material Culture, Transportation History, Landscape and Urban Studies, from the aspect of the History and Sociology of Technology, the paper attempts to focus on the function of the car as a consumption object, related with the construction of social as well as consumer identity in the Greek society of the period referred above. Moreover, the car can be considered as a technological artifact with a central role not only in the reformation of the Modern Greek culture, but also in the re-signification of aesthetic and cultural codes of social action.

The research theoretical context should be connected with the particular characteristics of the Greek case in the decade of 1960. During the Mid-War period, car was considered as an elite's transportation mean in the local society, whereas the attempts for the establishment of an indigenous car industry didn't come to succeed. Thus, the diffusion of the car use took place late in this state, in comparison with other European countries. However, because of the rapid growth of the Greek economy at the first decades of the Post-War period, a public enthusiasm related with car can be noted in the 1960s, locating it as a consumption product in the centre of the middle class' everyday life, and leading to a shift of its social signification. In regard with the above, the research sets as a starting point the supposition that consuming and technological objects have the function of establishing social meanings and mediating collective perceptions, via their ability of cultural communication and reflection of discourse norms and values systems within the context of material practices. From this point of view, car exhibitions in Greece can be examined as loci of mediation junction of the technology products' social biographies with the cultural experience of human actors, and the reconstitution of social structures and taxonomies, such as class distinction. Additionally, taking into consideration the instrumental notion of hybridism of people and machines that can be useful for the study of modern societies, the car exhibitions can be seen as field of semantics in which social behaviors and categories, such as gender roles are redefined. Finally, it is argued that the research conclusions can contribute to the understanding of the Post-War Greek culture, since this historiography field hasn't been meticulously examined, especially in relation with technology matters.

## **Anticipatory social performance through manufactured technical objects: the eID case study**

*Parotte Céline (Liege University, SPIRAL, France)*

Since 2009, after a decision of the federal Belgian government, all Belgians possess an electronic identity card (eID). In this paper, our ambition is to trace the performative effects of eID as an artefact that may reconfigure the relationships between different social actors.

Designed with a digital signature combined with a personal identification number, eID creates new opportunities for use in various contexts — for example for social services, taxes, health, retiree benefits and driver's licensing — as well as possible ethical, legal and social issues (ELSI). On the other hand, this also embodies a new commercial opportunity for industrial designers looking for additional applications. Recently, one of them is related to social elections — a legal restriction in Belgian consociational model of democracy for firms bigger than 50 employees.

At the moment, there is an ongoing dialogue between industrial producers and government officials on the possibility to implement eID for next social elections in 2012. For industry, so the argument goes, an electronic vote through eID would allow a better, cheaper and safer system for social elections. For government, so the argument goes, this would allow a quicker and more flexible way of voting for the social partners, while such an attempt would be of interest for a possible generalization of the system for future local and legislative elections. Anyhow, the implementation of an electronic vote for social elections would constitute a specific performative effect of eID.

In the meantime, together with social scientists, the industrials are involved in a research project funded by the Walloon regional government, focusing on social elections as a main topic for case studies of new possible context of use for eID. In that research project, named "System of Electronic Exchange" (SEE), performance is highly valued. For that reason, two interrelated building blocks are importantly discussed by the research partners: reliability (of the artefact, but also the system to be implemented) and trust (of the social partners). To serve the purpose, a participatory design arrangement is to be settled, in order to involve the users, integrate knowledge and expertise in an iterative learning process. In others words, performance will be assessed by the final users (the voters) and will condition the nature of future performativity of eID within the socio-political landscape.

Based on official document analysis, semi-structured interviews and informal discussions with actors from politics, social workers, industry and industrial federations we will argue that the SEE project we are part of is an attempt to cut into heterogeneity and complexity through design and planning. However, although it calls upon new and reflexive practices like participatory design, this remains limited by a typically modernist approach of anticipation from craft knowledge. Under that scheme, the modernist logic of order and division of labour between technical and social experts is maintained, through powerful mechanisms of purification of boundaries.

## **Non-Human Activism: the role of objects and things in the production of topologies of change**

*Rodríguez-Giralt Israel (Universitat Oberta de Catalunya, Spain)*

My research aims at connecting two fields of study which have not had much interaction in recent decades: on one hand, the study of social movements, and on the other STS. With this purpose, my doctoral thesis discussed the implications that an STS approach could have for the analysis of contemporary collective action. As a result of this research, I have lately been interested in studying the role of non-humans in the production, development and consolidation of forms of protest. In this context, my main goal for this paper would be to recognise the relevance of technical and material dimensions of non-humans for understanding the creation, stabilisation and transformation of forms of protest. In which ways non-humans contribute to articulate and give form to modes of protesting? Drawing on the framework that establishes the so-called social topology, I would like to explore how political resistance was enacted in Doñana's Ecological Disaster, one of the most serious environmental crisis in the recent history of Spain, and critically discuss how non-humans are taken into account in social movements' definitions. Focusing on the practices of environmentalists' groups to involve non humans in their action and in their attempts to redefine the content of the controversy, I will state that it is necessary to take into account not only the number but also the nature of the "others" involved in the enactment of protests. In effect, depending on the number but also on the nature of entities involved in the chains of interaction that popularly are recognised as social movements, a particular mode of protesting will be produced. In this sense, drawing on the heideggerian differentiation between objects and things, I will argue that while objects are important to produce a mode of protesting where order, coherence and consistency become relevant, things, with their heterogeneous and contested nature, are crucial to enable a mode of protesting that can transform events into opportunities. These observations will allow me to finally vindicate the need to critically explore this mutable and contested role of non-humans in the production of topologies of change.

### **The white cane and blindness: meanings and social practices**

*Sena-Martins Bruno (Faculdade de Economia da Universidade de Coimbra, Portugal)*

The white cane is an object used by blind people. Besides its instrumental value as a mobility technology, it is also the universal symbol of blindness. Therefore, the user of the white cane will carry the various and contradictory meanings socially associated to blindness. Grounded in a longstanding ethnographic experience undertaken with the Associação dos Cegos e Amblíopes de Portugal (Association of the Blind and Visually Impaired of Portugal), I propose to evaluate the plays of power and subjective implications surrounding the appearance of the white cane in the public space. Through the white cane I will address the complex relation between the cultural representations socially disseminated on blindness and the lives of those who know its implications in the flesh. Given the long and persistent exclusion of disabled persons in our societies, I argue that the symbolic values surrounding the white cane allow us to capture the struggle between an empowering perspective of blindness, in which the white cane can be a central instrument for personal achievement, and an hegemonic perspective through which the white cane tends to represents the “personal tragedy” (Oliver, 1990) associated to blind people.

I argue that the cultural and historical representations elicited by the urban uses of the white cane allow us to establish a dialogue between the cultural representations of blindness, the personal experiences of blind people and the existing social organization that discriminates disabled people: subalternizing beliefs and attitudes; architectural, transportation, and communication barriers; insufficient, inadequate or non-existent support in the regular education system; systematic exclusion from the economic activity, precarious salaries and precarious work-conditions.

Instigated by the powerful disparity emerging from the cultural hegemony and the experiences/ expectations of disabled persons, I try to understand how the cultural representations about disability struggle in social live. I pay particular attention to empowerment and resistance narratives resulting from the organizations of disabled people that emerged during the 1970's.

## **Ceramics under the microscope: Uncovering the social and science in creative practice**

*Smith Hilary (University of Brighton, UK)*

*Boys Jos (University of Brighton, UK)*

What can a scientifically-focussed interpretation reveal about the interplay of contextual factors in creative learning spaces? It is widely acknowledged there can be large differences in how artists and scientists see the world. Creative practice can evoke an image of undirected explorative activity, extravagant use of time and materials, and discarded 'mistake' pieces during the process of art work development. Reflecting on art practices from a scientific or efficiency perspective could exemplify this image through impoverished appreciation of skills, knowledge, resources and time required to develop a piece from concept through to 3-dimensional reality.

In this pilot study of ceramics teaching and learning at higher education (HE) level we found assumptions around creative practice are challenged by a science based inspection using a grounded theory approach (Glaser & Strauss, 1967). The creative practices of 12 students, supervised by 3 tutors over a 3 week period, were observed whilst they each created a plaster mould from which clay pieces were formed, then kiln-fired, finished and glazed. We discovered an intricate and complex inter-relationship between the application of science routines and processes with socially constructed and valued peer interactions.

Observations revealed frequent references to scientifically based, precise procedures through:

- accurately measuring and time-managing chemical reactions required to form a good plaster mix, or to add colour and glaze to clay pieces;
- strong emphasis on students' explorative experimentation
- the haptic experience of feeling and working the texture and moisture of the clay;
- the acquisition of in-depth knowledge about chemical interactions and percentage of shrinkage obtained at different kiln temperatures on different clay types;
- the importance of accurate record keeping for refining and replicating processes;
- and development of critical reflection skills to understand what actions produce desired results.

Intricately bound with this performance of science activity we identified a plethora of social nuances and performance through which experts imparted their knowledge and peers engaged in informal support. For example:

- sharing the work involved in production, and use of a batch of fresh plaster viewing and informal reflection on peers' pieces on display at drying stage;
- engaging conversations with older students on their activity and achieved effects;
- sharing of tutors' own practice experiences and mistakes
- and the formal critical review process, reinterpreted as a version of speed-dating to encourage maximum interactive engagement with forming opinions about students' own and peers' work.

In this presentation we will illustrate findings on how experimentation and discarded objects are intricately bound.



## **The establishment of heterogeneous networks in performative spaces**

*Suenson Valinka (Aalborg University, Denmark)*

*Harder Henrik (Aalborg University, Denmark)*

This paper presents an empirical research combining the Actor Network Theory with a development of RFID (Radio Frequency Identification) technology for tracking indoor movement behavior. The aim of the paper is to discuss the value of RFID technology as a method for observing heterogeneous networks in public spaces between users and architecture.

During the past decades there has been an increasing tendency to construct Danish public community centers with an aim to make them multifunctional, flexible, and facilitating individual needs of the users. This tendency is seen both in Danish sports facilities and in libraries. The demands (of the users) have become increasingly individualised, and neither the library nor the sports facility can any longer survive relying on their traditional functions. This effects the way these indoor public spaces are constructed and renovated. The performative space is in high demand and an attractive goal for developers.

The paper presents two case studies from a contemporary Danish library and a Danish sports facility where the performative space is in focus, and the interaction between the architecture and the users is needed before the architecture is fully unfolded (Kiib, 2009). By interacting with the surroundings, each user can create their own unique experience every time they visit the library or sport facility. Both cases are placed in the north of Jutland, Denmark. The sports facility is a renovation of an old public swimmingpool originally build in the seventies, the library is a new construction build in 2008. Both the centers offer more functionalities than what is normally combined with books or swimmingpools. Regarding the library a café, a childrens playground, study facilities and hidden spaces for quietness and contemplation can be found. The sports facility has incorporated a library and a fitness center, as well as a multifunctional sports hall. With these new changes, both facilities are now more than just public spaces that serve a specific function, and are a center for cultural and social meetings and interaction – examples of new public domains (Reijndorp).

In the conception of ANT the interaction between users and the contemporary performative spaces becomes interesting as a question of how heterogeneous networks occur between the users, the artefacts and the physical surroundings. By looking at the relations between users and architecture through this theoretical perspective, it highlights the importance of the user involvement in the performative spaces where materiality becomes an actant on equal terms with the users.

This paper discusses the use of RFID technology for tracking indoor movement behavior as a method for examining the establishment of these networks. The empirical background presented consists of movement patterns from 255 users collected in November 2009 in the Library in Hjørring, Jutland. By tracking and visualising movement patterns of different user groups in indoor public spaces, the paper discuss how we then can understand the use of performative spaces in new perspectives and how it opens up for new possibilities for interpretation of the relationship between the physical surroundings and the individual?

### **This is not a highway: topologies, performativity and urban objects**

*Tironi Manuel (Pontificia Universidad Catolica de Chile)*

This paper explores the performative constitution of a large scale sociotechnical device, namely a highway. We argue, however, that the notion of performativity, as deployed by science and technology studies, economic sociology and especially actor-network theory, is still anchored in a dualistic representation of the enacting and the enacted, thus insufficiently prepared to deal with the multiple and co-determined ontologies of objects and (large scale urban) devices. The paper draws upon an ethnographic investigation that studied the pragmatics of everyday relations between a recently inaugurated urban highway in Santiago, Chile, and the community living next to it. We show that both the 'highway' and the 'community' enact multiple realities. But we go one step further arguing that the multiple realities of the highway and the multiple realities of the community are *the performative effects of each other*. We propose the notion of topology as a way to think about this *iterative enacting*, this is performative processes in which the 'performed' and the 'performer' are exchangeable positions/moments in a continuous flow of co-enactments. We make the larger point that performativity should be understood not as a discrete situation bounded to a specific circumstance, but as the inherent process of ontological constitution of objects, technologies and spatialities.

## Designing for the Cosmopolitics of Food

*Tuters Marc*

Food flows and food authenticity are ideal objects for studying the contemporary discussions on agency and the use of design methodologies in science and technology studies as well as for policy issues regarding public engagement. Pioneering science and technology studies theorist Bruno Latour has indicated the place of information technology in connecting science and technology studies' radical views of agency to a politics centered on objects, or a "cosmopolitics" (Latour '04 a). His material semiotic approach is well suited to reflect the interrelationships and dependencies in food flows, and his thought maps well onto an object-oriented approach towards interaction design which has emerged in recent years with the emergence of ubiquitous computing technology (Sterling '05, Tuters & Varnelis '05, van Allen Et al. '07). There is a paradox exists between the practices of science and technology studies and design, where the former provides a framework to study non-human agency, while the latter is increasingly called upon to produce interventions at this scale while tending to frame agency strictly in term of "human factors". I consider how the implementation of Latour's *theory* might currently be being explored in design practices (Christien Meindertsma, Arlene Birt) as well by open source web projects (SourceMap.org, Fairtracing.org). Beyond describing the problem in an academic text, the ultimate objective my own research is informed by my own interests as a foodie and my job in interaction designer. My objective is to consider Latour's critique in terms of the creation of a food experience that connects the eater to a backstory and engages urban people with idea that as Wendell Barry famously stated "eating is an agricultural act". Currently, Farmville is the most popular app on Facebook. An urban farming movement has surged lately connect this idea with actual farming with digital interfaces and actuation (Refarmthecity.org). I have a background in interactive installation design, having presented my work for a decade at new media festivals and have an MFA in Interactive Media from USC. This practice-based research thus seeks to design experiences, combining multisensory digital experience design with food preparation. The work will thus integrate sensors and actuators into small scale food production (so-called "refarming") and design an "end-eater" experience which visualizes the provenance of the very food you are eating. This multi-year research is in its first year, currently working with Richard Rogers's Digital Methods Initiative at the University of Amsterdam as well as an interaction designer at Champagne Valentine.

## **The Matter in Immaterial, Communication Design Objects After Vilém Flusser**

*Velez Estêvão Sara (Universidade da Beira Interior)*

Although recently, design has been increasingly present in the social and philosophical thinking about modern societies, particularly the study of its mediating condition between man and his world. Communication design, despite having no conceptual differences with design in general, has, nevertheless, been mostly regarded as a semantic vehicle of sense and style underestimating its mediating action.

As such this paper is intended as a reflection on how communication design objects, specifically, co-shape the relations between people and our experience in the world. This question has been touched by some authors in the design field but has largely remained to be addressed. Vilém Flusser's work appears as particularly suited to bring some light to the discussion of this issue. He turns explicit the connection between his thought on culture with design, communication, and technology. In his work, the approach to the cultural world problem - more specifically of the technical objects, human communication, technical images and the design associated to these – reveals their dialogical function in permanent confrontation with their condition as objects. Design, being a cultural form ubiquitous in contemporary communication, resides in technical objects, takes on characteristics of the technical images defined by Flusser and, as such, in our view, faces ontological questions identical to the ones raised by Flusser in his texts. With the above description, becomes apparent and transversal the mediating condition of communication design, allowing its analysis.

During this paper, Flusser's main concepts will be described and linked with the specific characteristics of communication design objects and process regarding a clarification of their mediating process. Also, we will bring to this discussion some contributions of other authors on the subject of design, who have approached this issue. The findings in this paper allow us to explore what communication design objects do in a society in which a culture based on dematerialized information plays a main role. As technical objects lose their material thickness or even existence, communication design increasingly becomes a final form of information appearance.

## **Bodies in a wheelchair or wheelchairs in a body? Lived mobilities through time and space**

*Winance Myriam (CERMES3, INSERM, CNRS, EHESS, Paris V, France)*

When people are loosing the ability to walk, they might have recourse to a wheelchair. But what does the wheelchair do to them ? How does this object give them mobility and which kind of mobility ? In my presentation, I will analyse this question of mobility in wheelchair, focusing myself first on the interaction between the wheelchair and the person, second, on the interaction between the person, the wheelchair and the environment (physical or social). I will show that the mobility or immobility of the person (and the activities that are made possible through mobility) first results from the “know-how” the person acquires through a temporal process of adjustment and accommodation to the wheelchair, which transform the person. I will secondly show that im/mobility results from practical arrangements defined by the person, between her/him, the collective in which s/he is included and her/his environment. Those practical arrangements will be more or less flexible depending on the “know-how” of the person and depending of the available resources (human or non-human) in the environment. So accessibility, that consists in thinking the social space in order to make it open to all users, whatever their qualities and competences, is a frame which theoretically make mobility and activity possible; in fact, it never absorbs all individual differences. In practical, then, we can observe a process of adaptation between the person, his/her wheelchair, and those, human or non-human, which surround her/him.

Finally, I will show that the status of the wheelchair (being an object exterior to the person or an object that is constitutive of her/him) and the circulating space of the person (its extension and geometry or composition) varies through the temporal process and the practical arrangements s/he find.

I will base myself on my previous work about “trying out wheelchair” completed by a new enquiry consisting in observation and interviews with users of wheelchairs, including children, adults and old people.

## **Mundane Materials at Work: A Study of Paper Practices in University Administration**

*Ylikauhaluoma Sari (Aalto University, School of Economics, Finland)*

*Pantzar Mika (Aalto University, School of Economics, Finland)*

Recent literature on knowledge work has emphasized the importance of materiality (cf. Orlikowski, 2006) in social action. The role of various kinds of material objects (Swan et al., 2007), tools (Thurk and Fine, 2003), media (Lanzara, 2009), and all kinds of 'stuff' (Orlikowski, 2006) is found to be critical as working, learning, and innovating (Brown and Duguid, 1991) take place in organizational settings. In short, as Swan (2006) points out, 'materiality is constitutive of organizational knowing and learning'.

So far, the existing organizational research on materiality has often focused on the development and use of various kinds of technologies in general (cf. Yli-Kauhaluoma, 2008) and the information technologies in particular (cf. Orlikowski and Yates, 2006). Basically this means that the focus of the existing organizational studies has been on technology itself and the consequences of its complexity to organizational life. The emphasis on various kinds of technologies, such as computers, databases, softwares, telephones, photocopiers etc., has been particularly dominant in empirical studies of office work (cf. Fayard and Weeks, 2007; Bloomfield and Hayes, 2009). The result has been that the role of mundane materials in working life, for example paper, remains almost unexplored. Instead, these ordinary materials have become taken-for-granted and nearly invisible although they can be assumed to have an important role for people in different kinds of offices, occupations and positions as they organize their work, connect to other people across various kinds of boundaries, and simply want to get their job done.

Our presentation explores the role of a mundane material, paper, at office work. The aim is to find out in what ways people particularly in administrative offices use paper to get their job done and why these kinds of mundane materials are so important in their ordinary day at work. Our preliminary findings point out that paper helps university administrators to get their job done mainly in two different ways. On one hand, administrators use paper to organize their own work in offices in several different kinds of ways. On the other hand, paper acts as a medium for administrators to bridge boundaries and to connect to other people within and between offices. The study recognizes several types of practices that paper is tied with as an essential material in administrative work in offices. The key identified practices are the remembering practices, sketching practices, modeling practices, bridging practices, anticipatory practices, verifying practices and back-up practices. According to our results, paper is then defined in various contexts of use as a "functional material" - not only by its natural scientific properties but also by the "demands" of practice (c.f. Duguid 2005; Trentman, 2009). Our presentation suggests that the mental and material preconditions for the paperless office might already exist at present, but only few organizations has been able to develop work practices that would accommodate the paperless office (Sellen, Harper, 2003).



Practicing science and technology,  
performing the social  
September 2<sup>nd</sup>-4<sup>th</sup> 2010

## **TRACK 5**

# **Techno-Scientific Re-Construction of Capitalism**

**Convenors:**

**Les Levidow (Open University, UK)**

**Luis Suarez-Villa (University of California, Irvine)**

## **Biotechnology and global biocapital**

*Garcia José Luís (University of Lisbon, Portugal)*

I intend to demonstrate the influence of biotechnology to the constitution of a bioeconomy oriented to the reconfiguration, appropriation and commercial management of the various relevant spheres of the biological world. I set the formation of the bioeconomy, driven by the capitalization of knowledge, made possible by the transformations in the patent system, in the context of the emergency of new technology linked to information and its reproduction, as well as the restructuring of the technoeconomic universe and the expansion, deepening and globalization of markets, processes which began in the 1980s.

My arguments underscore how the ideological environment favourable to the flexibilization and extension of the old rules of intellectual property contributed both to the transformation of public science into commodified research, and to the economic valorisation of biological phenomena as simple raw material. I then present the gestation of a true space of industrialization and global market, which tends to be oriented to all biological organisms, to the knowledge associated to them and to the sensitive area of medicine and health in general. In this regard, I seek to support how, guided by a reductionist theoretical interpretation of life, bioeconomy endeavours for the almost unlimited exploitation of all possibilities of living organism reconstruction, including anthropotechnological intervention. Finally, in opposition to the general depletion of political-ideological interest, I mention the preconceptions and the charismatic aspects that underlie the emergency of a global biocapitalism and the practical reality the latter helps to expand.



## **EU biofuels policy: technoscientific expectations for multi-sustainability**

*Levidow Les (Open University, UK)*

The European Union has mandated targets for transport fuels to come from renewable energy, in practice meaning mainly biofuels, along with substantial subsidy for R&D on biofuel innovation. This policy framework has been promoted as a means to generate 'competitive, sustainable biofuels' – meaning that future biofuels will link economic, social and environmental sustainability. By projecting cornucopian qualities onto natural resources, economic imaginaries help to mobilise investment and justify policies which create new markets. This EU agenda has wider aims in political economy – energy security, technology export, global economic competitiveness, trade liberalisation and IPRs – and thus as a capital accumulation strategy.

New industry coalitions seek to gain an advantageous position in global value chains from agricultural resources, seen as 'oil wells of the 21<sup>st</sup> century'. Agriculture becomes biomass to be identified, mined, decomposed and recomposed for diverse industrial products. These are to be produced by an integrated biorefinery, aiming to integrate agriculture with the energy supply industry. Eco-efficient innovation is sought for gaining a competitive advantage in global markets. Future biofuels are also promoted as an opportunity for European technology export, e.g. higher-value agri-inputs and biomass processing techniques which can be patented.

Going beyond biofuels per se, these research agendas implement the EU's Lead Market Initiative for Bio-Based Products. This has a central role in policy narratives for a Knowledge-Based Bio-Economy (KBBE). This vision links agriculture with energy and other industrial sectors, most prominently through designs for an integrated biorefinery. In this vision, agriculture gains greater importance through horizontal integration linking diverse sectors – e.g. food, feed, energy and other industrial products. As an extra support, the Renewable Energy Directive offers incentives for second-generation biofuels and their co-products.

But commercial prospects face rival priorities for value chains. Commercial viability depends partly on more efficient and flexible conversion pathways. Although co-products already complement bio-energy production, more lucrative products are foreseen from R&D efforts which would transform industrial processes and thus make bio-energy more commercially viable. More and more technological pathways have been proposed.

Amidst multiple possible value chains, efficient conversion has proven technically more difficult than some anticipated. According the Biofuels Technology Platform, the necessary R&D is too costly and commercially risky for the private sector, thus needing more public funds to share the risks. To achieve the vision, they propose a research budget of 8bn euros over the next decade.

These optimistic visions can operate as a self-fulfilling prophecy by representing specific innovation pathways as obvious, while marginalising others. A capital accumulation strategy gains legitimacy for state support from claims for multiple sustainability. At the same time, sceptics attempt to hold the beneficent promises accountable, from outside and inside the EU policy system.

To analyse those conflicts, this paper draws upon three analytical frameworks:

- sociology of technoscientific expectations (Brown, Michael);
- an imagined economic community of common interests (Jessop) and co-production of technology, nature and society (Jasanoff).

## Capitalism in constructing carbon emissions

*Lippert Ingmar (Augsburg University)*

By way of presenting ethnographic evidences from corporate practices of the conceptualisation and measurement of carbon emissions, this paper engages with a diversity of actors engaged with greening capitalism. It discusses how effects of consulting companies as well as of an international environmental NGO are enacted by corporate actors whose job it is to manage carbon emissions. Based on an understanding of these actors as agents of ecological modernisation, then, the paper draws out a critique of supposedly ecologically innovative mechanisms.

Based on ethnographic fieldwork in a leading multinational in the financial services sector over a period of more than 12 months, I focus on everyday work practices as taking place in a capitalist context. It is through practical work that the presences of diverse external actors are imagined and brought into being, resulting assumably as well in material effects. Internal and external actors are forged into a shared trajectory channelled through financial arrangements. Acted out on a stage shaped by interwoven lenses of science, engineering, accounting and management, the co-construction of corporate carbon management allows to further our understanding of how capitalism is recreated and stabilised along multiple paths. First, work in the field is enabled and exercised by a highly diverse mixture of employees, including cheap labour, such as coloured migrants, reaching via white interns and part-time personnel to top managers. We need to understand how their work is interlocked in order to conceptualise measures which would transcend the sustaining of capitalist carbon markets. Second, I will address how the quest for profit is organising the management mechanism. Finally, the paper provides insight into the fabric of the very emissions which are traded through carbon markets. Thus, we discuss the shaping of the artefact "carbon emissions" as a specific kind of entity emitted within capitalism and enabled through an assemblage of actors.

Following these paths allows to question the linkages of the actors involved and how their practical interactions render carbon, nature and our society (un)sustainable. This provides a chance to better conceptualise individuals, their social and material contexts, and through that, corresponding room for manoeuvre.

## **Visions of health and wealth: The role of expectations in commercial regenerative medicine**

*Morrison Michael (University of York, UK)*

*Cornips Lucas (University of Maastricht, The Netherlands)*

Regenerative medicine (RM) is an emergent area of technoscientific endeavour and, as such, is attended by both significant promise and considerable uncertainties (Brown, Rappert & Webster, 2000). The term 'regenerative medicine' describes a heterogeneous assemblage of technologies and practices, including stem cells, tissue engineering and gene therapy, which use novel biomaterials to stimulate or augment the human body's inherent capacity for self-repair. This novel therapeutic mode of operation, in contrast to traditional small-molecule pharmaceuticals and biological drugs, has led some commentators to speculate that regenerative technologies could eventually constitute a 'third arm' of medicine (Mason & Dunnill, 2008).

In keeping with a technocapitalist paradigm, the challenge of innovation - turning the basic science of regenerative medicine into viable products - has been taken up by biotechnology companies looking to capitalise on the promise of these technologies (Suarez-Villa, 2009). This contemporary commercial development of regenerative medicine is the primary topic of our paper; specifically the role played by the expectations and promissory futures associated with stem cells, tissue engineering etc. Scholars from a range of fields including STS have highlighted the importance of expectations in driving and shaping technological innovation, especially in recruiting investment(s) to support promissory techno-scientific futures (Brown, Rappert & Webster, 2000). Of particular interest to the study of innovation in regenerative medicine is the relationship between the promissory health-orientated futures associated with the technology and the envisaged markets for prospective RM products, through which firms anticipate future profit for themselves and their investors.

To investigate this set of situated expectations, we carried out a systematic analysis of news articles on regenerative medicine collected from a number of dedicated biotechnology industry news outlets over the course of 2009. These articles play an important role in performing and disseminating expectations across different groups: especially by translating the technical claims of biotechnology for an audience of potential investors. Analysis of these texts allows us to explore how future obstacles and opportunities are anticipated and how these relate to strategies for marking out future directions for regenerative medicine. We also problematise the promissory futures contained in these texts by considering them in light of the difficulties which have beset prior attempts to commercialise regenerative medicine and its subfields such as tissue engineering and gene therapy (Rowley & Martin, 2009). Finally we reflect on the value of our findings for other studies of expectations and 'future-orientated' discourse in the processes of technoscientific innovation.

## **Alternative agro-food networks: a counter-hegemonic knowledge-based agro-food economy?**

*Psarikidou Katerina (Lancaster University, UK)*

*Szerszynski Bronislaw (Lancaster University, UK)*

Contemporary techno-scientific advances have played a significant role in articulating an agro-food imaginary which responds to the needs of the modern capitalist economy for profit maximisation and ever-increasing productivity (Kloppenburger, 1988). High-tech capitalism has been conceived as a new 'phase and face of capitalism' (Sunder Rajan, 2006), where new forms of knowledge, driven by techno-scientific innovation, seem to offer ways of reversing the long-term fall in profit levels. In the agro-food sector, technoscientific knowledge has become an important mechanism for subordinating food production to capitalist imperatives (Kloppenburger 1988), thereby contributing to a profound transformation in the social relations around food production, distribution and consumption.

However, growing mistrust in their promissory visions of techno-scientific imaginaries has fuelled aspirations for alternative spaces of agro-food production (Raynolds, 2004). 'Alternative agro-food networks' (AAFNs) can be regarded as 'seeds of social change' (Allen et al., 2003: 61), which at times can act as an oppositional movement against the European Union's support for capital intensive technological innovation in agriculture (Levidow, 2008), and as harbingers of an alternative to the dominant conventional agro-food market economy. In contrast to bulk commodity production, AAFNs are considered to redistribute value through the network, reconvene 'trust' between food producers and consumers and articulate new forms of political association and market governance (Whatmore et al. 2003).

The aim of this paper is to explore these alternative, counter-hegemonic dimensions of AAFNs. In particular, we investigate the distinctive aspects which qualify them as a form of resistance to the 'cognitive distancing' of new technologies of production (Eden et al. 2007); we explore the ways in which they could constitute an alternative knowledge-based agro-food economic system embedded in social relations (Polanyi, 1957), and the social and cultural values of the commodities produced (Graeber, 2001); in effect, we seek to identify the 'competitive advantage' of AAFNs in comparison to the dominant conventional agro-food market economy.

We draw on our findings from two case studies in Northwest England (rural Cumbria and metropolitan Manchester, UK) carried out for the EC project FAAN. AAFNs take diverse forms that differentiate them from the conventional agro-food system; in Cumbria, we looked at small-scale farmer/producer-based initiatives, utilizing organic and biodynamic production methods. In Manchester, AAFNs include small-scale retailers citizens', grassroots and food-and-health initiatives based on permaculture and organic agriculture. In both case studies, we found that AAFNs utilize a combination of diverse knowledges and skills (Polanyi, 1967; Nonaka, 1994). Moreover, the values and meanings associated with AAFNs are not simply those of narrowly defined economic interest, suggesting that they can make a significant contribution to a moral revalorization of the agro-food sector.

This paper explores the diverse knowledge systems operating in AAFNs and aims to identify their links to different patterns of social relations and forms of value (Graeber, 2001) associated with them. In doing so, we investigate the role such knowledges might play in the future reconstruction of capitalism, contributing to the constitution of a diverse economic landscape of difference signaling 'the end of capitalism as we knew it' (Gibson-Graham, 1996; 2006).

## Limits to (bio)capital

*Reynolds Larry (Lancaster University, UK)*

*Szerszynski Bronislaw (Lancaster University, UK)*

In this paper we explore the possible contradictions, limits and resistances to the imagined technoscientific regeneration of capitalism, mapping out some different theories of the crisis and possible future trajectories of the system. First we explore the promises, visions, practices and materialisations of 'biocapitalist' or 'ecocapitalist' variants of the technocapitalist imaginary, where strategies of ecological modernisation and new green techno-economic paradigms are enrolled as the solutions to both ecological and economic crises. We uncover the operation of this bio/eco/techno-social imaginary through a discussion of the policy discourses around the 'bioeconomy' (CEC 2005; OECD 2005), and review the emerging canon of theoretical work on the bioeconomy, a literature that both critically assess these imaginaries and risks unwittingly feeding them. For example, we survey the related ideas of 'biovalue' (Waldby 2002) and 'biomaterial labour' (Thacker 2005), whereby capitalism might find new ways of generating surplus value through novel assemblages of biotic matter with labour, information and (bio)technology. We discuss Cooper's (2008) suggestion that a biologically based capitalism promises to overcome natural limits to growth, through tapping into life's continuous autopoiesis and generation of complexity. We explore the notion of an 'eco-capitalism' that moves from the industrialised extraction of raw materials to accumulation strategies based upon the conservation and technoscientific optimisation of biodiversity (Bryant 2001). All of these suggest new configurations of biotic matter, technologies, labour, affect, subjectivity, knowledge and creativity in ways common to more general strategies of technocapitalist regeneration (Suarez-Villa 2009).

Second, we ask what the limits to such a transition in capitalism's productive forces might be. Here we situate empirical studies that look at the weak performance of the knowledge-based economy, and of the KBBE and biotechnology in particular, within the context of a more general assessment of capital's ability, since the crisis of the 1970s, to develop a new techno-economic paradigm, and in relation to a set of wider theories of the long-term crisis of capitalism, the rate of profit and financialisation, and the 'limits to capital' (Harvey 1999). We also outline other barriers to transition, including the techno-economic 'lock-in' of social and political institutions within a complex of existing corporate, financial and industrial structures, accumulation strategies, technological and resource bases and infrastructures.

Finally, from the above we frame our third question: 'If capitalism is unable to make the transition to a new regenerated form, what else might be happening today?' Here we explore a number of possible strategies that might be substituting for more fundamental transition. These include the performance of possible promissory economies which combine financial and scientific speculation to capture value; the various 'accumulations by dispossession' and enclosures of multiple commons, that appropriate indigenous knowledges, biodiversity, the welfare regimes of post social democratic regions and the scientific commons themselves; spatial reorganisations; concentration; and the rise of technological rent relations. We conclude by suggesting that the prevalence of such dynamics in varieties of technocapitalism indicate that we are not witnessing a linear successor but a variant that runs on top of and amidst its industrial Fordist precursor.

## **New Work as alternative in the reconstruction of capitalism**

*Seibt Claus (Austrian Institute of Technology)*

The paper presents research on alternatives of techno-scientific regimes within the reconstruction of capitalism. The investigation is starting with observations regarding actual techno-scientific regimes and their impacts on labour markets. Looking at the post Lisbon Agenda (for now it is called “smart, sustainable and inclusive economic growth”) one of the five goals is to reach an employment rate of all age 20 till 64 of 75% in Europe 2020. The Lisbon Agenda of 2000 had still the notion of full employment. However, today it is uncertain if the old order of capitalism will even have the potential to gain employment for 75% targeted in the European Agenda.

One alternative which has in the opinion of the author a high potential to become a significant counter hegemonic agenda in capitalism is the concept of New Work originating from the US philosopher Frithjof Bergmann. This concept is of major interest because there are a manifold of good practice examples all over the world. On the other hand the concept presents alternatives for recent techno-scientific regimes, and is with that an ideal object of study from an STS perspective.

The concept is simple: new and high technologies are used for self-production, or to produce collectively in community centers products of interest. There is meanwhile a broad community over the world exchanging ideas, construction blueprints etc. by the web or other media for these type of applications. High technology micro-machinery gets more and more effective and less expensive and allows producing components in small numbers: the most prominent example of this machinery is the Fabricator. Simple alternative production concepts with local resources in the construction sector allow to build and to maintain infrastructure and housing as well as sites for food production and water and energy supply.

Even concepts for individual mobility, like production of light electric cars, are in the concept. The approach is meanwhile very successful in neighborhoods which are in one of the other way decoupled from global or national economies, for example in South Africa, in the Detroit Area and as well at several places in Europe. The New Work approach supports local and regional communities to maintain or to gain back a decent quality of life, by giving people the chance to work for their respective needs and wants. The concept has a tremendous influence on social cohesion in these communities and was many cases the incubator for newly efflorescent local and regional economies.

The presentation and paper will discuss the concept of New Work from an STS perspective, by looking at the alternative techno-scientific and socio-technical regimes of this concept, but comparing as well the concept with earlier approaches, namely Appropriate Technologies. The authors sees a good change of anchoring the New Work concept in STS in studying similarities and differences with other concepts and earlier approaches of alternative techno-scientific and socio-technical regimes.

## **The nanotechnology paradigm in a Kondratieff cycle analysis**

*Vieira Cruz Rui (University of Minho)*

This presentation seeks to discuss until what extent does nanotechnology may be understood as the *leitmotiv* for the sixth wave of change, as using Kondratieff and Schumpeter's theoretical frameworks. We follow the premise that technological developments play a central role on capitalist continuous re-shaping, thus performing an important role determining the creation of new cycles, whether innovation cycles, business cycles or politic-economic cycles. This paper will demonstrate, in a retrospective analysis, the relation between technological transformation and political-economic change along the various cycles of capitalism and it will also exhibit some patterns in R&D worldwide, presently, that are potentiating nanotechnology as the dominant technology in the sixth Kondratieff cycle. NanoScience and Technology (nanoS&T) as a multidisciplinary field of science and technology and also as a form of production is gradually being imposed across different sectors such as energy sector, agriculture, health and lifestyles. Alongside with the new relevant questions nanotechnology is addressing on the light of progressively distinct modes of planning and operating politically, there is a need to improve theoretical debates concerning the actors, the processes and the implications behind its development. As it is being noticed by Heilbroner, Sweezy, Aghion and Acemoglu, the conceptualizations, as well as the interpretations about the waves of change crossing society's temporalities, plays a decisive role regarding the transformations that have to (or will) be made for social science relevant policy recommendations. The most striking relevant question we want to address concerns the likely intrinsic relation between capitalist system itself and nanotechnology (by the reshape of nature, materials, cultures of production and consumption and also social structure) insofar as this developments are projected to reconfigure the own models of production, proposing in several ways a strongly different society. This presentation is sustained by an exhaustive bibliographical analysis on nanotechnology as well as about the theory of cycles and social change, which also lead us to problematize the concepts of history, linearity and ciclicity.

## **Ecology and Economy: Halves of an ecosphere or the coming and going of metaphor between science and society?**

*Zalamea Marcela (University of Copenhagen, Denmark)*

Ecology and Economics derive their names from the same Greek root –oikos, being the first the study of the household and the second the study of its management. From this common place of origin, the two disciplines have developed almost independently, while from time to time the similarities between the objects of study of one and the other have been highlighted and open calls have been done to integrate market laws with natural laws. For example, Geerat Vermeij (2004) in “Nature: an economic history” characterizes both human and biological economies as collective wholes that adapt to and modify their environment as they compete locally. Furthermore, both economies imply inequality, are driven by processes such as competition, cooperation, selection, adaptation, feedback, consumption and production, and function through exchange of a common currency.

Going deeper into these common places between economy and ecology, I focus on the underlying metaphor of nature as an economy that is present in the ecological theory from Linnaeus until the present. Metaphorical thinking is an essential element of human cognition. In science, metaphors play various roles (e.g., heuristic, epistemic, rhetoric), being fundamental for the development of scientific knowledge. Metaphors fulfill these roles partly because they carry ideas, values and ideals that are meaningful in the particular context where they are used. Thus, it is not surprising that the history of science is plenty of successive metaphors. Different societies –being situated in particular cultural backgrounds– have conceived nature’s economy differently and striking parallels between nature’s and society’s economies are not difficult to find. For example, in the 18th C. nature’s economy was exemplified as the perfect household, while later in the 19th, it instantiated a competition-driven struggle for existence. Likewise, after WWII a central issue in nature’s (and society’s) economy was energy and matter budgets, while later during 1980-90’s the emphasis turned toward resources and consumption. Currently, we find ideas such as insurance theory, biodiversity as a business portfolio, and ecosystem services as part of nature’s economy; while in society’s economy we find carbon credits and self-organizing social systems. The constant humanization of nature and naturalization of society makes hard to determine whether laws of nature dictate market laws or vice versa. Furthermore, this amalgamation between nature’s and society’s economies has placed ecology in an odd situation as a science ever capable of providing expert guidance to overcome the current environmental crises. Finally, the conceptualization of nature as an economy –and in the present days, as a capitalist economy– contributes to legitimize capitalistic thinking and to recreate it in changing ways.





## **TRACK 6**

# **Uncertainty as an Asset? Neoliberalized Technoscience and the Manufacture of World and the Self**

### **Convenors:**

**Luigi Pellizzoni (University of Trieste, Italy)**

**Dario Padovan (University of Turin, Italy)**

**Maria Ylönen (University of Jyväskylä, Finland)**

## **The end of history and the search for perfection. A finite future for converging technologies?**

*Arnaldi Simone (University of Padoa, Italy)*

A growing body of empirical and theoretical literature discusses the relevance of temporal inscriptions for the development of socio-technical trajectories (Arnaldi 2010, Coenen 2009, Selin 2006) and future-oriented concepts like timescape (Adam 1998), guiding vision (Berkhout 2006), promise (van Lente 1993), expectation (Brown 2003) have proved useful to understand how temporality and temporal inscriptions in technology are instrumental in constituting (and contesting) new technological domains (Grunwald 2007, Horst 2007, Loesch 2006, Selin 2007).

Acknowledging the importance of these future-oriented concepts and narratives in the coordination of socio-technical networks (e.g. Rip and van Lente 1998), this paper attempts to examine the parallels between the neoliberal and NBIC discourses by exploring the perspectives on the future that these discourses have.

Indeed, they both seemingly downplay uncertainty and openness in the future, and replace them with the finitude of an “ultimate state” of human polity (liberal democracy) and human (social and individual) nature (‘techno-engineered’ humans and societies). On the one hand, neoliberal theorists declared loudly the “end of history”, the “total exhaustion of viable systematic alternatives to Western liberalism”, and the advent of “Western liberal democracy as the final form of human government” (Fukuyama 1989). On the other hand, thanks to NBIC convergence, “[u]nification of science based on unity in nature and its holistic investigation will lead to technological convergence and a more efficient societal structure for reaching human goals” (Roco and Bainbridge 2002, p. 1).

Accordingly, this paper tentatively examines three dimensions of this “finitude of the future” in NBIC discourse in search of possible parallels. A first characteristic is ‘perfection’, i.e. the best way to organise society and even direct human evolution. A second characteristic is ‘disclosure’: the ‘fore-knowledge’ of this perfect state for man and society means that we, by and large, know the expected effects of these socio-technical arrangements on society and that, on that basis, their assessment and governance regimes are well known and clear (van de Poel 2008). A third characteristic is ‘exclusivity’: the holistic nature of these future-oriented narratives, picturing the inevitability and limitlessness of technoscientific reach, restricts the capacity to imagine, envisage, and make salient alternative developmental paths and draws promoters and sceptics alike to accept the invitation that they should join a broadly and vaguely defined, and thus unobjectionable, notion of technoscientific progress (Nordmann and Schwarz 2008).

**Governmental practices, liberalism and psychology: from Walden II to Los Horcones**

*Arruda Leal Ferreira Arthur (Institut of Psychology-UFRJ, Brasil)*

*Machado Fernando (Institut of Psychology-UFRJ, Brasil)*

*Hautequest Felipe (Institut of Psychology-UFRJ, Brasil)*

This work aims to reflect about the political practices present in Los Horcones, a Mexican community inspired in the psychological utopia wrote by Skinner, Walden II. For this purpose, Foucault's concept of government - considered as a way of "human conduct of conduct"- will be resorted to. Nikolas Rose's work will also be used aiming to understand the relations between governmentality and psychology, defining this knowledge as an assemblage of inscription techniques and practices linked to devices for managing private life in democratic societies. This framework promotes the understanding of Los Horcones as a radical development of a liberal governmental technique, out of the State frames. In this new kind of management, government is defined as a technocracy, present in the scientific knowledge of the people, governing them by their own liberty, stimulating their self-regulation. These new governmental techniques are very different from the older ones such as the sovereigns (based in legal devices) and disciplinarians (based on the constant register and control of the actions). A great number of psychological practices work in this manner, but also the "experimental communities" planned by Skinner as "Walden II". Here, the sovereign forms of government are also put in question, including democracy understood as a tyranny of the majority. In Walden a kind of technocracy undertook by managers and planners is proposed, intending to be aware of the general laws of behavior, stimulating a great number of self-control devices in several domains such as work, education, and so on. But the transition from Walden II Utopia to real communities like Los Horcones (birth in 1973) presents a history of the experimentation of governmental techniques: first, the managers and planners system; second, democracy; and, third, the so-called personocracy. Here the initial Skinnerian system are reconsidered in a new fashion with decisions after community meetings where it is considered not the majority desire but the best arguments. This experience in Los Horcones points us to some important aspects. First of all, it shows a very important link between psychological techniques and liberal forms of government, without any direct relation with sovereign govern, but duplicating it. Second, this liberal form of government is specially based on a scientific self-regulation practice, conducting to some forms of "self-techniques". Even considering the skinnerian critics to the concept of freedom, all the control proposed in Walden II and in Los Horcones is based on the natural inclinations of the organisms, aiming at a kind of self-control. Concluding, it has to be remarked that if Walden was planned for 1000 habitants, in Los Horcones there are only 18 inhabitants, being 3 of them guests. Even though psychological experiments of government do not work with populational mass, dealing with small groups instead, all of them seek to extract general principles to the collective and individual lives. In all of them, we have a liberal government based in self-regulation, respecting the individual inclinations and the scientific principle that manage them, aiming to govern them through their own nature.

**Preventive Human Enhancement? Countering the Risks of Human Deficiencies**

*Bard Imre (University of Vienna, Austria)*

Arguments in favour of human enhancement tend to emphasize personal morphological and reproductive freedoms. Some proponents hold that individuals should be allowed to make decisions concerning the biological characteristics they themselves wish to have or want to confer upon their offspring. It is also claimed that these interventions would not resemble classical eugenics because the element of coercion is missing. However, closer scrutiny reveals that mechanisms of coercion are implicitly at work here.

Increasing and optimizing vitality has been a central element of biopolitics, yet, whereas earlier attempts to increase the quality of the human stock were centrally orchestrated and directed at entire populations, we currently see the rise of an individualized form of free-market eugenics. Individuals themselves have internalized the norm of self-monitoring and manage their own vitality as a form of asset. The body has become a crucial site for expressing and acting upon individuality, and biological traits are invested with more and more meaning and significance. Biotechnological enhancement may thus be understood as a manifestation of neoliberal governmentality, in which the political goals of increased productivity are intertwined with self-technologies aimed at securing, optimizing and improving individual health and well-being.

Nevertheless, the apparent centrality of the individual and her prudent choices is complemented by the resurfacing of the 'population' as a guiding incentive of interventions. I wish to argue that there is currently a shift underway in the argumentation in favour of human enhancement, moving from individual liberty to the protection of the public. As a part of this shift enhancements are reconstituted along the lines of preventive measures, that no longer serve the purpose of fulfilling individual desire or furthering choice but are subsumed under the logic of risk-prevention. This transformation is partly driven by a discourse on 'deficiency.' Being human is equated with a range of flaws and deficiencies that are in need of biotechnological amelioration. Thus, it is ultimately human nature itself and especially moral limitations identified from the perspective of evolutionary psychology that turn out to be threats we would need to counter.

The bioethicist Julian Savulescu voiced the opinion that enhancement technologies and screening procedures might enable us to screen out risky individuals whose antisocial behavior might threaten broader populations; and that we might need to loosen our commitment to liberal neutrality in order to find a common framework for dealing with our increasingly risky technological prowess. His calls for widening the already problematic scope of screening further exacerbate the push towards a 'surveillance society' that views its citizens as suspicious by default.

This line of reasoning thus re-arranges enhancement technologies and presents them as instruments of protecting the public from dangers inherent to human nature. It exemplifies how certain conceptions of what it means to be human link up with claims for political action. This radical discourse on deficiency and risk-prevention highlights the dialectic involved in the drive towards safety and security, which ultimately results in self-restraint making the distinction between choice and coercion blurred if not invisible.

**Uncertainty as an asset or a trouble? Actors and expectations in technoscience**

*Brandimarte Renata (University of Bari, University of Basilicata, Italy)*

The dimension of uncertainty produced by technoscience has become a stable fact of scientific knowledge and it can no longer be regarded as a temporary lack of knowledge. Its importance is particularly relevant when individual and collective actors are in the position to have to make vital decisions (for example, decide what to eat or cultivate, to build an incinerator, choices about environmental issues, etc.).

However, this dimension of uncertainty has a different meaning depending on the type of actors present in the arena of technoscience: scientists, profane actors (laymen), policy-makers. This partition is completed with the inclusion of social science scholarship that in recent years has proposed different analytical frameworks (co-evolution, co-production, post-normal science, sociology of expertise and experience) to understand the relationship between science and society, in part also including the role of uncertainty.

Each typology expresses a "sense of uncertainty" and connects with it in a profoundly different manner from one another. These differences create a framework of complexity in which carry out the reflection on uncertainty and require to consider the "sense of uncertainty" of each actor.

The paper aims to reconstruct the complexity of this framework and discuss different "cultures of uncertainty". Particular emphasis will be placed on the lay culture of uncertainty and on policy makers, understood as areas of greatest vulnerability, because they are located at the crux of the relationship between technoscience and society. In fact, the first deal with technoscience in everyday life while the latter are involved in decision-making processes intertwined with science and technology on issues of public importance. For both these groups of actors uncertainty is a trouble because it undermines the ability to make decisions in contexts where decisions are often urgent. Instead, the actors in the world of science are accustomed to considering the uncertainty as part of the progress of research work, a fundamental asset.

At stake there are different cultures of uncertainty expressing different expectations and conceptual relations that seem not to recognize each other and talk.

**Taming the beast: How experts construct do-able uncertainties in policy advice**

*de Vries Annick (Twynstra Gudde Consultants)*

*Halffman Willem (Radboud University Nijmegen, The Netherlands)*

Handling uncertainties in expert advice to public policy is a tricky problem. Once experts acknowledge the gaps and limitations of their knowledge (e.g. after public contestation), they are faced with difficult balancing games. Even with the best intentions, it is impossible to address all thinkable uncertainties, given limited time and resources. Experts are therefore forced to focus their attention, depending on which uncertainties are considered pertinent, meaningful, policy relevant, and manageable. From wild and untamed uncertainties, experts have to create *do-able uncertainties*: uncertainties that can be managed during the production of an advice and that help structure policy problems.

The notion that experts construct do-able uncertainties in their policy advice is an extension the creation do-able problems in experimental sciences, as described in the seminal article by Joan Fujimura (1987), and picked up by later studies of scientific work that highlight the pragmatic choices scientists and experts make (e.g. Star, Bowker, Clarke). We confront this approach of detailed empirical study of knowledge workers with the extensive research on uncertainties in expertise. Much of the latter research tends to be either analytic, trying to distinguish types and kinds of uncertainties; or prescriptive, trying to develop generalised guidelines for dealing with uncertainty (e.g. the work by Van der Sluijs, Morgan and Henrion, Van Asselt, Petersen). In contrast, we try to describe in more empirical detail how experts themselves resolve the practical challenge of handling uncertainties (e.g. Lynch, Star, Shackley and Wynne).

The acknowledgement that experts construct do-able uncertainties in public policy advice raises questions about how this process takes place. First, how does the setting of the expert organisation influence what uncertainties are do-able? The availability of resources, such as models, previous studies, or particular forms of knowledge in the organisation means that some uncertainties are easier to address than others. Second, how do experts consider what uncertainties are relevant or interesting to policy makers? We found that a well-structured communication process between experts and policy makers is crucial in this respect. Third, what strategies do experts use to structure uncertainties? Classification of uncertainties appears one important approach to tame uncertainties and reconfigure them according to the knowledge assets of the organisation, but preferences for different forms of classification vary.

Our study draws on the detailed description and comparison of four reports, produced in two organisations of policy expertise in the Netherlands, one on environmental issues and one on economic policy. These 'planning bureaus' provide authoritative expertise to government and provide crucial building blocks for public policy making. We found at least two different approaches in our study: one that stresses detailed and extensive communication of uncertainties, and one that focuses on a synthesis of major uncertainties presented as a reminder to policy makers that not all is fixed. Even though we formulated some advice on how to handle uncertainties productively, there remain some difficult questions, such as what to do with uncertainties that are *not* do-able, or about the entitlement to judge what is and is not do-able.

## Immaterial Culture: Beyond Postmodernity

*Gandini Alessandro (Goldsmiths College Alumni, University of London, UK)*

The paper represents a critical attempt for an epistemological trespassment of the dichotomy modernism / postmodernism, with the purpose of identifying the coordinates of their 'beyond' in sociocultural and semiological terms.

This work aims to be a landmark in the bibliography concerning this debate. It consists of a variously developed analysis involving art, mass media, technology and the impact of the 'digital revolution' ongoing at the multi-disciplinary levels of society, labour, perception and subjectivity, Marxian notions and the posthuman perspective.

The discussion which pertains the work as a whole is the answer to the question if, and why, we might argue of a dramatic change in the categories defining the sociocultural context of the first decade of the 2000s, following the outburst of a dramatic financial crisis. In other words, the author believes we are confronted with the necessity to stop and analyze what the world has become, alongside the expansion of importance of the mass media, the technological development and, above all, the spreading of Internet consisting in possible new ways of approaching the world.

Throughout a complex social, semiological and critical analysis, the outcome results which we might highlight from this work are:

- a) a modification ongoing at the level of labour which depicts a context which seems to allow the trespassment of the Fordist / post-Fordist dichotomy, thanks to a structure of society at whose core we can find the notion of 'multitude' and a mode of production coinciding with the notion of communication, as well as a modified notion of commodity, which becomes a world-making object carrying social values (theoretical background: Lazzarato, Virno);
- b) the emergence of an 'immaterial' paradigm or cultural logic of society, concretely shown by the development of the digital technologies (Internet) and their relation to the commodity, together with a modification at the level of perception and subjectivity going towards the pre-individual perspective theorized by Gilbert Simondon;
- c) as a result, at the theoretical level, the possibility of a perspective of 'a-signifying semiotics' (Maurizio Lazzarato) and the need of a redefinition of the Marxian notion of 'value' through the lens of Bernard Stiegler's 'economy of contribution', as well as a deep analysis on the possibility of a posthuman perspective as concerns society as a whole, now confronted at all levels with 'machines' whose influence on life is constantly growing, especially in relation to the human expansion of the body and the possibility of biogenetics.

## The views of news media on converging technologies in Slovenia

*Grobojsek Blanka (University of Ljubljana, Slovenia)*

*Mali Franc (University of Ljubljana, Slovenia)*

Converging technologies represent a new phase in the development of science and technology resulting from the integration of nanotechnology, biotechnology, ICT and cognitive sciences. The progress of converging technologies is today increasingly characterised by various types of controversies. On the one hand, there is a lot of proofs (and even more expectations) about their tremendous socio-economic benefits. We could say that some views of experts rely on very speculative scenarios and visions about the progress of converging technologies in the near future, especially in regard to their early “marketing” and “commodification”. On the other hand, there are arising a lot of fears in society due to the risks associated with the progress of converging technologies. In our contribution, the main focus will be oriented to the issue how the question of benefits and risks associated with the converging technologies are framed by news media. Namely, by analyzing recent progress of converging technologies our starting point will be that with the tremendous progress of emerging technologies the new public space has been created in which different perspectives are confronting, ultimately creating various (utopian or dystopian) visions, values and options. One of the important perspective is created by the news media which have strong influence on public opinion. In our discussion, the main attention will be paid to the issue what is (could be) the role of the media in ‘upstream’ engagement of citizens in the early-stage phases of scientific and technological progress which usually raise specific challenges for their risk assessment and risk governance. In last decade, a growing number of EU countries are debating how best to engage the public in matters of science and technology to avoid strong its negative response to the new emerging technologies. We’ll mainly restrict in our presentation to the situation in Slovenia. Slovenia is one of the Central-East European countries which has at least in some areas of converging technologies made some progress. For example, according to Third European Report on Science&Technology Indicators (2003), Slovenia was included in that time in the group of the 15 most productive countries in nanotechnology publications. In contrary to this, as regards the empirical knowledge of the benefits and risks of converging technologies it is generally scarce by citizens. In Slovenia, in contrary to some EU countries which have a fairly long tradition of participatory activities in the governance of S&T, there is still a lack of active “scientific citizenship”. What is the role of news media in Slovenia to come to a more active “scientific citizenship”? Are the citizens at all ready to turning to newspapers and magazines to find information about the current progress of converging technologies? Are only experts determining the media coverage and definition of risk's aspects of new emerging technologies? Are news about converging technologies in daily press based mostly in hypes, etc? There will be used the findings from content analysis of national daily press (the results of some additional bibliometric analysis as well) to explain the role of news media in Slovenia in recent dialogue between scientists, R&D policy decision-makers and citizens.



## **New Research Collectives and Knowledge Production of Childhood Diabetes in a Manufactured World**

*Leminen Juha (University of Helsinki, Finland)*

The DIPP (Diabetes Prediction and Prevention Project) was launched in 1994 in Finland. The DIPP has collected blood samples from children who have a genetic susceptibility to Type 1 Diabetes and also it has maintained biobank collections and databases in three university hospitals in Finland. Nowadays, eight Finnish research groups are participating in the DIPP research. In 2005, Quantitative Biology and Bioinformatics (QBIX) research group of the VTT Technical Research Centre of Finland was affiliated to the research community in order to use bioinformatic tools and metabolomics research methods in the study of T1D.

In recent years, new collectives of disease research have been funded under European Union as new research collectives (for example Seventh Framework Programme). In the age of neo-liberal political economy, biobanking can be seen as politicized activity, which has an important mission as creating “united life sciences” in the European Union innovation policy. This means one of the most ambitious programmes yet in world of biobanking - the BBMRI (BioBanking and BioMolecular Resources of Infrastructure project) - to create resources for collaborative medical research. But before the harmonization starts, the research collectives have to produce political and governmental imaginaries; there is a reason to see and to believe how this collaboration is important for creating partnerships and collectives for the biobank related scientific studies. In my opinion, this change in biomedical research means major transformation in understanding how risk production related to disease research is created in the biomedical age of research in a manufactured world. In STS point of view, this can be seen also as changing nature of cycles of credibility in scientific research, to ask for whom and why new kinds of credibility are produced.

In this paper, the DIPP project will be used as a case example by means of which three central changes in the current biomedical research will be made visible and analysable. The first of these is the systems biological turn, which denotes the movement in biomedicine to form links between three separate fields of the knowledge – that is, knowledge on genomics, antibodies and cell metabolomics – for better understanding the development of the T1D disease. Secondly, the chosen case example allows us to contribute to the current debates on the legal, moral and economic challenges of biobanking, that is, on the ways in which biobanks are administrated and regulated. Thirdly, the DIPP project also reflects information technological turn in biomedicine as systems biology heavily relies on the use of bioinformatics, mathematical modelling as well as various kinds of software tools and Internet-mediated databases in the analysis of data stored in biobanks. As such, the case example is suggestive of an important transformation in the current biomedical research practice recently discussed in terms of biomedical platforms that are Internet-based infrastructures that grow out from local laboratories and experimental systems to constitute an entirely new level of research work and as a part of the new research collectives.

**The ambivalence of neoliberalized technoscience: viral genomics as a case study**

*Mutsaers Inge (Radboud University Nijmegen, The Netherlands)*

In 1930 Sigmund Freud published *Civilization and its discontents*, in which he suggested that 'civilization' is a trade-off. The benefit civilization brings is security from the many dangers which stem from (natural and human) nature, from one's own body and those of other humans and other organisms. If Freud would have written his book now, eighty years later, he would most probably reverse his diagnosis: contemporary neoliberal techno-societies represent accumulations of trade-offs, but this time it is security which is sacrificed to individual freedom, unprecedented mobility and globalization (Bauman). This drawback of neoliberalism is also reflected on technoscientific level. A plethora of technosciences are put at work to make this socio-cultural expansion feasible. In this paper, I will focus on virology (notably viral genomics) as an emerging technoscience that is employed both to explicate and to counteract the various threats that hinder or constrain the tendencies towards mobility, globalization and freedom.

Whereas new forms of mobility, expansion and migration of organisms (ranging from human beings down to microbes and viral life forms) exposes us to new global threats to health and survival, viral genomics is a highly *ambivalent* field in the sense that it both explicates the emerging threats (thus spreading catastrophic foresights and upsetting scenario's) while at the same time entailing the promise that viral genomics as a technoscience will be able to counteract the treat and safeguard the globalization and mobility patterns of neoliberal societies.

In my assessment, I will notably build on the concept of 'immunization' as coined by the contemporary German philosopher Peter Sloterdijk who outlines how we are not only constantly expanding the sphere and radius of our societies, but also continuously developing new technoscientific and regulatory barriers to safeguard us against the new and unknown dangers (*das Ungeheure*) looming at the boundaries of our expanding or emerging spheres. He considers cities or cultures as local immune responses against possible threats from the outside. But cities and cultures are themselves also expanding and spreading as an 'epidemic' because of globalization. This asks for new immunization strategies since the immunization potential is continuously challenged because of confrontation with new dangers (new viruses etc.).

With regard to the viral genomics case, by increased air traffic for example viruses are rapidly spread from one continent to the other thereby increasing the threat of a pandemic. On the one hand, viral genomics enables us to respond to (immunize against) viral threats in terms of vaccines etc. On the other hand, the new knowledge on viruses also explicates new risks. So, paradoxically, increased knowledge about viruses has as disadvantageous effect that it also increases the public perception of potential risks, which feeds the perception of viruses and pandemics as fearful. I conclude my paper with the notion that increased knowledge can not automatically be translated into analogue immunity advances.

**Hegemonic contingencies. Neoliberalized technoscience and postrationalization**

*Pellizzoni Luigi (University of Trieste, Italy)*

*Ylönen Marja (University of Jyväskylä, Finland)*

It is widely recognized that there is more than a chronological link between the last NBIC technoscience wave and the rise and expansion of neoliberalism, with special reference to the centrality of innovation and nature exploitation for neoliberal programmes and practices. Yet what precisely this link consists of remains somewhat elusive. While generally insisting on the encompassing reach of society and nature neoliberalization, the literature is split into two main camps. On one side we have a 'political economy' account of neoliberal restructuring of human relations with nature. From this perspective new technoscience, especially biotech, represents a further, major step in the process of capital accumulation. Well identifiable power relations are central to this reading. On the other side – mostly corresponding to the STS field – we have a 'governmentality' account of neoliberal restructuring of social relations via technoscience advancement, according to which biotech and converging technologies are to be understood as expressions of an ongoing biopolitical evolution of society. Central to this account is the redistribution and reshaping of roles and identities and their ethical – more than political – import. Attempts at bridging these fields are few and mostly skip the main points of contention. In this paper we make a case for a closer scrutiny of what one perspective may provide to the other and, building on that, we focus on what can be described as a core move of neoliberalization: a subtle yet profound change in the understanding of 'nature' and its inherent tensions vis-à-vis humanity, with respect to preceding modern accounts. Bio- and nanotech have fuelled plenty of discussions on their implications for the human-nature relationship, yet what needs to be further elaborated is the way contingency, agency, commodification and immunization are interconnected in producing a specific regime of truth – or worth – that might be called 'postrationalization', the hegemonic status of which is visible not only in the public sphere but also within social science criticism.

**Scientific Uncertainty, Risk, and Democracy - The case of India**

*Ravi Rajan (University of California, Santa Cruz, USA)*

During the past decade, scholarship in the field of Science and Technology Studies (STS) has contributed greatly to our understanding of the interface of risk, science, and democracy. Most of this literature is however on the advanced industrial nations of North America and Western Europe, with little of note on democracies in the developing world. The proposed research project will address this gap by focusing on India, the largest democracy in the third world. It has two parts. Firstly, it will examine three recent controversies that cast light on the social, economic and political contexts that drive the interactions between scientific uncertainty, expertise, policy making and implementation in that context. These controversies are about: a) the processes of environmental impact and hazard analysis in India (studied with the case of the decision about siting a large dam (Tehri) in a seismic Himalayan region); b) policy making on chronic environmental risks such as pollution (approached through the case of the CNG controversy in Delhi); and c) regulating emergent risks (addressed via the case of Bt Brinjal controversy). Secondly, it will explore the viability of STS, as a domain of expertise, to contribute to the building of the new environmental regulatory institutions being built in India today.

## How Technology Changes Our Idea of the Good

*Sentesy Mark (Boston College, USA)*

The ethical neutrality of technology has been widely questioned, for example, in the case of the creation and continued existence of weapons. At stake is whether technology changes the ethical character of our experience: compare the experience of seeing a beating to videotaping it. Interpreting and elaborating on the work of George Grant and Marshall McLuhan, this paper consists of three arguments: 1) the existence of technologies determines the structures of civilization that are imposed on the world, 2) technologies shape what we do and determine how we do it, and 3) technology, unlike any other kind of thing, seems not to make moral demands of us: it is morally neutral. But technological objects point toward our activity of using them. This means that they offer us the freedom of imposing on something that does not impose back. The introduction of this experience of freedom changes the way we experience the world in general by introducing a new way of relating to the good, namely by introducing the act of subjective valuation. Each of these points implies that technology structurally changes or interferes with our ethical relationship with things, with the result that through subjective valuation the experience of the obligation to act can be suspended.

**Among “Bananas” and “Backyards”: the American way of studying the risk in Nimby-cases**

*Tipaldo Giuseppe (University of Torino, Italy)*

Arising from some of the main results of a 3-years research conducted on the social impact and possible NIMBY-effect of the under-construction incineration plant in the city of Turin, the paper is first of all concerned on how risk perception influences the attitude towards high-tech and controversial industrial plants. It proposes a typology of risks and shows how each type works inside the mechanism of attitude-building, also considering the effects of other important variable such as trust, expertise, mass media and social representations.

The paper argues that plant and infrastructure settlements with a heavy ecological impact represent a highly sophisticated and diverse social phenomenon, in which risk plays an important role but it can't be taken as a whole. In fact, at least two dimensions of the concept seem to be involved into the mechanism, in two different ways: the *individual* component (outcoming from risks depending on personal choices) has both a direct and an indirect effect on the attitude towards the incineration plant, while the *social* component (deriving from decisions made by collective actors such as Governments, Corporations, lobbies, etc.) has just an indirect effect, which also regards trust on expertise and the mass media overemphasized narration of risky facts.

The paper also considers the main topics of Beck's and Giddens' theoretical works on risk, on one hand, and the United States-based work on the other, and suggests that the American theory of risk seems to be more suitable to describe the complexity of the phenomenon, according to the evidence coming from the field work.

**Neoliberal discourses of genetic risk management and partially reproduced subjectivities: Breast cancer genetic practices in Germany**

*zur Nieden Andrea (University of Düsseldorf, Germany)*

One of the components of neoliberal discourses of the self is the notion of responsibility for one's own health. Health has become a matter of competence and an outcome of one's own decisions rather than fate. New genetics and the search for genetic predispositions for illnesses such as the 'BRCA mutations' for breast and ovarian cancer form a part in the promises of a personalized medicine and suggest an individual risk management to prevent the actual onset of disease. Tracing these promises, this paper presents the results of a case study of discourses and subjectivities around BRCA services in Germany.

Here, women considered to be 'at risk' because of a family history of breast cancer, are widely encouraged to undergo BRCA genetic testing and as a result preventive measures including prophylactic mastectomy or ovariectomy. (Carriers of mutations in the BRCA 1 or BRCA 2 gene are said to be exposed to a breast cancer risk of 30 to 80% compared to 10% in the average female population.). Drawing on discursive analysis and ethnographic fieldwork carried out in German BRCA centres, the paper suggests a twofold perspective on individual and societal implications of these services: besides a reconstruction of neoliberalized concepts in medicine and health care, it is worth while to explore how patients' subjectivities respond to these concepts. By this means, first the rhetoric of informative literature and counselling sessions is outlined as propagating a model governmentality of pro-active behaviour, free decision and risk management to control the future of their bodies, that constructs women as economic decision-makers confronted with uncertainty. Against the background of this discursive model, it will then be asked how women who have undergone genetic testing for breast and ovarian cancer actually incorporate this ideal. The hermeneutic analysis of in-depth interviews with these women will reveal patient subjectivities that do not automatically fit the neoliberal model. It is not only that the possibilities of individual prevention are questionable in general; some of the women also don't perceive themselves as active agents in the process of testing and treatment following the test or narrate more indirect forms of agency. Nevertheless the neoliberal concept has an ideological effect: even women who question their possibility to control the outbreak of the disease accept their personal duty to do something about it and feel guilty if they don't.



## **TRACK 7**

# **Are We Still Halfway of the Turn? Practicing Semiotics, Performing Science and Technology Studies**

### **Convenors:**

**Alvise Mattozzi (LISaV, Università Iuav di Venezia)**

**Anne Beyaert-Geslin (CeReS, Université de Limoges)**

**Maria Giulia Dondero (FNRS, Université de Liège)**



**Object and design as a dialogue between semiotics and STS**

*Beyaert-Geslin Anne (CeReS, Université de Limoges)*

After Leroi Gourhan (1964), the semiotics of object and design has focused on so-called *factitivity*. For Deni (2003), factitivity undergoes a distinction between the operative function and the communication of this function and has two directions for it relates the subject to the objet and the object to the subject. Latour (1993) had already proposed to get out of the reflexive system subject/object and to extend object's competence, considered a *go-between* that changes its whole environment. Thus this new competence challenges the status of the object that must be considered a *device*, "the part of a chain of practices that stands a bit more to analysis" (Latour; 1993; 35).

More recently, the semiotics of signifying practices has taken the concept of *factitivity* into account. Fontanille (2008) proposes a scale made of six levels of relevance. The level devoted to *object* being separated from the level of *practices*, various conversions occurs when it comes to practice.

I intend to reengage an active dialogue between semiotics of signifying practices and STS and go to show that they have shared interest and can be a reciprocal methodological resource.

## Search engines. Objectifying strategies

*Del Marco Vincenza (Sapienza University of Rome, Italy)*

Search engines play a key role in the access to the *mare magnum* of information on the Internet. They seem to provide objective results to queries. They conceal themselves behind their effectiveness and their automatism criteria of selection and of information relevance, of which the user is often unaware.

By making common operations, such as entering keywords in the Google search box, we adapt our research needs to a system that not only requires certain ways of setting a query, but also proposes results and does so according to a hierarchy.

Bowker and Leigh Star retain that the issues related to classification become central with the advent of very large-scale information systems and technologies, electronic integration, coding and coordination across geographically dispersed groups. They think that classification systems in modern organizations are tools that are both material and symbolic. [Bowker and Leigh Star, 1999]

According to Manovich [Manovich 2001, 27-30], digital media show a structural organization that produces sense to the users while following conventions related to the organization of the data [Ibid, p. 45]. This is what he calls the principle of transcoding. The author thinks that the logic of computers influences the traditional cultural logic of media.

The process of influence between culture and computers is bidirectional:

«In summary, the computer layer and the culture layer influence each other. To use another concept from new media, we can say that they are being composited together. The result of this composite is a new computer culture – a blend of human and computer meanings, of traditional ways in which human culture modelled the world and the computer's own means of representing it» [Ibidem, p. 46].

The principle of transcoding is our starting point to specify how we can establish a comparison and a relation of exchange between automated analysis and semiotic analysis.

Semiotics is defined by Greimas as a hierarchy of metalanguages: the object language, descriptive semiotics, methodology and epistemology. Descriptive semiotics is the semiotics applied to the object language [Greimas 1966].

Semiotic textual analysis, conducted according to the generative perspective, considers as a central concept, the immanent level, and is characterized by a scientific vocation.

Semiotic analysis is through the use of a metalanguage and is inextricably linked to analysts, who, facing the text, tries to develop the theory, probing systems and processes, supported by the identification of structures and recurrences.

The automatic analysis has very different characteristics: firstly it is done by a computer and secondly, the machine acts on the basis of algorithms, procedures decided from the beginning.

The aim of our work is to investigate how search engines relate with the user, developing strategies, for example in the construction of the interfaces, in the prescription of the practices of interaction, in the presentation of the results, that seem to be objective while they are a product of technical, epistemological and theoretical frames.

## **The theory of enunciation in semiotics and in STS**

*Dondero Maria Giulia (Fonds National de la Recherche Scientifique/University of Liège)*

My talk will focus on the theory of enunciation, that has its origin in linguistics and especially in E. Benveniste's works in the 60s and that has been developed by A. J. Greimas in the domain of semiotics in the 70s and 80s. B. Latour's works have been influenced by this theory (as well as by Greimas' actantial theory) as a number of articles explicitly show ("Petite philosophie de l'énonciation", <http://www.bruno-latour.fr/articles/article/75-FABBRI.pdf>, Italian version published in P. Basso & L. Corrain (dirs) *Eloquio de senso. Dialoghi semiotici per Paolo Fabbri*, Milano, Costa & Nolan, pp. 71-94, "Quand les anges deviennent de bien mauvais messagers", *Terrain*, n° 14, 1990, pp. 76-91, "A Relativistic Account of Einstein's Relativity", *Social Studies of Science*, vol.18, n° 1, pp. 3-44, 1988, etc.). In these studies Latour adapted the Greimasian theory to his sociological theory on delegation and more generally pointed out weaknesses in the theory of enunciation as it was formulated in its classical structure. Some developments of enunciation theory in the semiotic frame (J. Fontanille *The semiotics of discourse*, New York, Peter Lang, 2006) integrate elements that are more adapted to science and technology and to sociology (from a theory of simulacres to a theory of actors). In my paper I will take into account the works of F. Bastide as well, to show that the theory of enunciation has been used in the sciences to better understand the domain of scientific images as well.

All in all, I will study the intersection of semiotics and scientific studies from the point of view of the theory of enunciation, taking into account the epistemological construction of the two disciplines and their fields of investigation (scientific discourse, scientific images, theory of society, etc.).

## **Translating Movements Translating Neurons. A Semiotic Account**

*Gianelli Claudia (University of Bologna, Italy)*

*Montanari Federico (University of Bologna, Italy)*

The aim of this paper is to analyze and discuss the role of scientific images during laboratorial practice in the field of cognitive neuroscience of action.

Specifically, we focus on images and graphs elaborated by a kinematics system which is used in cognitive neuroscience to track and analyze simple actions or single motor acts: e.g. reaching and grasping, pointing, touching objects.

In the field of cognitive neuroscience the movement itself is considered as a “trace” of the neural activity, in which a given articulation of cerebral areas and circuits is translated into a configuration of movement. The internal articulation of this configuration is not directly detectable, but needs the mediation of a particular device of visualization. In this way, starting from a supposed neural pattern we can detect a series of mediations through which the actual movement emerges. The actual movement is recorded and studied not at a qualitative level but for its specific quantitative variations. The analysis is then focused on evaluating the quantitative differences in the same movement as induced by different types of stimuli.

In our paper we will investigate how these differences are experimentally construed in order to become “significant”, that is scientifically valuable and comparable. The neuroscientist’s work is guided by protocols and parameters defined before the experiment, and the researcher operates thanks to processes of progressive “subtractions” with respect to the natural movement. These subtractions and filters are of particular interest for the study of scientific images, since allow us to investigate which forms of narration and of enunciation emerge.

Nevertheless, the specific kind of kinematics’ images we analyze, allows us to detect and discuss the contribution of different visualization devices. These devices permit a work on actions and motor acts which are experimentally articulated and re-articulated, following a specific laboratory practice. These devices are active also to make “visible the invisible”, that is to elaborate hypothesis about the neural substrate of actions – defined in terms of neural correlate.

All these possible levels of analysis will be investigated in this paper from the perspective of semiotic methodology integrated with STS contributions: this will contribute not only to the elaboration of an integrated methodology to analyze scientific images, but also the theoretical discussion between the semiotics and STS approach to the same object of analysis.

## **The relevance of semiotics in the ergonomics of visualization devices**

*Lloveria Vivien (CeReS, Université de Limoges)*

Before the 21<sup>st</sup>-century research into ergonomics used approaches known as “human factors” centered on general data resulting from laboratory research primarily undertaken in the fields of physiology, of cognitive sciences, and of computer sciences.

These results made it possible to draw up a whole list of recommendations to adapt the material environment to human user by general rules which did not really take into account the specificities of a real situation of work.

At the beginning of the 21<sup>st</sup>-century, a new way of understanding grew-up, based on the analysis of the activity which insists on the comprehension of the situation of work as a whole. Each ergonomic study is thus specific to a real situation of work and looks to account for “prescribed” task, “real” activity of the prescribed task’s operator and especially differences between this prescribed and this “reality”, giving us access to the needs for adjustments of a programmed activity.

Taking the words of René Amalberti, the study of these “cognitive compromises” between external requirements of the performance and subject’s internal requirements, implies the ergonomist to be not only capable of quantifying these variations, but also to qualify them. However, it is precisely tools for the qualitative analysis which seem to miss the ergonomics. Also, the emergence of the “information visualization design”, initiated by researchers such as Jacques Bertin in France and Colin Ware in the United States, gives a relevance to the intervention of the semiotic analysis.

And as for semiotics, the question of perception takes its rise in the discipline with approaches such as the “embodied” semiotics of Jacques Fontanille which pose to the comprehension of the “bodies” thought as operators of the semiosis.

In the same way, approaches such as the “socio-semiotics” taken by Landowski and the “practices” of Jacques Fontanille make it possible to study today a situation of work by adding to it the polemic relationship between the form of the practice prescribed to the operator and the form of the practice expressed by the material properties of the object. This form concerns as much texts and objects, as vaster plans as the social organization of the working situation.

Another interesting way brought by semiotics is its all-embracing point of view, which makes it possible to see in what the situation reproduces “the already known” or innovates by producing a “form of otherness” to which the subject will have to adapt himself.

The semiotic approach gives the means for developing trainings intended for future “interpreters” and for improving the capacities “to visually communicate thoughts” by precisely identifying the factors which define the courses of the signification concerned.

At the same time of this intervention, we will try to argue this position of semiotics through the description of a doctoral research on the x-ray visualization devices of the threats in aviation security. This positive approach will allow us, by this concrete case, already, to measure the contributions of semiotics in term of ergonomic study.

These current researches, exposed here, are conducted on visualization devices in aviation security. The practice involved in this situation is the screening of passenger luggage. Thus,

the overall theme of this study can be easily linked with Linhardt's<sup>1</sup> Studies on sociology of the threat and those of Jobart & Linhardt on surveillance practices of security screeners.

The second interesting point in connection with the STS studies, is the question of "convergent diversity" described by Charles Goodwin<sup>2</sup>. We will try to illustrate it by describing this convergence as a negotiation between divergent practices. This negotiation will lead us to a junction embedded in one real object. This allows us to make links between Goodwin's studies and the "socio-semiotics" of Landowski<sup>3</sup>.

The third interesting point is the projection of a "social macrostructure", which involved human beings, on a "social microstructure" embedded in objects. For that, we will refer to Cetina<sup>4</sup>'s works on "Complex global microstructures", to describe a form of social structure's innovation, involving the criterion of size. The aim is to show how the whole social macrostructure of the aviation security practices is projected on, and condensed within the visualization devices as Fontanille<sup>5</sup> describes it in the field of semiotics.

At last, we will try to point out that the systematic nature of semiotics can model practices, just from the plastic properties of objects used for. From this modeling, many diversifications can be projected, helping the searcher to anticipate the identification of new forms, missing "in situ". All of this, can constitute an helpful tool for the field of studies concerned by the "situated cognition" described by Suchman<sup>6</sup>. Similarly the empirical data from STS studies give its relevance to semiotics by testing its predictive model in real situation. The aim is to show the complementarities and mutual enrichments of semiotics and STS studies.

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<sup>2</sup> Goodwin C., (1995). "Seeing in Depth." Social Studies of Science 25: 237-274.

<sup>3</sup> Landowski E. (2006). *Les interactions risquées*. Limoges : Pulim.

<sup>4</sup> Knorr Cetina K. (2005), 'Complex global microstructures: The new terrorist societies, Theory, Culture & Society, 22(5): 213-234.

<sup>5</sup> Fontanille J. (2008). *Pratiques sémiotiques*. Paris : PUF, "Formes sémiotiques".

<sup>6</sup> Suchman L (1987) *Plans and situated actions : the problem of human-machine communication*. New York . Cambridge University Press.

**Designing the User. Semiotic Analysis of User's Guides of Contemporary Technological Devices**

*Mangano Dario (University of Palermo, Italy)*

During the last years, the dialogue between Science and Technology Studies and Semiotics has taken lots of different directions. In fact there are several ways in which a theory of meaning production can be applied to technology studies. Semiotic notions such as that of actant, as the call suggests, have been usefully applied to STS leading to rethink the relationship between humans and non-humans and therefore traditional sociology. Among the different issues that these two disciplines may want to address together, one seems to be more intuitive than others, namely the problems related to the usage of technological devices. Interfaces are the way in which technology becomes visible to (and usable by) people, the point of contact where the relationship between humans and non-humans starts to develop, and, because of this, their importance is crucial both for scholars who study the impact of technology in people's life and for those who deal with meaning production processes.

In this paper I'm going to address the issue of human-machine communication and interface design starting from the semiotic analysis of a corpus of User's Guides of contemporary technological products. Manuals are the place where an interface is explained, a "translation" from the language of buttons and indicators to a more conventional (natural?) one. They speak about technology but, at the same time, they are traditional "texts" where the interaction between people and devices becomes a "story". Such an analysis, thus, becomes a way to address not only issues concerning how guides and interfaces work but also how technology operates in terms of creating relationships between people and machines. If the place where Latour's hybrid is being created is always the physical interface of a device, then its manual becomes the place where, thanks to Semiotic tools, this relationship can be made visible. According to this perspective, the user's manual of Kindle (Amazon's device for reading e-books), for example, gives us the chance to say something about how the social role of books is supposed to change in the future, as well the Toyota Prius' guide (an hybrid car by the important Japanese Company) to speak about the different approaches to the environmental issue.

**Climate change: perception and perceptions and communications**

*Manzoli Federica (University of Milan, Italy)*

On the ground where science and society meet, aim of the paper is to analyse how publics and media structure their discourses –scientific, economical, ethical- on the climate change. General premise is the latest debate in the Science and Technology Studies, based on concepts as *co-evolution* and *transdisciplinarity*, that shows how science and society are intertwined in the contemporary production of knowledge and how the traditional way to produce it changed in the last few decades (Funtowicz 1993, Novotny, 2003).

The science of climate is emblematic of the more and more tight relationship between science, technology and publics and of the contribution of different disciplines, scientists and other experts involved in this field.

My focus is on the first part of this story: the relationship between science and its publics.

Since the challenge of global climate change (CC) needs a large effort by the scientific community, policy makers, and science communicators for providing the public with the best information possible, it is important to establish and sustain a genuine sharing of understanding between science and society (Carvalho 2008, Felt and Fochler, 2008). Especially after the crucial tipping point represented by the year 2007, CC has become a matter of respect and urgency for the general public, as most of the surveys on this issue show (Eurobarometer, 2009, Carvahlo, 2008, Ford, 2008).

Under the theoretical frame of the process sociology (Elias, 1970), and of the socio-semiotic paradigm (Greimas, 1984) as a heuristic method of investigation, my analysis is based on two main complementary parts: on one side a qualitative research phase with selected publics, on the other a media analysis.

I investigated what are the main actors, places, themes, voices, communicative scenes, so to re-construct the Italian main discourses on the climate change and some local debates in particular: as far as the qualitative social research is concerned, it moved from the European Project R.A.C.E.S. (Raising Awareness on Climate Change and Energy Saving, [www.liferaces.eu](http://www.liferaces.eu)), during which 15 focus group in five different cities all along Italy were carried out (Trento, Modena, Firenze, Potenza and Bari) with three different publics: teachers, families representatives (householders), stakeholders (administrators, ngo's leaders, services suppliers). Main themes explored were: the meanings of climate change, the most important local issues on climate change, the sources of information and the communication issue. Two additional focus groups were carried out after the COP 15 event (December 2009) in order to focus on the theme of the *responsibility* as central for the communication process and the policy making.

Second complementary part of the research is the analysis of a sample of tv news during the COP 15 conference.

Aim is to provide the scientific community, the policy makers and the science communicators with a fresh analysis of how the climate change is *qualitatively* perceived at the Italian level and how the news construction represents it.

The results show a complex network of narratives, characterized by a language typical of the controversies and based on a strong dichotomy between the local and the global dimension.



## **A Few Steps Back to Accomplish the Turn. A Semiotic Reanalysis of Two Classical Cases in STS.**

*Mattozzi Alvise (Iuav University of Venice, Italy)*

As an introduction to the track about STS and semiotics I would like to re-consider few classical studies where semiotics has been explicitly used within STS.

On one hand I will thus retrace the history of the relations between semiotics and STS, on the other I will show how concepts, categories and models elaborated by semiotics in the last twenty years can be a methodological resource for STS.

Semiotics has had indeed a relevant theoretical influence on STS which is still alive today – see for instance the idea of ANT as a material semiotics proposed by John Law. Semiotics has also had a methodological influence which today is not as strong as it was twenty years ago.

But I think that the question is still the same raised by Madeleine Akrich and Bruno Latour at the beginning of the nineties: how can we describe (technical) objects and, more in general, non-humans? This question is even more relevant today when the idea of a non-humans agency is more generally accepted and non-human agency is more and more taken into account but very rarely accounted for. Indeed, in his *Reassembling the Social*, Bruno Latour asked to “attend first to the associations out of which it’s made and only later look at how it has renewed the repertoire of social ties” “when faced with an object”.

I will try to show how recent semiotics categories and models can be useful in accounting for artefacts by reconsidering Wiebe Bijker’s social history of the bicycle and John Law’s analysis of the TSR’s brochure. In both studies the two authors refer and use semiotics categories mainly coming from the ‘70s semiotic tradition.

**World views and GMO's discourses in Turkey: operationalizing semiotic/actor network theory**

*Süerdem Ahmet K (Istanbul Bilgi University, Turkey)*

*Veltri Giuseppe (European Commission - Joint Research Centre, Institute for Prospective Technological Studies)*

**RESEARCH OBJECTIVES**

This paper analyzes the discursive construction of genetically modified organisms (GMO) issue in the Turkish political arena following the public debate on the pending legislation on bio-security. The study proposes an operational approach to semiotic/actor network theory (ANT) applied to public representations of a new technology. It aims to highlight how different world views produce different risk discourses of GMO in Turkey. For this purpose, we base our analysis to a theoretical framework developed according to the cultural cognition theory of risk besides ANT. According to this theory, the discourse on risk is articulated in the form of boundary transgressions. Far from being a pure neutral, technical issue, risk concept is constructed according to discourses reflecting a lack of ordering or a subversion of a pre-existing order. Therefore, the discourse on risk is always situated within the world-views of the semiotic actors acting as 'world making entities'. Discursive construction of risk provides actors with a framework for describing how any entity builds its world. Different social movements act as 'risk entrepreneurs' and political actors use the language of risk to blame and destabilize a given social order in order re-form it in terms of their visions of the ideal polity. This is not only reflected to the contents but also to the forms of their logics of articulation that manifest themselves in the ordering of the concepts. Therefore, how different actors discursively construct the risk concept requires discovering the rules connecting the themes articulated in a discourse.

**PROPOSED METHODOLOGY**

Within this scope, this study adopts a semiotic approach to elicit the latent structures behind the discourses of the actors. Semiotic analysis is usually an interpretive endeavor. However, interpretive elicitation of semiotic structures is usually opaque and raises some reliability and validity concerns. The semiotic methodology as adopted in this paper addresses these concerns by bridging quantitative and qualitative methods. In the first phase of the analysis, the articles making the text corpus are thoroughly reviewed and paragraphs are coded according to their main themes. This is an interpretive-qualitative approach to coding. The second phase adopts a quantitative approach. The first part of the second phase jointly classifies the themes and actors according to their discursive similarities by employing Formal Concept Analysis. Formal Concept Analysis is a systematic-quantitative way of automatically deriving ontology from a collection of objects and their properties. In this context, objects are the newspaper columnists of different political orientations and the properties are the themes elicited from their articles on the GMO. In the second part, the semiotic networks within the discourses of the discursive groups obtained FCA will be analyzed. Semiotic network analysis as used in this study is based upon the principles of mathematical graph theory and semiotic analysis. This method is built upon the idea that semiotic analysis basically adopts a structuralist approach. A key concern is the 'specific signifying practices', the tradition of social semiotics, focusing on what has been called 'situated

social semiosis'. It aims to describe the conceptual syntagmatic structure of different actor's discourses

Hence, semiotic networks of different actor's discourses are meant to bridge actor network theory (material–semiotic networks) and social semiotics.

Within this scope, network indicators obtained through network analysis of the theme co-occurrence matrices give us important clues about the position of a theme within a semiotic web. To give a blunt example: we can calculate the centrality of a theme through network analysis. Centrality measures give us important clues about influential and prominent themes such as referents and metaphors.

#### DISCUSSION OF EXPECTED OUTCOMES

Preliminary formal concept analysis revealed four discourse networks reflecting nationalist, Islamist, progressive (left) and neo-liberal worldviews. The semiotic structures of these discourses will be compared in terms of a set of mathematical network indicators reflecting the logic of articulation behind them. Some of these indicators elicit but are not limited to the concept centrality, density of the structures, major concept clusters and number of syllogisms. Finally, these structures will be grounded back in the articles for a richer interpretive analysis.

## Turning to Ontology in STS? Turning to STS through 'Ontology'

Wyatt Sally (*Royal Netherlands Academy of Arts & Sciences, KNAW, The Netherlands*)

Leydesdorff Loet (*University of Amsterdam, The Netherlands*)

van Heur Bas (*Maastricht University, The Netherlands*)

Deploying the notion of 'turn' is a powerful rhetorical move that has been used to good effect in STS on several occasions. In this presentation, we examine the evidence for Woolgar's claim that there has been an 'ontological turn' in STS. Using the ISI Web of Science, we first discuss the extent of the increase in the use of the word 'ontology' in the social sciences and humanities between 1989-2008. We identify a set of 131 articles and essays from STS journals for the same period and conduct two sorts of semiotic analysis, qualitative (pragmatics) and bibliometric (syntax and semantics). Although a combined qualitative-quantitative analytical strategy used to be common in STS in the 1970s and 1980s, interpretive and bibliometric approaches have grown apart. In this presentation we demonstrate the added value of adopting a combined approach, since it generates knowledge on the ontological turn that could not have been produced either by concentrating on interpretive analysis or by presenting bibliometric data alone.

Despite a dramatic increase in references to 'ontology' in STS, we demonstrate that there has not so much been an ontological turn as a multifarious ontological debate consisting of many small movements that have changed the landscape. These movements do not point to a shared STS-wide understanding of ontology, but instead take place in parallel realms with limited cross-referencing. On the basis of the qualitative analysis, we identify three main thematic complexes: constructivism and realism; instruments and classification; and the social sciences and humanities. Each of these can be subdivided, which overall leads to a rather fragmented debate on ontology in STS. The introduction of ontology into the established constructivism-realism debate to an extent signifies a rapprochement and an acknowledgement on both sides that objects are real (i.e. pre-existing the situation) and constructed at the same time. The thematic complex of instruments and classification is strongly shaped by the emphasis in ANT on fluidity, emergence and local specificity. The third thematic complex broadens the debate and actively seeks to promote an STS-driven ontological turn for social scientific research in general. This applies particularly to ANT and post-ANT authors such as Latour, Marres and Mol who advocate the use of multiple, relational ontologies in order to enable an awareness of the diversity and complexity of socio-technical environments.

Bibliometric analyses not only offer an empirical basis for claims about the extent to which the use of a concept, ontology in this case, has changed over time, they also provide insight into the structure of sets and subsets of literature at any given moment. We use, separately and in combination, a range of bibliometric tools, including co-authorship relations, co-word analysis, citations and co-citations. Our results illustrate very clearly that the so-called turn is quite fragmented even though STS authors and the journal, *Social Studies of Science*, play a pivotal role in contemporary discussions about ontology. Our results suggest that the construction of a semiotic platform about ontology in STS has provided a vehicle for the dissemination of STS authors into neighbouring disciplines.



## **TRACK 8**

# **Probing Technoscience**

### **Convenors:**

**Regula Valérie Burri (Swiss Federal Institute of Technology, Zurich, Switzerland)**

**Martina Erlemann (University of Augsburg, Germany)**

**Karen Kastenhofer (Institute of Technology Assessment, Austrian Academy of Sciences, Vienna, Austria)**

**Alfred Nordmann (University of South Carolina, USA)**

**Astrid E. Schwarz (Institute for Philosophy, Darmstadt, Germany)**

**Peter Wehling (Universities of Augsburg and Munich, Germany)**

## **Combining discourse analysis and ethnography in research on the epistemic culture of systems biology**

*Döring Martin (FSP BIOGUM, Universität Hamburg, Germany)*

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The research project “Towards a holistic conception of life? Epistemic presumptions and socio-cultural implications of systems biology” (THCL) investigates systems biology with respect to its epistemic as well as societal implications. Systems biology represents a new research field within the life sciences that emerged roughly in the 1960s, in an era of big science and technological optimism. It draws on a systems approach already prevalent in Ernst Haeckels’s ecology and Ludwig Bertalanffy’s thinking as well as on high throughput technologies that arose later onwards. Moreover, systems biology is – at least functionally – linked to synthetic biology and the latter’s ambition “to build new organisms from scratch”. At first glance, systems biology therefore appears to be a blend between an earlier tradition of descriptive, holistic natural philosophy and modern data-driven, interventionist and application oriented technoscience. To analyse the actual (techno-)epistemic culture of systems biology in more detail, the research project THCL takes a twofold, empirically grounded approach, drawing on discourse analysis as well as ethnography.

From a discourse analytical perspective, the concepts prevalent in current systems biology research, their historical emergence and present day meaning are investigated. Authors such as Ashmore/Woolgar (1989), Hacking (1983, 2002), Keller (2005), Weingart (2003), Mulkay/Potter/Yearly (1983) converge in emphasising that knowledge systems and the order of knowledge are discursively produced and maintained. Concepts and their discursive dispersion provide principles of arrangements that construct, constitute, signify and stabilise knowledge as discursively ordered paradigms based on thought styles and thought collectives which are open to change. From an ethnographic perspective, the epistemic culture (Knorr Cetina 1999), experimental systems (Rheinberger 1997, 2006) and practices (Pickering 1992, Rouse 1987, 1996) of present day systems biology research are investigated. The practices of knowledge production thereby “re-encode material cultures, epistemic orders, and social configurations-both within and outside the laboratories and clinics” (Burri/Dumit 2007:1). The possible contribution of such approaches to critical science and technology assessment has also been recognised (e.g. Bonneuil 2006, Kastenhofer 2007).

As we still stand at the beginning of our twofold analysis within THCL, we want to discuss how the two empirical as well as conceptual approaches can be combined in a meaningful and sound way. To do so, we address the question of how (scientific) discourse and (material) research practice are actually interlinked within current technosciences. A re-assessment of the significance and interrelation of the two prominent approaches, the linguistic stance of a discourse analysis and the ethnographic stance of a cultural analysis, seems a promising strand for integrated practice oriented technoscience studies; especially against the observation that both aspects – the rhetoric(s) of technoscience and the (real-)constructionist dimension of technoscience (cp. Schmidt 2007) – have both been prominent subjects of debate within STS in the past years.

## **When does the co-evolution of technology and science overturn into technoscience?**

*Fiedeler Ulrich (Austrian Academie of Sciences, Institute of Technology Assessment)*

There exist different concepts of technoscience. For example from social perspective the term is used to mark a change in the organization of research (Weber 2003). State, technology, science, military and industry are strongly interrelated, which has become obvious by the development of so called "big science". From the epistemological perspective the term concentrates on the inextricable fusion of the production of an artefact with the gain of knowledge. In more abstract words the disappearance of the difference between intervention and observation.

In my contribution I will concentrate on the later concept or aspect of technoscience. I will illustrate with examples within physics that from the early beginning the development and use of technological skills were strongly linked with scientific progress. This interconnectedness has increased considerably but continuously. With the help of these examples I will investigate if it is possible to identify a certain state of interconnectedness which introduces new qualities such as the inability to abstract the observable fact from the artefact. Against this background I will question if nanotechnology marks a turning point within this development thus it turns into something new which is technoscience (see eg. Nordmann 2005).

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## **Probing Technoscience: Postprocessing – making technical artifacts more intelligible**

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Current discussions about technoscience are mostly centered around reflections on the characteristics of technoscience in comparison to the traditional realms of scientific knowledge production. One of the characteristics is the yet unresolved status of technical artifacts as a potential representation of knowledge. Advanced products from rapidly evolving fields such as e.g. nanotechnology or computer science may significantly deviate from what is known in traditional engineering. They are thus setting up empirical basis that seems far from being intelligible. Technical artifacts with such autonomous standing could be viewed as paradigmatic for technoscience.

In order to discuss this emerging «epistemic gap» we will present some advanced engineering scenarios that fully rely on computer-based automated design procedures using numerical structural optimization. Though such design approaches yield artifacts with potentially unparalleled performance these outcomes are often barely understood. Besides the proper synthesis aspect of computer-guided design the underlying optimization also offers highly formalized modes of observation for tackling this «novel» empirical basis in a framework of what we like to call «postprocessing».

In the following we conjecture that postprocessing fosters epistemic modes of knowledge acquisition that are more science-oriented compared to professional R&D practice implied by the production of the underlying artifacts. Hence, in computer-guided design engineers are increasingly forced to (re-)develop scientific attitudes towards their findings when the morphology of those findings becomes counterintuitive with respect to existing engineering expertise.

It certainly remains open whether this change in attitude is less relevant in traditional engineering practice where computers are typically used for providing so-called forward solutions in e.g. CAD construction, calculation, modeling, simulation, imaging and control scenarios. In order to illustrate the particular status of the so-called inverse solutions (i.e. the outcomes of computer-guided design scenarios) we focus on population-based design approaches as supported by biological-inspired search heuristics like evolutionary algorithms. Within such optimization schemes a finite population of potential solutions is numerically iterated according to specific genetic reproduction rules, undergoing a kind of artificial evolution where the overall population gets increasingly «competent» with respect to the technical design goal. Therefore, population-based optimization algorithms are apt to deliver structural and temporal information during evolution, which is mandatory for tracking down implicit correlations amongst the most promising solutions of the population. It's now worth recognizing that «tracking down» actually addresses the formal modes of postprocessing, whereas the «implicit correlations» are nothing but the information needed to reconcile the peculiar outcomes with current engineering expertise. We will try to underpin this punchline along a selection of design examples in the realm of laser physics and nanophotonics. Whether postprocessing will be manageable as a new instrument in engineering epistemology has to be left for discussion – together with the very practical question how future engineers will deal with being doomed to wait during such autonomous design procedures.



## **What exactly IS a Computational Econometric Models – Technoscience? Assemblage? Artefact?**

*Haynes Paul (University of Cambridge, UK)*

This paper will consider the question what is a model and consider the way it is an artefact, a heuristic device, an abstraction, an assemblage, and an embodiment of technoscience. Using a framework derived from the work of, for example, Michel Serres, Bruno Latour, Manuel DeLanda, this paper will examine the concept of “model” using an expel to explore the technoscientific basis of this conceptualisation.

To clarify how models embody scientific knowledge this paper will build on the concept of technoscience. It will exemplify the complexity of identifying what a model is and what it means through this concept by examining the development of E3MG, a global energy-environment-economy sectoral econometrics model used for analysing long-term energy and environment interactions within the global economy and assessing short and long-term impacts of climate change policy. The model consequence of millions of pounds of public and private research funding but also a commercial tool available to anyone with an appropriate problem and the willingness to pay. It embodies scientific knowledge through a range of networks that are material, human and hybrid in nature: econometric equations, lines of code in different languages, databanks, solution routines, raw data, documentation, sectoral time series data, feedback mechanisms, assumption files, data repositories, and also requires various elements of computer hardware, programmers, modellers able to run to program, as well as economists and econometricians able to interpret the findings. By understanding the technoscientific nature of this assemblage, the status of the model becomes clearer as an expression of its components.

This paper will consider the interdependencies between these components in relation to the way the model is conceptualised in different ways – as an artefact, as a forecasting machine, as a boundary object, as a network of strategic alliances, as the manifestation of the intuitions of the chief economist, etc. From these conclusions, the paper will exemplify the way models contribute to an improved understanding of technoscience and how the concept of technoscience can be used to explain the role of models in knowledge and innovation.

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## On the technosciences' power to change the world

*Kastenhofer Karen (Institut für Technikfolgen-Abschätzung, Österreichische Akademie der Wissenschaften, Austria)*

Within the realm of nano-, bio-, info- and cogno (or NBIC) technosciences, the “power to change the world” is often invoked. NBICs are endowed with the capability to “manipulate bits, atoms, neurones and genes” and to “shape the world atom by atom”. The molecular biologist Francois Jacob (1988) describes experimental systems more generally as “machines for making the future”. One could dismiss these formulations as purely rhetorical, one could interpret them as rhetorical and self-fulfilling (due to the orientational function exerted by scientists' self-understanding and the way such formulations contribute towards agenda setting at the policy level, cp. Schummer 2009) or as an adequate depiction of one of the fundamental characteristics of technoscience. In the latter case, a very specific nexus between science and technology, or, the epistemic and the constructionist realm is addressed (cp. also Schmidt 2007 on Bacon's “real-constructivism”).

The presented paper focuses on this nexus drawing on theoretical conceptions as well empirical material. It presents an overview of different technoscientific ways to “change the world” (via the propagation / creation of: specific world views; opportunities of intervention and control; materials and objects; new techno-social actors, contexts and constellations). It discusses the problematique inherent in the resulting and manifold role of technoscience to function as a site of “displaced politics” (Nahuis/van Lente 2008, Kastenhofer 2010). That technoscience enacts this role – so the main argument of the paper – is related to its hybrid character as an epistemic as well as constructionist realm. The hybrid character of technoscience makes it difficult (if not impossible) to separate knowledge production from real world interventions and challenges current science and technology policy approaches in fundamental ways. Current developments within science and technology governance already react to this situation, while science and technology politics has not yet explicitly acknowledged it. It still refers to a separation and unidirectional relation between basic research and technological innovation – a model that makes it impossible to directly address fundamental and societally relevant aspects of technoscience.

The main aim of this paper is to provoke further discussion, both in the analytical terms of technoscience studies as well as in the practical terms of technology assessment.

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## **Objective Technoscientific Knowledge – what it might be**

*Nordmann Alfred (Technische Universität Darmstadt, Germany)*

This contribution proposes that the notion of “technoscience” serves to distinguish different forms of knowledge production. This requires, however, that the term is taken as a term of reflection rather than classification. There is no fixed set of technosciences that are opposed to the sciences. Instead, “technoscience” affords understanding and self-understanding of certain goals and interests, values and presuppositions of research practice.

Conceptions of objectivity tend to revolve around two poles. On the one hand, there is ‘objectivity achieved’ as scientists submit their ideas to a process that cleanses these ideas of their subjective origins at a particular time and place – here, objectivity tends to be viewed as something that holds intersubjectively. On the other hand, there is ‘objectivity encountered’ which highlights the objective character of phenomena and artefacts – here, objectivity tends to be viewed as something that adheres paradigmatically to objects that exist independently of what anyone thinks of them.

The two poles serve as a backdrop for querying the achievement of and encounter with objectivity in the case of research practices that are oriented not primarily to the production of propositional knowledge but to the production of what Davis Baird has called “thing knowledge.” If scientists advance theoretical propositions that aim to describe a feature of the world, questions of objectivity are intimately tied to questions of truth, evidentiary relations, and the like. But how is objectivity ascertained when researchers advance that they can shrink a tumor in a cancer mouse, or that they have produced a simulation that successfully models climate change over the past 2000 years, or that they have developed a technique for doing something under atmospheric conditions which has previously been done in a vacuum only? Throughout the history of the sciences, such claims have played an important role. Calling them “technoscientific” directs attention to the special problems they pose: Here, the truth of the claims is comparatively trivial, and what matters more appears to be the robustness of the acquired capacity, built system, or demonstration of control. To complicate matters, however, questions about objective technoscientific knowledge arise not only in regard to more or less robust devices, systems, or processes. They arise in respect to manuscripts and research publications, and these publications report proofs of concept, piecemeal progress towards more perfect control, potential breakthroughs, and the like. These publications or reports of acquired capacity represent an achievement of objectivity – but it is not readily apparent how this objectivity is determined and how it can be evaluated. What is objectively known here is not only what is but just as importantly what can be or might be or will be: Technoscientific claims often take the form of asserting that something has been accomplished which will allow researchers to accomplish something else – to cure cancer in humans, to predict climate change over the next 100 years, to scale up the novel technique for manufacturing purposes.

## **Towards an Epistemology of Nano-Technosciences: Probing technoscience from the historical perspective of Francis Bacon**

*Schmidt Jan C. (Unit of Social, Culture and Technology Studies, Darmstadt University of Applied Sciences, Germany)*

Test-tube embryos, atomic-weapons, self-reproducing nanobots: technoscientific objects are conquering our life-world. The aim of this paper is to contribute to the expanding discourse on a philosophical clarification of technosciences. My approach is a historical one. I will look back to the origin of the project of modernity and to its founding father: Francis Bacon. Does Bacon work provide a framework that might facilitate a deeper understanding of technoscience? Is there a trajectory from Bacon to recent nanotechnoscience?

I will argue that nearly everything what we need today for a (dialectic-materialist) epistemology of technoscience can be derived from a critical review of the epistemic program put forward by Bacon—a position I tentatively call epistemological real-constructivism (Schmidt 2007). However, whereas in former times Bacon's ideas were just programmatic visions, today they seem to be realized to the full extent. The continuous history of (Baconian) ideas is interlaced with a discontinuous history of technology and technoscientific engineering; for describing the latter, I explicate the term technological reductionism (Schmidt 2004).

The outline of the paper is as following: (I) From the perspective of well-established distinctions in philosophy of science, I begin with a reconstruction of Bacon's program and his philosophy of (techno-) science, also in order to give substance to "real-constructivism". This includes reflecting: (I.1) Approach: Bacon links light-bearing and fruit-bearing knowledge, end-in-itself and means-to-an-end. (I.2) Methodology: According to Bacon, central means for knowledge production and for the context of discovery are experimenting, intervening and manipulating. Experimenting mediates between the given and the constructed, as well as between object and subject, mechanism and action. (I.3) Epistemology: The material manifestation of evidence and the context of justification emerge from works and machinery: as the truth of works. In these, facts and artifacts, reality and constructivity, theoretical and technical, truth and utility, knowledge and power are combined. (I.4) Ontology: Materiality is the core element of real-constructs. Real-constructs—material things, artifacts and machinery of our life-world—mediate between nature, technology and culture, between the naturalization of technology and the technologization of nature. Many well-established dichotomies obviously have never existed.

(II) Bacon's epistemic program is broadly present in nano-technoscience. I explicate this thesis by focusing on (II.1) the approach, (II.2) the methods, (II.3) the truth manifestations and (II.4) subject matter and the view of nature, in the program of nanotechnoscience. From the perspective of philosophy of science, I explicate that a specific kind of reductionism—what I call technological reductionism—is involved in the epistemic program of the Baconian nanotechnoscience.

(III) By relating my findings to the works of prominent STS scholars and philosophers (e.g. Hacking, Latour, Ihde, Nordmann, Collins, Knorr Cetina, Weber), I argue that much Baconian real-constructivism can be found in these present day concepts. This point again highlights the relevance of Bacon for understanding our recent technosciences.

(IV) Prospects and Conclusion: The predominance of Baconianism today has to be acknowledged before we can raise critical questions and assess technosciences from a societal and political perspective. From a wider perspective it may turn out that we are not doomed to Baconian real-constructivism.

## Is Paleo-Climatology Best Understood as Late Modern Technoscience?

*Skrydstrup Martin (Waterworlds, Department of Anthropology, University of Copenhagen, Denmark)*

Conceptualizing paleo-climatology as technoscience, as coined by Latour and Harraway et al, seems spot on in so far this scientific discipline converges Science (glaciology) and Technology (ice core drilling) into relatively stable projections about uncertain climate scenarios at the planetary scale. Moreover, paleo-climatology intervenes with inscription devices and translates nature (ice) into knowledge about how culture (human activities) affects nature. Thus, “technoscience” seems to lend itself conceptually and empirically well as a general framework for understanding paleo-climatology. Or does it?

I conduct ethnography at one of the worlds most isolated and remarkable research stations: The North Greenland Eemian Ice Drilling (NEEM) research camp. Here, scientific knowledge about climate change is produced on the evidentiary terrain of deep ice cores, by leading climate scientists from 14 participating nations. My camp ethnography specifies the myriad of steps by which ice cores are drilled, de-coded and transfigured into scientific knowledge about the Eemian - a layer of ice corresponding to a period in the Earth's climate history, which was 5 degrees warmer than the present - holding significant implications for projecting future climate scenarios for global warming. My essential research objective is to unpack the "evidence culture" and probe the epistemic contours of the NEEM science trench. I pursue questions such as: How did the imagination of ice as Earth's climate archive come up in the first place? What is the socio-technical world required to produce evidence in the medium of deep ice cores? What are the situated connections among actants in trans-local networks stretching from the knot of NEEM to the rest of the world? Most generally, I am interested in the larger questions that this project enables; the scientific re-configuration of nature in its relationship to society, entailing the possibilities and legitimacies of expert knowledge production in Western democracies.

My presentation will discuss what is at stake in understanding paleo-climatology as “late modern techno-science”. Discussing this concept, I will touch on what is involved in studying the cultural and material dimensions of climate science and I shall draw on Knorr Cetina's notion of “epistemic cultures” as a template for understanding NEEM. Finally, I shall probe whether climate science and the forms of realism pursued by climate science is best understood as the emergence of an ever more entangled network, which brings actors, objects, technologies, and knowledge into new hybrid configurations, that is if “late modern technoscience” represents the most valuable conceptual purchase for understanding NEEM.

## Technoscientific objects

*Schwarz Astrid (Institut für Philosophie, Technische Universität Darmstadt, Germany)*

The field science of ecology is built of multiple research programmes that are not necessarily related to each other - concepts and theories used in the field might be incommensurable. Thus, ecology embraces a plurality of approaches and partial knowledges, which by now is mostly acknowledged as being an important aspect of how ecology fruitfully grapples with the complexity of its objects. From a philosophy of science perspective this complexity is mainly due to the fact that ecological objects are construed according to different modes of description. In the scientific mode, these objects are described as pure objects along the traditional separation of the natural and the artificial, of representing and intervening. These categories become intertwined and interdependent in the technoscientific mode of description, which results in the description of hybrid objects. These different modes might be reflected in the division of ecology into ecoscience and ecotechnology. While ecotechnology is about developing tailored solutions and site-specific practices (examples are restoration ecology, landscape ecology, and industrial ecology), ecoscience seeks to overcome the dimensions of case studies and instead to describe ecological phenomena with more general concepts, models and even laws (such as the competitive exclusion principle, models about predator-prey relationships, as well as ecosystem theories). Whether ecological objects are finally assigned to ecoscience or ecotechnology depends mostly on the vantage point that is adopted.

An object of contemporary ecological research will be used to clarify the division in ecoscience and ecotechnology and to sort out respective arguments. The “Chicken Creek” is a real-world model of an artificial water catchment that is a constructed natural site: the model simulates its own behavior in that it monitors its own performance. It is a specific kind of field experiment that abolishes the carefully maintained spatial separation between an experimental system and the natural system, which it is supposed to represent. It serves as a model for a natural system and at the same time authorizes its own representation. This raises the problem of how to critically assess findings from this “real-world simulation”, and thus of how to adequately characterize the vantage point of description.

## **Technoscience, Control Society and The Politics of Life Itself**

*Weber Jutta (Braunschweiger Centre for Gender Studies)*

Today, there is a lively debate going on whether the relation of science, technology and society was profoundly transformed in the last decades, whether we live in an age of technoscience and whether the epistemologies, ontologies, categories and epistemic values of (techno)sciences radically changed (Haraway, Latour).

From my perspective, technosciences such as New Robotics or Nouveau Intelligence invented powerful analogies between humans and machines and reformulated the traditional epistemologies and ontologies of GOF AI (Good Old Artificial Intelligence). Their new approach is centered on the determination of optimal boundary conditions to bring emergent processes into being, while ignoring the intrinsic properties of organisms and refraining from the objective description of universal laws. Evolution via tinkering, the processes of trial and error are the main tools to help the construction of complex dynamic and therefore intelligent systems, which are beyond the analysis and control of the classical sciences. The logic of research centers on the emergence of the unexpected and to find possibilities to exploit surplus processes in a technical way.

At the same time, the project of Enlightenment and traditional narratives of progress are left behind. Technology is seen as the main factor in an entrepreneurial enterprise for developing innovative solutions for economic growth and specific societal problems (Nordmann).

Having these developments in mind, I would like to focus in my contribution on new societal and biopolitical developments discussed under the heading of 'control society' (Deleuze), 'New World Order Inc.' (Haraway) and the 'Politics of Life Itself' (Franklin, Rose) and whether and how shifts in values, historical narratives, epistemologies, ontologies, and technologies can be seen as part of a new episteme called technoscience.

## **The technoscientization of medicine and its limits: patient organizations between biosocialities and technoscientific identities**

*Wehling Peter (University of Augsburg, Germany)*

In recent years, biomedicine has increasingly been conceived as technoscience. In an influential paper, Adele Clarke and co-authors, for instance, understand the “technoscientization” of medicine as one of five key processes in what they term the “biomedicalization” of health and illness (Clarke et al. 2003). Another key process is seen by these authors in the “transformation of bodies and identities”, and particularly in the construction of “technoscientific identities” (e.g. “geneticized” identities). As the authors argue, “these new genres of identities are frequently inscribed upon us, whether we like them or not” (Clarke et al. 2003, 182). There is little doubt that the “successful” imposition of such identities would be an important element of the establishment of technoscientific biomedicine in contemporary societies. However, the scope and implications of the stated transformation of identities remains open to discussion: As the authors themselves emphasize, biomedicalization is not a “technoscientific tsunami that will obliterate prior practices and cultures” (Clarke et al. 2003, 184-5). Instead, they acknowledge the “heterogeneities of biomedicalization practices” and their effects in different situations. Accordingly, in her qualitative research with women diagnosed with breast cancer, Gayle Sulik (2009) found out that a “technoscientific illness identity” has been adopted by only about 25 per cent of those women who used medical information to understand their situation and become “lay experts”. It is particularly remarkable that Clarke and her co-authors understand the concept of “biosociality” introduced by Paul Rabinow during the 1990s as “the major framing of technoscientific identities” (Clarke et al. 2003, 183) while other scholars, as for instance Nikolas Rose (2007: 144-147), conceive biosociality in terms of making claims for “active biological citizenship” and of lay actors’ participating in the cooperative production of medical knowledge (see on this also Wehling 2010). In particular, patient organizations are credited in recent research with the ability to contribute to the creation of novel forms of knowledge as well as to escape the imposition of “technoscientific illness identities” (see, for instance, Rabeharisoa 2003; for a critical view see Hughes 2009).

Given this background, the aim of the paper is to assess the reach of the “technoscientization” of the medical field as well as its possible limits. To do this, it will exemplarily focus on exploring the extent to which “technoscientific identities” are adopted (or modified or rejected) by patient organizations. What is at stake here is the question of whether and in how far the concept of technoscience reaches beyond the institutional production of scientific knowledge and is able to describe wider transformations in the medical culture and social practices of contemporary societies. In addition to theoretical reflections on technoscience, biomedicine, biosociality and biological citizenship, the paper will draw on current research conducted at the University of Augsburg on the activities of rare disease patient organizations in the governance of biomedical science.





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## **TRACK 9**

# **Speculation, Design, Public and Participatory Technoscience: Possibilities and Critical Perspectives**

### **Convenors:**

**Carl DiSalvo (Georgia Institute of Technology, USA)**

**Tobie Kerridge (Goldsmiths, University of London, UK)**

**Alex Wilkie (Goldsmiths, University of London, UK)**

**Speculative design by practice - A robot case study**

*Auger James (Royal College of Art)*

*Alex Taylor (Microsoft Research)*

*Laurel Swan (Royal College of Art)*

STS's methods tend to be descriptive, focused primarily on producing accounts of technology and science in action. As a consequence, they have not been applied in any concerted fashion to examining possibilities for the future (for exceptions, see Haraway, Urry, etc.). Moreover, STS's concerns for analytical interpretation and theorising can appear, at times, removed from the worlds they describe and thus inaccessible to many. Indeed, there is a tendency for the methods and theories to obscure the very phenomena being examined. In its ideal form, Speculative Design provides a means to solve some of these problems. By applying normative methods commonly associated with industrial design, the themes being studied take on forms that echo the everyday products people use and play on the familiarity people have with them. As such, there is the potential to both reach and engage a wide public audience. Moreover, speculative design can effectively 'domesticate' emerging technologies by extrapolating scientific research into potential future realities and by giving these realities form.

In this presentation, we describe our use of speculative design for these purposes. Our presentation centres on the design of five speculative entertainment robots that are meant to raise questions about contemporary ideas of domestic robotics. Deliberately invoking a stylized aesthetic, the five robots are meant to seduce the viewer into thinking about what it would be like to live with machines that incorporate a degree of autonomy. To provoke speculation, we take advantage of commonly held views of furniture and domestic appliance design, but disrupt them with somewhat troubling notions of entertainment. Thus, the robots intentionally toy with the ideas we have of consumer products whilst at the same time suggesting something more sinister.

## Chasing the Carrot or The Not-Implications of STS for Design

*Bredies Katharina (Deutsche Telekom Laboratories)*

*Rosan Chow (Deutsche Telekom Laboratories)*

The description of social situations as networks of human and nonhuman actors in STS is systematic and grounded. It provides a robust language and methodology to describe designing as an inscription of social relationships into material artefacts. Therefore it appears to provide designers a framework for analysis of design situations. However, whether STS really delivers more or better information for designers than the casual observations they normally do is not clear. At present we have found that those who employ STS theories and models for design projects often do so rather superficially. What STS is contributing to design now is far more limited than what we hope it might. We cannot help but wonder whether STS is used merely as buzzwords to sound impressive, or whether STS is difficult to implement in practice.

In our experiences of employing Actor-Network-Theory (ANT), the most beloved STS account in Design, we have encountered difficulties that make us rethink the potential contribution ANT can make to Design. Although there is a possibility that the problem lies with us rather than with ANT, we would still like to share our thoughts here to open up discussion. We notice that there is a gap between social relationships as described in ANT – although they include material artefacts – and how these very relationships change due to a design intervention. We have found that ANT merely describes the social and material relationships that designers need to change; ANT does not say what kind of change will have what kind of effect; ANT therefore only has negative implications for design (we can learn what not to do). The basic dilemma for any (social) scientific theory in and for Design is that knowledge about an existing situation will lose its currency at the very moment when the situation is changed by design. An idea or projection does not have the same agency as a materialized object.

By designing a new artefact, designers make information about the situation partly obsolete. ANT can describe how artefacts make part of social networks post facto. It can only run after design.

In other words, ANT is a social account and therefore mainly meant to observe and describe. Design, in contrast, needs to intervene. While analysis is nowadays usually an integral part of design (research) projects, the gap between explaining a situation and trying to change it remains. Therefore ANT faces the same difficulties in informing design as any other (descriptive or explanatory) theory that came before it.

We therefore find it particularly problematic to use ANT as an informative source for Speculative Design proposals; although it might serve as a profound and useful perspective where and when an extensive analysis of socio-material relationships for design is needed.

## **The Agency of Design in the Innovation Process**

*Compagna Diego (University of Duisburg-Essen, Institute for Sociology, Germany)*

The main issue of this abstract is the crucial role of design in the innovation process. On the basis of a case study about the user-centered development of two robot assistants for the integration in a care facility for seniors the agency of design should be demonstrated. By adopting the scenario-based design (Rosson/Carroll 2003) to ensure a user-developer exchange the designed scenarios of the planned applications of the robots turns out to be more than just 'boundary objects' (Star/Griesemer 1989). To characterize the dynamic that the designed scenarios unfold the concept of the obligatory passage point of the Actor-Network-Theory (ANT) is quite more fruitful (Callon 1986).

In the mentioned case study a knowledge transfer loop between the users (care-workers and seniors of a stationary care facility) and the developers of robot assistants was established. Based on a requirement analysis in the facility (adopting qualitative methods and including all relevant parties, e.g. the inhabitants, the care workers and the management of the facility), first scenarios were drafted. After discussing the first scenarios with the developers and adjusting them because of the technical feasibility the scenarios were presented in the care facility anew and adjusted again due to the recommendations got by the potential users. These adjusting loops were repeated until every party was satisfied with the planned scenarios. At this point one can finally assume that the designed scenarios fit with the socially desirable and the technically possible.

At first glance the scenarios could be described as boundary objects that create a link between heterogeneous groups like seniors, care-workers and developers of robot assistants. But this concept does not fit with a distinguishing mark of the scenarios: The meaning of the scenarios as well as the objects and the action that are part of the scenarios changes constantly for all participants of the knowledge transfer loop during the whole adjusting process. A second thought could be to characterize them by taking a social constructivism perspective in mind; e.g. describing them as a bargaining field for the redefinition of approaches for different purposes (Pinch/Bijker 1999). But also this perspective misses one important attribute: By mediating through the scenarios also the purposes of the participating parties changed.

Adopting the ANT framework - especially focused on the concept of translation and obligatory passage point - the agency of the scenarios could be captured properly. A major incitement for the observed reciprocal alignment between the scenarios and each different party could be described as a stabilization strategy. This again could be described by melting some main thoughts of "Identity and Control" (White 2008) with the ANT-Inventory. At last, to bring the humans back in as focal actors of the user-centered innovation process, the causal loop concept of the structuration theory (Giddens 1984) is able to describe how by non-intended effects of the human actors the knowledge transfer loop - which is mainly focused on the designed Scenarios - generates a firm environment for a fruitful developer-user-exchange. Instead of transfusing the symmetrical assumption of the ANT over the whole process, the agency should be conceptualized by a mode of temporality and in such a way as a 'dance of agency' (Pickering 1995).

## **Speculative design and the issue of public participation**

*Dawson Emily (King's College London, UK)*

To explore the relationships between speculative design and science and technology studies this paper will focus on overlaps between speculative design and public engagement with science and technology (PEST) practices. In the UK context PEST has developed from more didactic iterations of society and science relationships, those concerned with increasing scientific literacy and appreciation amongst a homogenous public, towards a model oriented towards participatory democracy and mutually informative discussions between heterogeneous publics and sciences (Hagendijk and Irwin 2006, Miller 2001). It is within this participatory, discursive and political space that some have sought to locate a role for speculative design alongside PEST practices (Beaver et al. 2009, Kerridge 2009). However, as a result of operating within the same field as PEST, speculative design practices can be explored using criticisms commonly made of PEST theories and practices, regardless of whether speculative design would or should want to fit the PEST 'mould'. This paper will highlight some concerns raised by the overlap of PEST and speculative design and will focus on where the role of publics and society/science relationships might lie in this convergence. Do speculative design projects reinforce problematic models of society/science relationships as centred on controversy and futuristic novelties? If speculative design seeks to open up socioscientific issues in a 'new' way, such that publics might participate in critical discussions, to what extent can this succeed without further developing how publics are conceptualised and involved?

Within PEST theories and practices notions of 'publics' have evolved since the days of public understanding of science rhetoric into more diverse, multiple and nuanced perspectives (Holliman et al. 2009). Despite these developments PEST practices remain elitist, with a tendency towards catering solely for the white, middle class family audience, with the ensuing exclusion of other publics (Dawson 2008, British Science Association 2006). Where speculative design practices overlap with PEST there is a danger that perceptions of publics may become even narrower. While some speculative design projects seek out alternatives platforms for engaging with diverse publics, for example workshops in community centres or with patient groups, there is a persistent tendency towards the exhibition as the central engagement format, often coupled with an online element. It is clear from decades of research in museums and galleries that exhibitions, both physical and online, are a fantastic way of preaching to the choir, and little else (Bennett 1995, Hood 1993, Macpherson 2006). Speculative design projects in this vein may not reach beyond an already interested audience of designers and scientists. As a result this paper argues that while aiming to foster spaces for publics to participate in, critique and explore alternatives for science and technology, speculative design projects may fall short of their mark by addressing elite audiences who are already well catered for. Consequently questions concerning how publics are conceptualised and enrolled (or not) in speculative design projects on socioscientific issues deserve further consideration.

## Attending to the Objects of Speculative Design

*DiSalvo Carl (Georgia Institute of Technology, USA)*

Through the practices of speculative design, we have come to witness spectacular objects, which purportedly act as provocations for reflection and debate, and promise new forms of public engagement with science and technology. Paradoxically, although speculative design is object-oriented, in that it depends upon the construction of artefacts, there is little discussion about the particularities of these objects themselves. The exhibitions and discourses of speculative design tend to emphasize the conceptual aspects of the objects. Such an approach to the objects of speculative design is limiting and problematic because it elides the materialities of these objects and the media through which they are presented. These factors are important, because if we are to claim that the objects of speculative design act in particular ways, then attention to the particular media and materiality of these objects is necessary, for they play a constitutive role in any affordances and effects these objects might have.

For example, the objects of speculative design span images, video and physically instantiated artefacts, ranging from robotic dogs to jewellery made from bone. Clearly, these objects are not all of the same kind. They are produced, circulated, and consumed quite differently. But these differences are rarely attended to in the discussions surrounding speculative design. In overlooking or eschewing these differences, we miss an opportunity for more exacting description and analysis, and we may advance an undiscerning perspective of the object-world, in which all objects are seemingly cast as equivalent.

In this paper I will draw from recent work in science and technology studies (Latour, Marres), digital media studies (Bogost), and political theory (Bennett), to bring the material and media qualities of the objects of speculative design into relief and discuss their significance. As all of these authors have all drawn attention to, media and materiality plays a important role in public life, in politics, and, of course, in technoscience. If the goal of speculative design is to prompt reflection and debate, and enable new forms of public engagement with science and technology, then both designers and scholars need to develop a critical perspective on the media and materiality of objects of speculative design. This paper will attempt to be a first step in that direction.

**Fabricating futures**

*Galloway Anne (Victoria University of Wellington)*

Since 2004, the Design Led Futures industrial design programme at Victoria University of Wellington's School of Design has been exploring different approaches to creating the future. This paper assembles a critical and creative narrative to examine the programme from both theoretical and empirical perspectives. A complex and dynamic history of industry sponsorship, government partnership and public exposure raises productive questions about the politics of the programme, and compels close consideration of the ways in which speculative design projects perform particular publics and how these relations have shaped both pedagogical approaches and student outputs. Bringing together actor-network theory and a sociology of expectations, particular attention is given to the way that each year's design briefs have operated to articulate issues, and how students have both complied with and resisted the given constraints. A comprehensive analysis of the types of products designed over the years presents a typology of fabricated futures that offers one means to evaluate the possibilities and limitations of combining STS concepts and methodologies with future-oriented design practice.

## Performing future waste practices in a shopping center

*Halse Joachim (The Danish Design School)*

In a recent pilot project about reducing the amount of waste that is incinerated instead of recycled, my fellow design researchers and I were commissioned to challenge existing methods and approaches to waste handling by establishing new design-oriented dialogues in which citizens, together with professional stakeholders explore and unfold innovation potentials.

Our initial inquiry into the networks of waste professionals revealed that while much has been tried out over the years, there is hardly any tradition of exploring possibilities before having a fully endorsed and specified plan for change. Two important objectives of the project became to: re-think waste innovation activities as temporary experimental setups, and generating a renewed image of motivations and practices of the citizens served.

In one particular event, where a caretaker, two citizens, and a shop owner are exploring possible future waste handling systems together with a municipal waste planner and four design researchers, these two objectives effectively intersected.

In this paper we will recount in detail how this diverse range of stakeholders was mobilized, how their everyday environment was articulated as a stage for trying out new opportunities, how they were actively articulating their stakes, and finally how they engaged in three collective performances of possible futures.

We will discuss this interventionist formation of publics and futures in the shopping center with a special attention to engagement and power in that it entails obvious negotiations of claims to what is real, what could be real, and what is desirable.

How can we talk about the performativity of such interventions? This paper will explore the notions of parliament (Latour 2005) and theater (Schechner 1988) as two different metaphors for understanding the transformative dynamics of what takes place during this three hour event in the shopping center.

The metaphor of the parliament directs our attention to the inherently political negotiations implied by the participants' diverse concerns; it raises questions about who our constituencies are, and how our different stakes in the topic are played out – democratically or otherwise?

The metaphor of the theater directs our attention to how embodied practices around imagined artifacts may allow us to collectively redefine the situation at hand, and thus allow us to rehearse how future practices might play out. It raises a question of reality and fiction: how far is the distance from a successful rehearsal to a new robust practice?

We will provide tentative answers to these questions, and end the paper with a suggestion for continued convergence between STS and exploratory design research; in particular it seems that exploratory design researchers can immediately benefit from a constructivist approach to how things come into being, and conversely, a new breed of socially aware designers are increasingly turning design interventions into interesting ethnographic questions of relevance to scholars of STS.

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**Circulating speculative design – public engagement and practitioner promotion**

*Kerridge Tobie (Goldsmiths, University of London, UK)*

In this paper I provide an account of the circulation of speculative design as it relates to recent science and society activity in the UK. Empirically, I focus on three public settings: online publications (including blogs and design practitioner websites), a Café Scientifique event, and an interdisciplinary exhibition. I will focus on the construction of the public within these settings, drawing upon sociological accounts of Public Understanding of Science (PUS) and Public Engagement of Science (PES), including notions of publics as publics-in-general and publics-in-particular. Additionally I will explore the extents to which these settings provide occasions for lay and expert conceptions of technoscience to become interleaved. A key issue with regards the making of publics in these settings is to what extent speculative design occasions debate, along with a series of interrelated questions including: who is having a debate, what are the terms of the debate, and what are the effects of the debate? In doing so, I address how literature concerning practitioner accounts of speculative design is underdeveloped, and provide some form of accountability for these practices.

**Experimental Processes – A Study of Design for ‘Future Digital Manners’**

*Lange Ann-Christina (Goldsmiths, University of London, UK)*

In this paper I will explore the notion of ‘innovation’ as it is deployed in the practice of ‘critical design’. In this practice design is used as a medium to foster critical awareness of social and ethical implications of new and emerging technologies. This is part of my ongoing research on innovation management viewed as a practice between design, art and business. In relation to this study I will trace the concept of ‘innovation’ through participatory observation of a 4-week design brief. The brief is set by an international Tele company and responded by a group of master students being taught to practice critical design. The brief investigates the future of digital manners, which addresses the emergence of etiquettes modeled around the invention of new digital technologies. The project was organised as a pedagogical experiment taking place at an academic institution in London. From this array of the design process I will examine the use of ‘design for research’ focusing on provocation as a research method for social experimentation. In doing so I will draw upon Deleuze and Guattari’s concepts of ‘deterritorialization’ and ‘reterritorialization’ to understand how critical design entails a process of social ordering mediated through the design of ‘poetic’ objects. First I will present a specific event from the design project: ‘The Berlin Street experiment’, which was conducted as an artistic intervention. The approach for this intervention were characterised as ‘confrontational techniques’, that is, encounters and situations the designer sets in motion that challenge social behaviour and render the practices of everyday life visible. Second, I will account for the object invented as a response to the brief. The data gained from the intervention was used to produce poetic objects, which are meant to provoke a ‘fictional’ reality. The design object is produced to test an experimental situation: i.e. to destroy our common sense experience of reality enacting a process of deconstruction in order to reconfigure the world differently. In conducting the design project of ‘Future Digital Manners’ the design practice claims to use fine-art means to provoke debate in order to question how users cohabit with electronic technology. As such, my analysis of design for ‘Future Digital Manners’ draws attention to an aesthetic approach to the study of innovation.

**Artifacts from the future of domestic living: Engaging innovation by means of speculative design – a preliminary investigation**

*Lenskjold Tau (Danish Design School)*

The background for this paper is a forthcoming research project “Artifacts from the future of domestic living” initiated by the Danish Design School in conjunction with TEK0 and Innovation Lab as part of a recently established innovation network, Innonet Interior and Wear, financed by the Danish Ministry of Science, Technology and Innovation. The network is comprised by a diverse array of research and educational institutions and consultancies. The general aim of the network is to support growth and innovation within the Danish furniture, clothing industries and create stronger ties between research and industry.

The main focus of this paper is to investigate and discuss the ways in which a speculative design practice can be deployed as an exploration of possible futures, but also how this proposition is likely to be shaped by various actors and agendas – designers, research partners, new materials and technologies, innovation policies among others – involved in the project at present and in the future. The paper will attempt to answer the following questions:

What is of concern when attempting to engage Danish furniture and lifestyle product manufactures in projecting the role of their future products in the shaping of domestic living – and, vice versa, the shaping of the future products by changing conditions of domestic life?

And how are such prospects of the future likely to be influenced and co-produced, by the heterogeneous network of actors and potential publics?

Central to this preliminary examination is an outline of a framework of how to address the future through conventions of the imaginary or in the present. It seems that STS in general and what has been called a sociology of expectations (Michael & Brown) in particular has a lot to offer in this respect by complementing a looking into the future found in critical design practices with a looking at the future as located in the expectations of past futures presented in the real-time now. How can such considerations be translated into the rather mundane practices of furniture and lifestyle product production, and what are the subsequent potentials and limitations to be gained from these radically different approaches?

The research project utilizes domestic living as a collective thematic context through which to explore the possible futures of a number of different products and produces. Aspects of domestic life have often been the subject of critical design endeavours, such as PLACEBO (Dunne and Raby) and more recently Carnivorous Domestic Entertainment Robots (Auger & Loizeau). What differentiates the notion of domestic life discussed in this paper from these examples is a conception of the speculative which is more readily preoccupied with understanding how users can adopt and evoke a critical stance towards the use of designed objects in their everyday life; what tactics they deploy to tweak and appropriate future products as means of articulating an implicit or explicit critique of inherent values in designed artefacts and services.

**Democratising technology and innovation: the role of the “participant” in Living Labs**

*Mensink Wouter (Leiden Institute of Advanced Computer Science, The Netherlands)*

*Benoît Dutilleul (Bristol Centre for Leadership and Organisation Ethics, UK)*

*Birrer Frans A.J. (Science & Society, Leiden University, The Netherlands)*

Particularly in the last decade, democratisation has been presented as a near panacea for better aligning technologies to the wishes of citizens, and for giving them greater influence on processes of technology development or innovation. In this paper, we use the case of Living Labs as a means of exploring various approaches and attitudes to participation and democratisation. Very briefly put, they are conceived as environments where potential innovations can be experimentally tried out with and adapted to users. Since their official launch in 2006, 129 Living Labs have been established and networked to tackle Europe's declining economic competitiveness and societal challenges. Currently, a fourth wave is in preparation, involving another 118 applicants. The innovative potential of Living Labs is based on new social configurations for organising innovation. We untangle and describe the three main configurations of the Living Lab concept as follows: (i) a setting for in vivo experimentation on social systems, (ii) an innovation and product development approach involving users, and (iii) a type of innovation system. We analyse the different approaches to participation and democratisation in these configurations, with a particular emphasis on the subjectivity of the citizen “participant”.

When it comes to the understanding of democratisation and participation, there are strong differences in the way it is framed in the political discourse on Living Labs. Ranging from describing a focus on societal involvement in innovation to boosting the competitiveness targets of the Lisbon strategy, a whole set of motivations is offered for citizen participation. We analyse how such approaches are translated into practices for the three Living Lab configuration mentioned above.

We confront the practical use of these concepts with theoretical approaches to democratisation. The Living Lab movement explicitly refers to Von Hippel's Democratising Innovation (2005), to Scharmer's work on co-creation and to the Scandinavian tradition of participatory design. We juxtapose the argumentation about these approaches, to confront this with Andrew Feenberg's ideas about democratising technology. We particularly discuss the opposition between democratisation theories that place the citizen in the role of a co-producer or lead user (Von Hippel) and those that focus on the strategic participation of subordinate actors (Feenberg).

Based on an analysis of cognitive and motivational asymmetries in the three configurations, we argue that there is in fact a risk that participants are placed in a subordinate role, rather than in a strategic participatory role. This has major implications for the subjectivity of the participant: a subjugated actor has a very different place in a development process than a collaborator has.

## **Designing Public Engagement with Science: Citizens, Idiots, Parasites**

*Michael Mike (Goldsmiths, University of London, UK)*

It is now commonplace to recognize public engagement with science and technology as a major theme in contemporary science and technology studies. Inevitably this has been problematised on a number of counts: How representative of the public is it? Does it really contribute to policy making or is it a form of PR? In entailing 'formalized mechanisms of voicing', does it construct reductionist versions of citizenship? Moreover, there are concerns about the ways in which public engagement is related to forms of governance and governmentality: Are there forms of political activity or scientific citizenship that become marginalized through public engagement? The present paper takes a rather different approach by contrasting public engagement techniques typical of social science to those of speculative design. Elaborating on Stengers' notion of 'the idiot' and Serres' notion of 'the parasite', speculative design can be understood as an 'idiotic parasite'. This concept aims to address how actors and activities that 'make no sense' in relation to a particular event (such as social scientific research project or a public engagement exercise), by virtue of being excluded, can return to haunt that event. A number of speculative design engagement projects, notably 'Biojewellery' and 'Material Belief' are treated as 'idiotic parasites'. Though they seem to make no sense in relation to social scientific 'formalized mechanisms of voicing', they return to interrogate, and supplement, social scientific assumptions about, for example, the qualities of citizenship, the place of scholarly duty, the parameters of scientific controversy and the nature of engagement. The paper thus uses these projects as a way of developing more expansive and heterogeneous models of public engagement.

## **Combining engineering design and STS: designing technology and society**

*Miedema Hanneke (Wageningen University and Research)*

Design is the work of engineers. Engineers and their designs are object of study in Science and Technology Studies (STS). STS has shown that engineering design is a thoroughly social process and that technology and society are indissolubly connected and interwoven. However, during the design process engineering designers deliberately disconnect the intended design from its context in order to develop it. Once the technology is developed, it will be given back to the social context. This context – the society – is rather unpredictable and has often fuzzy and ever-changing needs. Several engineering design methods are developed that should help engineering designers to deal with this unpredictability. Since STS has gained a lot of insights on the two-foldness of technology and society, STS could be of help for engineering designers.

To find out whether STS insights can contribute to a more contextualized design, a project is followed that uses a Reflexive Interactive Design (RIO) method for the design of integrally sustainable pig housing systems.

Reflexive Interactive Design (RIO) is an attempt to deal with ever-changing needs in the highly contested area of animal production systems by combining a particular methodical engineering design method with insights from Science and Technology Studies (STS).

The designs RIO delivers are not meant to be blueprints for future animal husbandry, but rather vehicles for sustainable development. RIO differs from a problem solving design method in the sense that it tries to actively contribute to the formation of a new sustainable future for animal production systems.

And the use of the reflection tools in the project, is self-evident, since both fields have different functions. The RIO project, called Porkunities (pork opportunities), organized three consecutive design workshops with an increasing heterogeneity of participant groups. Among the participants were researchers, farmers, policy makers, advisors, and farm equipment manufacturers. During these design workshops tools were developed and tested that motivated participants to critically reflect upon present day pig production from the perspectives of different stakeholders.

Analyses of the RIO project and the testing of the reflection tools in the project, show that RIO as such, and the tools in particular adapt the engineering design method and open up the design process for reflection. The RIO approach, and particularly the tools enabled the design teams to actively keep the connection between technology and society alive during the design process.

In this paper I will try to show how these adaptations can be translated into design tools that enable engineering designers to incorporate STS notions.

## Critical Making

*Ratto Matt (University of Toronto, Canada)*

The description of this track notes the increasing engagements between design and STS, and emphasizes a nascent desire to articulate and develop novel modes of intervention into technoscience. The development – and the critique – of such modes is the main focus of our recent work in which design methods and open source software and hardware (e.g. arduino, processing, etc) are used to supplement and extend critical reflection on the role of information and information technologies in modern life. We call this work ‘critical making’ in order to highlight the reconnection of two modes of engagement with the world that are typically held separate: critical thinking, traditionally understood as conceptually and linguistically based, and physical ‘making’, goal-based material work. We see this as a necessary integration for a variety of reasons; first, as a way of overcoming the ‘brittle’ and overly-structural sense of technologies that often exist in critical social science literature; second, as a way of creating shared experiences with technologies that provide joint resources for transforming the socio-technical imagination; and third, as a site for overcoming problematic disciplinary divides within technoscience.

One divide that remains under-addressed in many design-oriented methodologies is the variety of epistemic valences afforded the explosion of artifacts that are typically produced in speculative design methods. Texts, drawings, photographs, storyboards, material and digital prototypes, and so forth – each is considered more or less important, more or less valid, depending not only on the use to which the artifact might be put, but also on the disciplinary context in which the artifact is to be found. In this paper we will explore some of the links between design artifacts and disciplinary affiliations, noting in particular the ways epistemic and ontological commitments impact on what kinds of artifacts are seen as relevant – and, even more importantly, when they are seen as such.

Ultimately, critical making is an attempt to bring hands-on material making – not just design – to bear on the continuing divide between critical scholarship on technologies and the work of technological production itself. To do so requires attention to the results of such work as constellations of artifacts with varying and different affordances and associated ‘objectual relations.’ Rather than differentiate these results using standard binaries, e.g. as analytic texts made to be read and symbolically interpreted, or as emotive material prototypes made to be used and experienced, our focus is on the whole constellation of materialities that are engendered through and within acts of production. Through such attention we hope to both value and relate the different modes of engagement and intervention into technoscience that are articulated through forms of making.

## Communication-Mediated Computation: The 'Hmmm' Environment as an engine for Participatory Speculative Design

*Savery Nathaniel (University of Colorado at Boulder)*

Processes of 'becoming' must be directly engaged within design practice. This research contributes to developing 'frameworks for becoming'. In particular, I argue that we must shift focus to real-time interaction support systems, interrogating how such systems can structure shared meanings, generate various forms of reflexivity, and mediate power relationships involved in interaction.

The paper presents a prototype interaction environment called 'Hmmm', the result of ongoing informal design collaboration led by the author, that is specifically designed to address this problematic. Currently instantiated as a pen, paper, and token-based system for co-located users, the 'Hmmm' interface represents an offline starting point for articulation of design requirements to be incorporated into an complex computational infrastructure for localized intervention in what Latour clarifies as 'political ecology'.

Using this system, end users can model physical and conceptual structures or 'spaces' and map relationships of these structures to emerging situations, negotiating dynamic relational constraints among them. The system enforces the interdependence of users' actions by subjecting users to responsive 'structures of engagement', rules and resources which themselves can be directly modified by users, that constrain the interaction process in particular ways. Actions and decisions recorded in the 'Hmmm' environment serve as subsequent inputs in reconstituting the system according to user thematizations of recorded content captured automatically on dimensions of 'sustained attention' and 'intensity'. The paper will walk through brief usage scenarios of 'Hmmm' in action, demonstrating how structures and modes of engagement within 'Hmmm' can transform over time through the process of interaction.

By focusing on supporting context-specific communication and interaction patterns implicit in all forms of situated 'knowledge-production', we can ground new mediation systems at the real-time, interactional level. This enables ontology-modeling and active inter-mediation of systems themselves 'from the ground up', by end-users. It is this communicational grounding, I argue, that opens up design processes to participatory, heterogeneous underspecified infrastructures called for in literature on 'design for ongoing re-design'. From a foundational intelligibility of interaction, emergent patterns provide the structural content for various forms of 'coordination mechanisms'. Herein, I argue, lies the promise and challenge for design as a mode of intervention in technoscience, re-orienting the traditional STS analytic of intervention to see ambiguous structuring and contextualizing effects of micro-processes of interaction, grounded in 'world-presenting' communicative actions that are already relationally responsive.

Speculative design as proposed here both supplements and destabilizes existing 'information ecologies', moving the focus to a radically de-centered interaction ecology that re-situates all existing information systems and infrastructures, insofar as they are relevant to participants, within 'contested spaces' of negotiated becoming and being. This re-situating is captured by inverting the phrase 'computer-mediated communication' to 'communication-mediated computation'. Studying interaction carried out via 'Hmmm', including user inquiries clarifying and making sense of the system design, provides insights into how bringing speculative design together with STS can transform possibilities and processes of public-forming, participation, and politics in the broad sense, and how such designs might form a basis for new modes of co-constructive embodied knowledge-production.



## Ambivalent Animal

*Thomas Geoffrey (Georgia Institute of Technology, USA)*

The Ambivalent Animal project explores the interactions of animals, culture and technology through the creation of two speculative design projects: Zoocentrix: Purrplex and Petite Charm. These projects focus on domestic pets, highlight the animal's uncertain status and explore the overlapping ontologies of animal, human and machine. They create concrete artifacts that engage with theoretical issues of anthropocentrism, animality and alterity.

Zoocentrix: Purrplex is a series of artifacts and experiences that are tailored to the phenomenological interests of an individuated cat. The project privileges cat concerns, sometimes at the expense of human interests. Zoocentrix includes the following pieces:

Customized CatTV: television programming tailored to an individual cat's preferences.

Outsideln: a space that tracks cat movement and projects twitching images a cat can chase.

SunSeeker: a moving 'bot that seeks out sunlight in your home; a cat naps on top of the 'bot assured he'll be moved to the warmest place in the house.

Meat Mobile: a mobile adorned with dried fish that slowly rotates as a cat approaches.

Tail Twitcher: stuffed-animal mice tails that twitch, triggering a cat's hunting instinct.

Petite Charm is inspired by the innovations and manipulations of biotechnology. The central image of the project is a genetically modified puppy who lives on your arm. The animal feeds by drawing blood from you and removes bodily waste by accessing your body's digestive tract. This parasitic pet is promoted as the latest emotional-support dog. A pet attached to your body can accompany you throughout the day; she goes where you go. But this continual companionship creates complications: an animal drawing blood from your body may create light-headedness; the mingling of body fluids and waste may lead to infection; and removing the pet from your arm requires a life-support system for the animal—a system that requires a steady supply of blood. Petite Charm explores the complications of a bioengineered symbiotic relationship between animal and human.

These projects employ an ambivalent aesthetic that evokes two or more incompatible sensibilities. Zoocentrix is simultaneously affirmative and critical. The project is a serious attempt to imagine mediated experiences that a cat might enjoy. At the same time, the project parodies the utopian drive to solve all problems by technological means. A cat's desires are affirmed even as the excesses of techno-culture are questioned. Petite Charm encapsulates the long history of complicated interactions between humans and animals. Genetically modifying an animal so that he is small and docile enough to live on a human's arms is an exaggeration of the anthropocentric demands imposed on animals. Yet in Petite Charm's scenario, demands are made on animal and human bodies, and the extreme intimacy between pet and host is something to be desired and feared. Both projects explore the terrain of speculative design by highlighting conflicting desires and issues of subjectivity and corporeality. They also include moments of humor as they embrace contradiction and irresolution.

## Enacting Users, Mediating Publics

*Wilkie Alex (Goldsmiths, University of London, UK)*

*Boucher Andy (Goldsmiths, University of London, UK)*

Each approach to design presents and deploys a particular conception of the user: whether scripted into artefacts, configured in discourse or constructed in use. In this paper we compare two contrasting approaches to user involvement in the design process and examine how each constructs its publics. Rather than taking the theories, discourse and history of designers or designed artefacts as entry points into sociotechnical networks, we focus on how, in practice, users are brought into play in order to link up situated persons, technologies and collectives. Here, we draw upon Deleuze and Guattari's notion of 'assemblage' to understand how user enactments synthesize and mediate the relations between technologies and publics. Furthermore, we consider how the related notion of the 'virtual' can work to characterize the various temporalities that are at play between mediations of the user and the public. Empirically, we explore the relations and mediations between users, collectives and publics through two contrasting case studies involving the commercial application of user-centered design and the work of a university based design research group. First, we consider how a persona of a housewife acts to define the prospective sociotechnical context for a novel ICT technology for the kitchen. We draw upon a six-month ethnographic study of how users resource the everyday practices of designers in a commercial context. Second, we trace the various user-enactments involved in the design, deployment and field trial of the 'Prayer Companion', an electronic device to resource the prayer practices and associated activities of a community of contemplative Nuns in York, England. In drawing out such a comparison, we demonstrate how users variously function to bind technologies, publics and practices. How, for example, users in the corporate application of user-centered design act as virtual platforms for sociotechnical propositions by prospecting economic and demographic scales, thus constituting particular socio-economic models of publics. On the other hand, we demonstrate how users enacted as part of design research engagements constitute different kinds of publics through electronically supported spiritual practice. As such, this paper explores contrasting user assemblages that mobilize and constitute very different innovation temporalities, practices and publics.

## **TRACK 10**

# **Video & STS: Methodologies and Methods**

### **Convenors:**

**Yuwei Lin (University of Salford, UK)**

**Christian Greiffenhagen (University of Manchester, UK)**

## **Benefits and Challenges of Microethnography**

*Antonijevic Smiljana (Virtual Knowledge Studio for the Humanities and Social Sciences, The Netherlands)*

Microethnography, sometimes also called video-based ethnography, is a qualitative method that draws on the post hoc analyses of in situ video-recorded data. Along the lines of traditional ethnographic research, microethnography seeks to understand naturally occurring behaviour through careful and thorough description of its situated occurrence. What distinguishes microethnographic approach is an analytic focus on minute (micro) elements of observed practice and methodological reliance on video-recorded data, supplemented by observer's fieldnotes and personal insights. Microethnographic study repeatedly examines video-recorded materials, giving attention to the sequential progression of analyzed events. Earlier microethnographic studies mainly focused on examination of embodied action in relation to concurrent verbal discourse; recent studies have shifted their analytic lens to the study of practice and consideration of tools. Such a shift has prompted a growing number of microethnographic investigations into users' interaction with technology.

Microethnographic approach enables a researcher to analyze the data in a microscopic manner, i.e., to isolate, freeze, and replay different elements of an event. Thus, a researcher is able to capture, identify and document the nuances of practice, as well as elements that can easily get unnoticed without the use of video techniques. This method also enables replicability of analysis and a possibility for other researchers to examine the same data, which enhances validity and reliability of ethnographic research. Finally, by providing possibilities for repeated reviewing of the research data, microethnography offers advanced opportunities for reflexive insights. In the context of STS research, microethnographic approach can serve as a resource for cross-fertilization of knowledge domains, as a means of facilitating dialog among epistemic cultures, as well as the source for developing understanding between the community of research and the community of practice.

Yet, this type of study also has important challenges and limitations. Microethnographic researchers commonly assume the complete—non-interacting—observer role, which requires as minor as possible level of the researcher's involvement. This type of observation eliminates the 'researcher effect' but often raises important epistemological and ethical considerations. Furthermore, an ethnographer needs to develop a specific trusting relationship with informants, so that the use of recording devices renders as unobtrusive as possible data collection. Finally, a specific trusting relationship needs to be established among researchers engaged in data sharing and reuse related to microethnographic research.

## Following and Filming Fibromyalgia

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The overall research project comprises an ethnographic study of persons suffering from Fibromyalgia (FM) in order to understand different ways of handling health as a socio-material practice and performance. The current paper presentation deals with some of our considerations involved when choosing filming by means of video camera as a methodology. FM is a chronic disease of pain in muscles and bones. The diagnosis of bodily pain cannot be objectively measured and observed on the body, and the disease is characterized by a non-verbalizable, bodily experience.

During fieldwork it is the intention to follow the FM sufferers and their bodies for some days, in order to get data regarding everyday health practices and bodily pain in various situations. While filming, the filmmaker/researcher will ask the performing persons about their experiences and interpretations of their bodily situations as they happen.

Visual methodology is chosen both as a fieldwork technique and as a theoretical aspect. In a visualized documentation non-verbalized images are combined with verbalized narratives of the bodily experiences and performances of pain, health practices, and the performed interaction with the material and social world. During the filming, a dialogue is possible between the performing person, the researcher and the important socio-material agent: the camera. As such, interviews will supplement the video camera.

There are several methodological reasons for choosing video camera. 1) The visual data will help see, sense and recall the bodily transformations from no pain to pain in ways that may be different from data obtained by observation, since it makes the transformations more visible and instant, also in the eyes of the performing person. 2) The researcher and the performing person get the opportunity to watch the film together, where the performing person can reflect upon the different situations. 3) Such a re-play of bodily performance gives the performing person and the researcher a common space for dialogue about bodily experience, sense of pain, and interpretations of the situations shown on the film.

As such, this methodology is creating a room for multilayered interpretations, and the camera has an important interactive position in the process of constructing data.

The camera should not be seen as a “disturbing and distancing object” but contrarily, as a dialogical, intermediating material agent, creating a “shared physical and imaginative space for both filmmaker and subject filmed” (Grimshaw and Ravetz 2005). Hence, the theoretical scope is (hoped) to propel for a methodology creating a bridge between a phenomenology of the body and a discourse of disease.

Summarizing: In this paper we elaborate on explorations and experiences with the visual methodology and its socio-material implications such as the interaction between the camera, the filming, the filmmaker, the body filmed; performing in interaction with other agents in various contexts, such as human beings, things and technologies in the lives of the people suffering from FM.

## **Making Things Visible: Phenomenological Videoobservation**

*Botin Lars (Department of Development and Planning, Aalborg University, Denmark)*

Video-observation has been part of the methodological toolbox for decades and it has mainly been treated as an ethnographical tool taking a historical stand in the ground-braking work of Margaret Mead and Gregory Bateson in the 1930's. The development of the camcorder from the 1980's and on has meant that a more embedded observation has been possible, which the work of Jordan and Henderson, Buur and Binder, and others is proving.

This paper will present a method, which is based on the ethnographical observation and the more recent work with the portable video cam. The method is cased in a hospital setting where we follow the implementation of an Electronic Health record over a period of half a year. And is focused on work-procedure in relation to the introduction of new technology.

It is the assumption that the method supplements various types of interviews and questionnaires making possible for the organization to get insight into tacit and embedded knowledge, which remain hidden for the other tools in the box.

The method has a focus on how we, as researchers, focus on the technology for observation (the video cam) and is characterized by an overall phenomenological approach on how we embody technology. The theoretical outset for discussion is the thoughts and ideas of Martin Heidegger, Maurice Merleau Ponty and the more recent post-phenomenological considerations of the American philosopher Don Ihde.

In a more STS related perspective the paper considers ground-breaking considerations of Donna J. Haraway on how we could/should relate to technology in a contemporary setting, where the notion of cyborg is placed in a central position. And the ideas concerning 'hybrid imagination' of Andrew Jamison.

On a more particular level we discuss the potentials and possible enhancement of the researcher in the situation of investigation and furthermore how we interact with the field in an open-ended and discursive manner, making way for results that are reached through proximity, inter-subjectivity and negotiation.

The method consists of the following steps:

- 1: The charge (agreement in between actors of the research to be made)
- 2: The scout (professional scouting of the setting)
- 3: The planning (detailed time and place schedule for the observation)
- 4: The observation (videoobservation in place and time)
- 5: Mind mapping (the observers mind map their experiences of the observations)
- 5: 1st editing (cutting and editing of the material with an outset in the mind map)
- 6: 1st show (primary actors of the observation is presented to the 1st editing)
- 7: 2nd editing (cutting and editing with an outset in the comments in the 1st show)
- 8: 2nd show (all actors are presented to the result of the 2nd editing)
- 9: Final editing (cutting and editing with an outset in the 2nd show)
- 10: The delivery (delivery of the product to the commissioner)

## Studying Astrophysicists-in-Action: The Use of Video in STS

Brooker Phillip (University of Manchester, UK)

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This paper reports some initial findings and methodological reflections from an ongoing video-based ethnography of a research laboratory in astrophysics, which has involved attending lectures in (and learning) physics, astrophysics and mathematics, as well as following the work of doctoral students in the laboratory. Rather than relying only on ethnographic observations of the research practices as the early 'laboratory studies' do, this project also aims to use video to help understand the day-to-day working practices of astrophysicists.

For doctoral researchers in astrophysics, performance and practice takes place primarily in front of computer screens, perhaps even to a greater extent than in other areas of physics and science in general. The nature of the research phenomena being dealt with – objects and events that are simply too far away to be observed – makes writing models and simulations (cf., Lenhard et al., 2006 and Knuuttila et al., 2006) a crucial endeavour to astrophysics. This is certainly true of doctoral research projects in gravitational lensing and microlensing (a phenomena relating to how light bends around massive objects), which aim to write new or adapt existing code with various computerised programming languages to better understand these events and also improve the accuracy and explanatory power of the model or simulation. This research project aims to look precisely at the everyday interactions these astrophysics doctoral researchers have with their computers throughout the course of their research, using video to record and analyse their work, including what goes on their computer screens (i.e. the 'labs' in which this work and experimentation goes on) as well as any relevant collaborations and interactions.

This project is situated in the tradition of video analysis (Goodwin, 1981; Heath et al., 2010) of making the familiar visible, and of making visible the taken-for-granted practices of people. However, this project is faced with a particular problem: most previous video-based research has focused on collaborative situations (e.g. collaborative work or expert-novice situations) whereas in an astrophysics research setting a significant part of the research is, at least initially, 'non-collaborative'. That is to say, researchers are predominantly working on their own in front of the computer (which is not to say that what they are working on is not thoroughly social). This paper thus explores the question of how we can use video to investigate non-collaborative work, and discusses some of the challenges and implications relating to research of this type.

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## **The Making of Brother Time, Kenya 2009: Conducting video ethnography in developing countries**

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Based upon 100 hours of video documentation and extensive interviews (conducted in 2008 and 2009) with Kenyan research professionals, university administrators, religious leaders, journalists, shopkeepers, farmers, college students, and internally displaced refugees, our international research team investigated the unique role played by universities and research institutes during a violent political episode following the most recent presidential elections.

How Kenya descended into political violence and eventually reconciled long standing regional and tribal feuds is intimately intertwined with (1) the nation's colonial and post colonial history, (2) the institutionalization of its higher education and research sector, (3) the social construction of new media, information and communication technologies, and to a certain extent (4) the global influence of recently elected U.S. President, Barack Obama, whose own family roots trace back to a pivotal tribal region within Kenya.

Conducting video research that focused on a sensitive political issue in a developing nation, though, involved a variety of logistical, cultural, and methodological obstacles that continue through post-production. Our choice to employ an Emic style to this work in progress underlies our multi-national team's commitment to representing the account of this human tragedy and reconciliation in terms that are meaningful to the subjects we documented. Latent Etic considerations though do influence our production style in the storyline we focus on, choice and order of images, pace of editing, and the choice of original musical score. How we reconcile these two analytical contradictions, we argue, reflects classical debates about the strengths and weaknesses of qualitative work. Moreover, that this work is digitized and thus can potentially reach beyond academia, even perhaps detrimentally influence the general population our subject's represent, portends a deeper ethical discussion about the role of video in research.



## Arranging for visibility

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With an approach based on ethnomethodological studies of work, this presentation discusses a theme that we call arranging for visibility. First, we present a case where professionals in medicine arrange so called learning sessions in order develop visual expertise in relation to a novel medical imaging technology. Characteristic for these sessions is that members of the team arrange the situations so as to be able to visually discern critical details. Second, we discuss how the members' orientation to visual details necessitates analytical access to these details, and – in relation to this – what arranging for visibility might mean for us as analysts.

The case that we discuss concerns a multidisciplinary team of scientists and professional radiologists. Diagnosis and follow-up of pulmonary diseases are most commonly done with conventional chest radiography. A fundamental problem with chest radiography is that overlapping anatomic structures may obstruct the detection of tumours and other pathologies. With a new form of digital tomography called tomosynthesis it becomes possible to visualise the chest as a set of slices. Within the first months of clinical use of the technology, experienced thoracic radiologists were able to increase their detection of pulmonary nodules, from about 25% to over 90%. The increase in the detection of true positives, however, was also paralleled by an increase of false positives. The introduction of the new technology did not just simply augment the professional visual of the thoracic radiologists. Rather, it reconfigured the expertise by installing new ways of seeing and acting. As a response to this, and in order to highlight critical issues in detection of pulmonary nodules, the team arranged learning sessions during which previous cases were collectively reviewed: two separate projector screens allowed for side-by-side comparisons of CT and tomosynthesis data from the same patient; historical records of all individual markings effectively displayed any incongruence of earlier judgements; the use of large screens and laser pointers enabled rapid and precise indexing; the uneven distribution of expertise made it relevant to provide extended instruction in professional ways of seeing.

The elaborate arrangement of learning sessions could be seen as an enabling condition for the team members' ensuing orientation towards critical details in the interpretation of images. As a consequence of this, investigations of the learning sessions have the potential to shed light on important aspects of the relation between technological shifts and reconfigurations of expertise. Video recordings becomes a indispensable tool in this research: since the interest lies in the orientation to visual detail by the members, there is a need for records that preserve this orientation in necessary detail. The work of us as analysts also makes relevant elaborated arrangements of transcripts, images and different camera angles. There are thus both parallels and differences between the arrangements for visibilities made by members and that made by us as analysts – an issue which connects to the more general issue of the relation between the perspective of the member and that of the analyst in social scientific research.

## **Empathographies: Using Video and Body Art Related Approaches in Health Care**

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This presentation introduces body art related methodologies applied in the biomedical context of a teaching hospital in Austria. The approaches discussed go far beyond the visual and performative. They include bodily sensations and the exploration of subjective and experience driven modes of knowledge production. The term empathography refers to the interrelatedness of bodies, to the somatically expressed affects between human individuals, and to how we present ourselves in everyday life as well as to how others picture us. The discussion will focus on three case studies which explore confrontations between merely classificatory, standardizing and objectifying scientific methods, which are commonly used in medical research, and art based and ethnographic ones. Theoretically and methodologically I will examine how such confrontations create novel philosophies of learning and knowing from one another. This involves addressing concepts of performativity. How is, for instance, the body image differently articulated by female patients and by their doctors? Questions of how we become 'other' in a medical sense are connected with notions of otherness created by visual and performative artists. Our selves are mediated through others and thus in constant flux. The fluid boundaries of becoming are encountered through the invention of audiovisual and sensory methodologies.

## **Technologies in Collaboration: Video Analysis of Complex Activities and Material Artefacts**

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*Christian Heath (Centre for Work, Interaction and Technology, King's College London, UK)*

Over the last couple of decades there has been a growing interest in the ways in which tools and technologies, objects and artefacts, feature in work and organisational practice. Within such diverse fields as medical sociology, visual studies and Computer-Supported Cooperative Work (CSCW), what have begun to be known as workplace studies have sought to reveal the details of everyday interaction with and around material artefacts, whether these are complex computer systems or mundane objects like paper documents. Video has become a critical resource for such studies. In this paper we will briefly review the methods and approaches taken in workplace studies that have utilised video and some of the challenges that these have faced, particularly when considering activities that are complex, distributed across settings or mediated through technologies. Drawing on a number of examples of workplace studies in diverse settings including control centres, healthcare domains and scientific research we will discuss concerns that have arisen not only for data collection but for analysis and presentation. Often these concerns are not those typically faced by social scientific researchers: access to record can be relatively straightforward to obtain, consent can be easily obtained to publish from participants and problems with the recording technology can be overcome. More significant problems arise however, for example, when trying to integrate fieldwork observations and video recordings, the kind of fieldwork required seeming to be distinctive. Also when analysing materials researchers face challenges in trying to develop ways of transcribing and presenting analyses that resonate with the qualities of actions revealed by the video data. Indeed, working with video seems to require distinctive methods and ordering of research activities. We conclude by discussing how these problems faced by those using video whilst undertaking workplace studies may have some bearing on social scientific research concerned with understanding scientific practice and the development of technologies.

## **What happens to interaction within an experiment in social robotics? - An example of applying video methodology for investigating technological systems**

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Developing interactive robot systems is a major challenge for future-oriented research. In order to systematically enhance interactive technical systems, scientific knowledge of relevant disciplines is combined – each applying different methodological perspectives to the emerging field of social robotics/human-robot interaction (HRI). In the process many surveys rely on quantitative techniques to assess the quality of the robotic system.

Qualitative videobased interaction analysis in contrast, reveals the underlying structures of communication and the detailed organization of turns. A main advantage of using video technology, as pointed out by Goodwin, is that the “detailed sequential order of not only talk, but also the mutual organization of living, bodies within interaction, and relevant features of the material environment that the participants are attending to” can be analysed. The transfer of an action centred approach to science and technology studies (STS) thus opens up to interdisciplinary investigations which contribute to HRI research.

Fundamental contributions from an anthropologist point of view made by Suchman challenge the problem of shared understanding in human computer interaction (HCI) with qualitative methods. Other studies from the field of STS recently introduce the methodological approach of ethnomethodological conversation analysis to investigate social components in HRI. Both authors reveal patterns of practical action in interactions with new technologies. This qualitative perspective is still uncommon in social robotics. Thus the social robotics research still holds a methodological gap: A robot's functionality is mostly measured by technical criteria only. But systematical methodological exploration of interaction in HRI should align with studies of communication and STS. Dourish pursues the goal of enhancing interaction with computing by transfer of methodology: “Social computing” therefore includes social understanding to the design of user interfaces.

Extending the approach of Dourish, we are employing a cross-disciplinary survey to combine technological and methodological knowledge, and implement it in our system to which we can apply a relevant setup of sociological reflection, based on Garfinkel's ethnomethodology. Our approach focuses on the actor. We investigate communication between human and robot in the form of verbal and nonverbal utterances in a laboratory situation, where an everyday life-like situation has been created. We asked human users to show objects to our Babyface robot and demonstrate its functionality. The robot has not been explained to the subjects; any interactive contact was established for the first time. We intentionally implied sources of irritation to the flow of interaction, therewith activating reactions which show underlying expectations of the subjects.

How are video methods applied in practice? Our approach combines the use of a) data which has origin in the robot system itself, and b) videotaped recordings of the experimental setup and the interactions with naive users filmed with a second camera. This enables detailed observations of sequences of interaction from the first person perspective. The video data includes the robot's attention focus and gaze direction. Integrating the video data of two partners perspectives, we reveal relevant key features for the analysis of basic structures of interaction with technical systems.

## Investigating video analysis as a social practice

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Michael Liegl (*Sociology Department, Johannes-Gutenberg University of Mainz, Germany*)

Video recording without a doubt offers great advantages for all kinds of endeavours in qualitative social science research and hence is widely used. In recent years, however there has been an ever growing concern about the status of video recordings, and the expression of a desire to methodologically ground the analysis of such data (e.g. FQS 2005). Sometimes even recipe-like instructions are given on how to analyse a video tape: how to identify relevant units within the (often quite voluminous) footage, how to transcribe the audiovisual information “correctly” into printable text, sometimes even avoiding pictures.

While we are very much in favour of methodological reflection on sensible use of video recordings in sociological research, and appreciate to sound out the specific potential of this instrument of inquiry, analysis and presentation (of findings), we are at the same time sceptical about the use of such method-recipes. Instead we argue for a more ethnomethodologically informed approach to questions of methods and methodologies, we argue to consider qualitative video analysis as a social practice that first of all needs to be described as an ethno-method of a certain science: What do sociologists do when analysing videos? What advantages and what limitations do they face? What kind of “vis-ability” do they have to develop and where do they obtain it? How can they see at the same time through and nearby the camera.

As a first step the paper refers to research on “professional vision” (Goodwin 1994) and STS-Studies in order to sensitize for the constructive nature of practices, which manufacture visual traces into evidence. Based on these theoretical considerations we will, as a second step, draw on video data from our own empirical studies in order to introduce the concept of “video-geneity” of social practices. It will be shown that video recordings are able to capture important characteristics of the often very complex situational dynamics. Still other important characteristics that are expressed only indexically, implicitly or incompletely might be conserved, but will not be noticed by a sociologist who is not skilled in the investigated practice.

We conclude from these empirically based considerations that the practice of video analysis requires a certain type of vis-ability from its members, which is obtained by participant observation. As Garfinkel noted: “The seen but unnoticed backgrounds of everyday activities are made visible and described from a perspective in which persons live out the lives they do (...) all in order to permit the sociologist to solve his theoretical problems” (Garfinkel 1967: 37). In our view the vis-ability necessary for qualitative video analysis is not to be trained in academic lectures but by participating in the investigated practice. It is the practices that vis-able the investigator.

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## **Zooming out? On the epistemic scope of video recordings**

*Schubert Cornelius (TU Berlin, Institut für Soziologie, Germany)*

Video recordings are typically used to zoom in on social life and to serve as micro foundations for analysing interaction and interactivity. This way, video has helped to uncover subtle, mainly non-verbal, practices of work and leisure, focussing for instance on glances, pointing, body movements or the repairing of a broken machine. Numerous fields like education, science, culture, medicine and a wide range of day-to-day activities have been penned with the videographic eye. The call for abstracts indicates, that we are far from video being a standard tool in STS research and that many empirical, epistemic and ethic questions remain concerning the zooming in on social life. I would like to discuss the use of video in the other direction, namely, how video can be used to zoom out of the micro phenomena it typically tries to capture.

Zooming out means to use video as an epistemic device for investigating phenomena not captured on film. The capacities for storing and distributing are the basis for broadening the epistemic scope of video recordings. So far, several methods have been used to zoom out with video. Elicitation techniques are a well known example for transcending the time/space boundaries of individual situations and generating feedback from the people observed. In anthropology, elicitation is used to capture the wider context of rituals or family relations. Videos are then used as a focus for interviews and discussions. In a similar way, video can be used for interdisciplinary research. A video sequence may thus serve as a common ground for sharing ideas, examining practices and discussing concepts.

In the context of STS, zooming out with video addresses some key issues. As an interdisciplinary field, STS may profit from using video to engage in a thorough discussion on socio-technical practices. Such a discussion can not only link researchers from different fields, but may also facilitate the exchange of ideas between experts and laypeople.

Furthermore a comparative study on different local, professional or national practices in diverse fields can help to link the micro-observations with larger contexts. The questions that need to be addressed are, in how far zooming in and zooming out are general methodological instruments for something that may be called "visual STS". We need to identify areas where visual analysis is used and where it could be useful. Obviously, technically mediated practices or expert and lay engagements in society come to mind. Also, the link between method and theory needs to be addressed. The diversity in the field seems to rule out a general theory of visual STS, but theories of practice are probably more widely used than discourse analysis. Zooming out with theories is the last aspect I would like to discuss in my presentation, so as to link methods and methodologies and connect video and STS more deeply.

## **Back to the Future? Video acrobatics, EM & STS**

*Sormani Philippe (University of Manchester, UK)*

Inspired by H. Garfinkel's recent studies and statements (e.g., Garfinkel 2002), the present paper introduces video acrobatics, arguably a new development in the ethnomethodological (EM) study of scientific work, and discusses its pertinence to science and technology studies (STS). Video acrobatics, curious as it may sound, offered itself as a promising path out of the current dualism in EM inquiry: the dualism between, on the one hand, studies based on the practical engagement in tutorial exercises of natural science (e.g., prism and pendulum exercises) and, on the other, descriptive analysis of filmed activities via their technical, if not multimodal transcription (yet without any explicit requirement of practical self-instruction in the analyzed activity). Video acrobatics, by contrast, may be glossed as [filming-the-activity-whilst-you're-accomplishing-it-before-using-the-film-for-the-descriptive-analysis-of-the-activity-filmed-again-when-accomplished-by-its-entitled-practitioners-or-vice-versa]. The hyphenated twenty nine-word gloss in square brackets should be discounted as an impossible expression, especially given the worldly concerns of STS mainstream today (cf. Amsterdamska et al. 2008). To demonstrate the heuristic potential of the introduced approach, as well as its broader pertinence, proves thus all the more interesting. To achieve that task, examples will be drawn from contemporary experimental physics (microscopic superconductivity research), but may include tutorial exercises in classical mechanics (Newton's demonstration of the law of conservation of angular momentum). The paper, in sum, outlines one possible, rather implausible and yet instructive answer to the first question of the panel (track 10, video&STS), namely: how are video methodologies and methods applied in different types of STS research?

## Using Video Data for Reconstructing Practices of Man-Machine-Interactivity

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Within the field for STS, the observation of human-machine-interactivity is mostly based on interview data, which are based on data in spoken language. Empirical data generated from technical sources, e.g. from video, are sparsely used. But in other strands of social science research, e.g. workplace studies (Heath/Luff) or the Sociology of Technology (Rammert/Buscher) video data is recognised as a specific kind of observation material, which brings about new opportunities, but also new challenges for data analysis. Based on an ongoing research project, and a long track of trying to use data technically generated, we want to present a possible approach – and the challenges for STS – related to such an approach.

In our talk we want to present the overall approach and first findings from an ongoing interdisciplinary research project of Sociology of Technology and partners from usability research (funded by the DFG), which make use of video and audio taping as a new method of tracking human-machine-interactivity, triangulated with interview material. To be more concrete, we are using the analysis of video data to reconstruct typical patterns (practices) of interactivity on the micro-level of analysis. The ultimate goal is to discover interactivity sequences which are not individual, but specific for groups of users. Identifying these groups is a challenge of its own.

In our talk, we want to proceed in three steps: 1) our empirical case, 2) the methodological approach we have taken with a focus on the integration of video material and 3) first research findings. First, the empirical case that is going to be presented is the interactivity with a speech dialogue system, which is installed in a Smart Home environment. Test persons are asked to fulfil certain tasks with different technical applications, using verbal commands to navigate through the set-up. A specific challenge of this methodological approach is the creation of an undisturbed environment that encourages people to freely apply their intuitive strategies of interacting with the system and capturing these moments on video. The resulting sequences serve as our main entities of analysis, which are complemented by in-depth interviews including video feedbacks. In this course test persons are confronted with a short video screening of sequences from their own interactivity shortly after they have carried out the tasks. This stimulus has shown great effect on creating constructive reflections by the person him- or herself and bringing up specific individual intentions that were of relevance for interacting with the system. By confronting a person with their own behaviour it becomes possible to reconstruct impacts on certain ways of acting and what practices he or she tried to apply in a specific situation.

Second, from our first findings it becomes apparent that people bring along a certain implicit “know-how” of interacting with technology that is gained through the everyday use of different ICTs and is “brought into” a new situation. This becomes in particular evident when looking at strategies that people try to follow when confronted with certain interaction problems. An arising assumption is that similarities to previous situations serve as points of orientation for users along which they try to manage the interactivity with the system. Third, we will discuss how different user experiences lead to different paths of interactivity. Based on this assumption we discuss the main benefits of utilising video recordings in our research is the possibility of reconstructing these interactivity patterns, as well as the social practices behind.



## **The action and interaction in time-critical settings**

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The methodological contribution of the present paper consists of uniting the analysis of visual actions with the study of spoken interaction so that the mutually constitutive role of talk and action can be examined. We also discuss the challenges of collaborative activities accomplished in and through the simultaneous use of multiple semiotic resources, such as talk, gesture, gaze, bodily orientation, material artifacts, etc. First, this paper will consider how the interaction between caller and emergency response centre operator's "action in interaction" becomes more understandable, when analyzing both, recorded calls and the videos of the operator's simultaneously working with the system and technological artifacts. The data have been synchronized, which enables the access to the "both sides of interaction". Due this setting, we can demonstrate the consequences of the operator's action for the interaction while talking with the caller. This paper highlights the challenges of the operator's working tasks to combine these interactional dimensions. These finding provides tools for developing both technology in used and the operator's interaction skills.

Second, this paper will consider how meaningful actions are constructed in and through embodied "action in interaction" in air traffic controller training. Gestures, such as of pointing and gazing may be used as a core embodied resources with which actions produced in the level of talk were augmented, specified or even compensated. Within the presentation we will especially investigate the interactional management of pedagogical activities and examine closely the multisemiotic nature of these instructional encounters in technology-augmented settings. With the help of empirical video data we will not only address simultaneity of the use of verbal and nonverbal resources and to examine how these different modes work together in the production of meaningful action, but particularly investigate instances in which communicative resources other than talk (gestures, body and material environment) come relevant; necessary or even exclusive in the accomplishing understandable action for the participants.

In this sense, there is a reciprocal and reflexive relationship between the verbal actions and the nonverbal actions. Talk, embodied actions and object-focused actions are critical semiotic resources through which participants carry out different activities in interaction. To demonstrate the value of this approach, the paper considers the ways in which visual actions can be inspected along with the stream of speech. The paper draws on ethnomethodology; conversation analysis and multimodal video/interaction analysis (integrated with multimodal analysis of interaction) and comprises video data from emergency response centre and air traffic controller training.

## **Video-based studies of work practice in distributed settings: potentialities and challenges**

*Veyrier Clair-Antoine (Laboratoire Praxiling UMR 5267 - ITIC Université Montpellier 3 – CNRS, France)*

The presentation outlines analytical potentialities and challenges of video data for the study of meeting interaction in distributed work settings. From its beginnings, Conversation Analysis has recognized the use of recorded data. Recordings enable the repeated, fine-grained scrutiny of moments of social interaction and the real-time production of social order. Taking attention to the participant perspective and the resources on which people rely on accomplishing their everyday actions and activities, studies from the first generation focused mainly on audio-recording as a “‘good enough’ record of what happened” (Sacks 1984, 26). However, the introduction of video recordings enables researchers to address a range of phenomena, topics that previously remained unexplored, where in previous literature studies focused mainly on verbal resources (Mondada 2008). How local ecology of objects, artefacts, tools, technologies and talk intertwine in the moment-by-moment accomplishment of workplace activities? How does it feature in and impact on the action produced by members? I will argue that video provide a basic technique for constituting the corpora for data analysis of situated and interactional accomplishment of practical actions.

Within a conversation analysis perspective, I will focus on recordings produced during webconferences work meetings of a R&D team to show how video data can be produced in such setting within specific, situated, contingent practices and how it can have a configuring impact on the way in which social interaction is documented. Video recording, as other kind of data, is selective (focus of the camera, position, sounds, and distributed space). I will discuss to what extent it is possible to identify an appropriate dispositive to record “where the action is”, using preliminary field work observations. I will show how video enable to study how participants are oriented to multimodal resources to manage talk in webconference that would be neglected otherwise, using audio-recordings.

Video provides a realignment (Heath et al.2010) in the way in which we analyse human activity. It constitutes a fundamental technique for constituting the corpora of data for analysis and to document members’ interactional practices.

## **Teaching Video-Making as an STS Methodology: Notes from the Classroom**

*Walley Christine (MIT, USA)*

*Christopher Boebel (MIT, USA)*

In this paper, we will consider what the use of video as a methodology can contribute to both the research practice and theorizing of STS studies. Our analysis of these topics is drawn from the experience of teaching classes at the Massachusetts Institute of Technology (MIT) that mix STS perspectives and documentary film production. In a combined graduate/undergraduate class entitled “DV Lab: Documenting Science Through Video and New Media,” we have been encouraging students to make videos that bring together an STS focus on science as social practice with a focus on documentary video as yet another complex form of social practice (one similarly best understood by breaking down artificial boundaries between theory and practice/production). After gaining familiarity with central texts from the STS literature, students are trained to use video technologies as a means to conduct research on the social practices of science and engineering as well as the communities in which scientists and engineers are embedded. Students also view classic documentary and science documentary films and explore accounts by filmmakers of their filmmaking practice as well as the complex relationships that can emerge among filmmakers, subjects, and audiences. With these tools in hand and with video equipment and support provided by DV Lab, students are encouraged to make short videos about practices of science and engineering, broadly conceived, around our home university of MIT.

In our presentation, we will show short film clips made both by ourselves and (with permission) a few of our students that suggest what such STS-oriented documentary films might look like. Video topics include: cinema verite perspectives on day-to-day laboratory life, profiles of researchers that range from neuroscientists to eccentric artist/technologists, and explorations of science narratives that utilize the “found footage” of older science films. There are also such quirky topics as an ethnographic look at survivalists attempts to live off energy grids and a Latourian take on a grad student assigned the task of keeping an exotic bird happy so it will sing and allow researchers to study its birdsong. In our paper, we will consider what such videos can contribute to STS studies as both a research methodology and a means of theorizing that research. For example, this methodology encourages a deep-seated recognition of how day-to-day experiences of doing science and engineering are embodied practices. It also encourages a focus on what some anthropologists refer to as “sensory ethnography” as a way to help uncover the experiential aspects of such embodied practices. Finally, we will consider some of the ethical and logistical questions that emerge for researchers who use video-making as an STS methodology.



Practicing science and technology,  
performing the social  
September 2<sup>nd</sup>-4<sup>th</sup> 2010

## **TRACK 11**

# **Performative Infrastructures, Multiple Mobilities**

**Convenors:**

**Alessandro Mongili (University of Padua, Italy)**

**Giuseppina Pellegrino (University of Calabria, Italy)**

## **ucturing and the value of collaborative design research**

*Björgvinsson Erling (Medea, Malmö University, Sweden)*

The purpose of the paper is to discuss mobile media infrastructuring as arena for everyday politics where sociomaterial values are negotiated and are tried out. The issue will be addressed in relation to two experiments conducted within a research led new media innovation milieu that has explored how innovation can be conducted as an ongoing collaborative infrastructuring process where prototypical communication practices enabled by new media are tried out. Two collaborative experiments will be discussed that focused on mobile video production, which aimed at exploring new software interfaces, new narrative forms and crossmedia productions.

One experiment was conducted during a yearly contested city festival in Malmö where six cultural workers did live mobile video broadcasts from the festival for a week. An experiment that involved an IT-company, an arts and performance centre, cultural workers, and academic researchers. Another experiment was a week long live crossmedia experiment where professional media and grassroots media collaborated on a fundraising campaign. An experiment that involved Swedish public TV and radio, a medium size media company, a hiphop grassroots organization and academic researchers. These disparate partners operate under quite different working conditions and with different aims and expectations regarding gainful knowledge.

Viewing such experiments as prototypical performative sociomaterial practices requires looking at the political and ethical dimensions the collaborations supposes and how roles and responsibilities are negotiated and distributed, which has to a large degree been neglected within user-driven design research influenced by STS. What does it say about how we imagine working conditions and working relations that the various practices can operate under? Central issues to be discussed are therefore who initiates such assemblies, how are people and technologies enrolled, what space for negotiation do the different stakeholders have and how does that relate to such issues as access to technologies, broadcast spaces, and financial infrastructure and competences.

The main findings are that probing into future mobile practices through an ongoing open-ended infrastructuring process where various partners negotiate and collaboratively experiment yield valuable outcomes in the form of new working relations and insights into new forms of mediations and practices. Setting up and conducting such large collaborative experiments starts multiple enrolment processes and assemblies on various levels that overlap and affect each other. Central issues that materialize and that such assemblies face relate to access to technologies, broadcast spaces, and content to be covered as well as branding. The collaboration also point at how cultural workers, that produce the content, risk symbolically and meritocratically the most. At the same time they are expected to contribute for free, which suggest that producers and their content as infrastructuring material has lesser value than more technical material.

The paper aims at critically address on the one hand co-design as an infrastructuring process (Star) as an ongoing working relations where practices and technologies are interweaved (Suchman) through hybrid arenas or Things (Latour) and on the other hand Thrift's discussion on participatory performative economies and McRobbies studies of newer forms for cultural entrepreneurial economies.

## **Mutable/Immutable Infrastructures for Mobility. The Subway Signs and their Maintenance**

*Denis Jerome (LTCI - CNRS - TELECOM ParisTech, France)*

*Pontille David (IIAC -CNRS/EHESS, France)*

Amid the deep transformations that cities have known in the last decades, the increase of mobility practices has played a central role. As a main feature of contemporary capitalism, it notably contributed to the emergence of new forms of exchange, which strongly articulate spatial configurations and communication technologies. However, such articulation is not completely new: cities have always been both material and informational. Along the new personal mobile technologies and electronic infrastructures, the 'traditional' public display of signs is inherent to the organizing process of urban settings. Objects such as street nameplates, traffic lights, and subway signs (that we propose to study here) are part of the immobile infrastructures that perform contemporary mobilities (Urry 2007, Latour & Hermant 1998).

Between 1995 and 2000, the transportation service in Paris have known a vast transformation. The Régie Autonome des Transports Parisiens, launched a process of modernization that lead to the renovation of different features amongst which the wayfinding system was considered as crucial. An ambitious signage policy was created. It resulted in the installation of numerous standardized signs that profoundly transformed the subway spaces and provided a graphical infrastructure dedicated to the circulation of riders.

In this communication, we question the performativity of such an apparatus by going backstage and doing an 'ethnography of infrastructure' (Star 1999). The parisian signage has been conceived of as an ordering device: it has been highly normalized in bulky documents that define precisely the shape, the place and the content of each graphical object. Therefore, as in the various settings studied in the actor-network theory framework, what counts for the signage system's efficiency are the immutability of the objects and their material stability. The durability, the fixity, and the integrity of the signboards seem critical to the performance of what Amin and Thrift (2002) call a 'landscape of movement'.

However, our ethnography invites to not simply consider stability and immutability as the causes of the signage's performativity. Rather, we will show that they are the outcome of a day-to-day working process: the signs are constantly supervised, repaired and updated. They are at the center of a maintenance work that one has to study in order to understand precisely what is the performativity of infrastructures. Now, during the maintenance work, the subway signs are not handled as immutable objects but as fragile and transforming entities. Some boards get worn, others might be damaged, vandalized, or stolen. More: as the maintenance workers handle them, they still appear as moving entities whose material 'properties' are changing according to the situation.

Therefore, we argue that the landscapes of contemporary mobilities are not performed by the stability of infrastructures itself, but by a daily invisible work where infrastructures are maintained and projected as immutable to the attention of their users. In doing so, we want to highlights the multiplicity of the infrastructures' ontologies and then show that the 'post-ANT' studies can be useful to analyze performative infrastructures.

**Track 11**  
**Performative Infrastructures, Multiple Mobilities**

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## **Mobility and Solidarity: Toward a Theoretical Analysis of Social Interaction on the Move**

*Fen Ekaterina (State University, Moscow, Russia)*

There is a paradox in conceptualization of interaction in everyday mobility. The more theorists work with the notion of mobility the less they leave space for understanding interaction. For example, J. Urry notes that driving a car leaves no space for face-to-face interaction, as every driver is invisible inside the iron cocoon of the car. He also notes that urban traffic consists of flows (cars, pedestrians, public transportation) that try to avoid intersection and interaction as well [1], (intersection means necessity of changing the rhythm or speed of movement). M. Augé questions the other theme, he examines the arrangement of transportation space. The key characteristic of this space is possibility to avoid the interaction or minimize it [2]. As a result, for understanding the notion interaction only little space left.

In current research I would like to question the everyday interactions that emerge in the situations on the move, primarily on those that make movement problematic. The priority is given to situations of face-to-face interaction, including the situations when interaction is mediated with technical devices (for example cell phones). The task is to find a theoretical optics that allows to analyze the situations systematically. Fruitful distinction was found in J. Tishner work on solidarity [3]. He offers to distinct two types of solidarity: among members of a social group and among strangers that face the same problematic situation. This interpretation of solidarity gives the opportunity to investigate the common ground for interaction. Interaction on the move may involve both of this perspectives. Either when a person refers to relevant for him social group (by calling family members, for example) or when they try to find a common ground for interaction with people involved in the same situation.

The solidarity notion has its long history in social theory. I would like to focus on Durkheimian tradition of its interpretation [4]. However, one should mention that in this tradition the priority is given to social group solidarity. That is why it is important to take into consideration E. Goffman's notion on face-to-face interaction [5] that is widely accepted in post-Durkheimian tradition. The result of this research is a revised concept of solidarity. Its opportunities and limitations are revealed and the implications of such a revision for the mobilities studies are discussed.

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## The WiFi passenger and double mobility

*Gimmler Antje (Aalborg University, Denmark)*

Travelling today is characterized by an almost seamless flow of two different types of mobility: mobility of information with ICTs and mobility of human beings, goods and other artefacts in form of transport and travels. Wireless systems combine the flow of information with the mobility of the moving social agent: double mobility so to speak. WiFi technology has become an integrated part of transport infrastructure at airports, railway station, busses etc. The new generation of cellular systems allows cooperative services that are able to make intelligent use of a decentralized network of terminals, making ad-hoc-networking and situational networks possible (Frattasi/Gimmler 2008). Other possibilities are so-called relay-based services, e.g. a taxi-ride-system that coordinates taxis and customers in order to match taxis and customers in the most efficient way as well as enable to share taxis (Frattasi/Gimmler 2006). Other examples are pop-up information about when the bus actually arrives, combined with information via the internet or via ad-hoc networking about restaurants that are situated along the bus tour. The new generation of cellular networks enables the combination of heterogeneous devices, a possibility that integrates urban infrastructure, buildings etc. with human interaction/communication in a hitherto unknown way.

The papers seeks to outline firstly a theoretical framework for the interplay of these two forms of mobility as on the one hand realized in certain infrastructures and mobility systems and on the other hand viewed from the perspective of the social agent. An ANT informed pragmatic understanding of the user who is in constant situational interplay and encounter with other actors (face-to-face or with communications technologies) as well with the material things she/he is dealing with while travelling (e.g. moving in hallways, eating snacks) allows a multi-level analysis (Gimmler 2007). From this perspective the social actor is conceptualized as not being determined by situations or technological artefacts but making creative and contextual use of them. Secondly the paper will present an empirical analysis of recent user scenarios (e.g. White Paper Motorola/Intel 2007) and investigating critically in some of the guiding presuppositions of these scenarios such as ubiquitous and constant access of users. While these scenarios are mainly technologically oriented ethnographic fieldwork about travellers at airports, train stations and local busses will show that social practices actually are much more situational and contextual. Again, the combination of a pragmatic understanding of the use of ICT's combined with ANT and ethnographic methods will show to be fruitful to understand this situational interplay between the two types of mobility.

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## **Traffic Shaping Systems and Resource Distribution: Orchestration, Autonomy and Equity on the Road**

*Hazareesingh Satya*

This paper will outline different strategies and architectures, extant and emergent, for managing congestion across road networks. The paper contrasts strategies reliant on 'higher-level' control and orchestration with those seeking to delegate responsibility for the ordering of traffic to participants themselves, and will examine the complex relations between both and the distribution of road space amongst different 'classes' of road user. Ultimately the aim is to explore the relative merits of different pathways for achieving more 'commonised' traffic infrastructures and streetscapes. The discussion will be framed throughout by reference to John Urry's distinction between series and nexus transportation systems. By way of entry the paper examines two contrasting applications of 'intelligent' infrastructure and pervasive computing to the problems of traffic congestion – one which preserves individual human sovereignty over vehicles and invites the self-modification of driver behaviour, the other which bypasses human awareness and volition altogether and delegates control to automatic vehicle guidance systems.

The first is a form of hyper-coordination which nevertheless seems to preserve the series character of vehicular traffic, which incentivizes road-users (configured as rational economic actors) to alter their behaviour, through the use of real-time pricing. Here, the road itself is framed as a market, access to road space a priced commodity, heralding as Graham notes 'differential geographies of inter- and intra-urban mobility' (2005: 9). The second by contrast seeks to achieve a more equitable distribution of road space by integrating separate vehicles into aggregates which can be managed and directly orchestrated en masse, entailing 'platoons' of vehicles moving in a manner more typical of a flock of birds or school of fish. Rather than attempting to pre-empt congestion by prioritizing certain (premium-paying) participants, the aim here is to pre-personalise traffic flow and ensure the widest possible access for the greatest number of vehicles.

The degree of agential delegation necessary for achieving such hyper-coordinated nexification of movement however, seems to entail bodies within traffic systems becoming more and more akin to mere passengers, passively 'ferried' around from location to location. Such 'technological' fixes to the problems of congestion ignores both the embodied and the wider 'social' contexts within which traffic is normally situated, reifying and treating as 'matters of fact' demand for road space itself, expectations regarding speed and unencumbered mobility, and driver behaviour whilst on the road. In conclusion therefore, through a consideration of specific examples, the paper shall ponder whether through re-design a 're-embodiment' of the traffic landscape could be achieved – where the human body takes on renewed importance for the negotiation of road-space amongst diverse participants. The paper considers whether such re-embodiment can serve as the basis for a more equitable distribution of road and street space, but where equality is an emergent outcome rather than pre-given, where all road users (including drivers, cyclists and pedestrians) are forced to take one another into account and 'compete' for space on more equal terms.

## **Social aspects of digital convergence: the role of mobile social software in the evolving landscape of social space and community**

*Lugano Giuseppe (Human Dimensions Research Group, University of Jyväskylä, Finland)*

Digital convergence is often discussed as a synonym of technological convergence, a phenomenon related to the increasing integration of telecommunication services and media with the Internet. Instead, digital convergence is a complex and multifaceted process encompassing the technological, economic, cultural and social dimensions (Jenkins, 2001). In particular, research on the social aspects of digital convergence is still in its infancy; the goal of the paper is to illustrate how converged digital networks in general and mobile technologies in particular are contributing to the evolution and transformation of social space and community, two related concepts occupying a central place in the sociological discourse. Taipale (2009) argued that the integration of mobile and Internet communications has transformed the way we perceive, conceive and experience social space: the new meaning of social space has been recently synthesized with the notion of hybrid social space (de Sousa e Silva, 2006; Kluitenberg, 2006; Erikson, 2007; Rheingold et al., 2007; Crabtree & Rodden, 2008; Bilandzic et al, 2009), in which the previously separated dimensions of social interaction overlap and create an always-on, ubiquitous and integrated digital layer.

Hybrid social space plays an important role in the characterization of contemporary communities as digital communities, socio-technical systems relying on the availability of ubiquitous and always-on social connectivity offered by converged digital networks. Being rooted in the use of computer networks as social networks (Wellman, 2001), the model of the integrated digital community shares many similarities but also extends the model of personal communities (Wellman, 1988) by introducing two novel aspects related to the characteristics of community ties. The first novelty concerns the nature of the tie: personal communities include only existing ties, which are often described as weak or strong ties. Instead, digital communities also acknowledge the significance of latent ties, potential ties that are not activated as weak ties until some sort of interaction occurs (Haythornthwaite, 2002). The second novelty concerns the duration of the tie, which influences the life cycle of the whole community: while personal communities were traditionally based on long-lasting social relationships, digital communities also include ad-hoc opportunistic interactions creating temporary social ties.

As product of digital convergence and only current access point to one's hybrid social space, mobile social software (MoSoSo) represents the enabler of digital communities. Previous research on MoSoSo presented several alternatives for the activation of latent ties by exploiting sensors and homophily principles to facilitate social serendipity (Eagle and Pentland, 2005). MoSoSo also enables instant mass mobilizations, such as smartmobs (Rheingold, 2002) and flashmobs (Mc Fedries, 2003; Marchbank, 2004; Kluitenberg, 2006), which represent a prototypical form of real-time digital community.

The limited understanding of the social aspects of digital convergence is likely not to progress much until the social foundations of digital convergence will not reach the maturity of its technological infrastructure. This paper offers a contribution in this direction by introducing a theoretical frame to discuss the role of emerging technologies, such as MoSoSo, in the evolving landscape of the hybrid social space and digital communities.

## **Networked Science: new scientific practices in digital environments**

*Mantovani Camila (Universidade Federal de Minas Gerais, Spain)*

*Moura Maria Aparecida (Universidade Federal de Minas Gerais, Spain)*

Expectations about changes and transformations that would be promoted by technologies in many fields of human activity had been also placed to scientific practice. In this sense, questions about the unstoppable overlap between mediations, speeches and the arrive of new social actors have divided the debate between the more optimistic view, focused on the possibilities of liberalization and democratization of technology, and the pessimists ones, who are concerned with the same opening mentioned above that, in this view, could compromise (or discredit) the knowledge produced by science.

In 1999, John Taylor, at this time general director of the Science and Technology Department of United Kingdom, coined the term e-Science to describe the use of technology in research projects. These studies were characterized by the composition of a collaborative environment, organized as a network, and by an intensive use of computer processing, storage and remote transmission of large amounts of data. This infrastructure met the needs of research carried out by teams distributed across the globe and belonging to distinct fields, laboratories and/or institutions. However, despite the essential role played by technological infrastructure in defining and characterizing e-Science, some authors propose that it goes far beyond the computational robustness. The issue is not only realizing this structure, but most of all the nature of the practices that it enhances. Thinking about the introduction of information and communication technologies in scientific context opens up the possibility of discussing the changes occurred in knowledge production. And it also makes us reflect about how science and scientists assimilate, dialogue and produce in this renewed scientific environment where we can perceive the emergence of new values, knowledge and standards of scientificity.

Regarding to mobile technologies, we can say that these ones have enriched or even enlarged the researcher fieldwork, both in natural sciences and humanities. Specifically in social sciences and humanities, reflecting about the way these devices are used by researchers brings up important issues which are linked to how these fields build their research subjects. If the *modus operandi* of these areas relay on understanding human experience and if human experience occurs in living and changing processes - that need to be interpreted in order to grasp its meaning -, nowadays, we can say that information and communication technologies are the main mediators of these experiences. So many individuals have their behavior, thoughts, impressions and reflections mediatized. In this sense, this process, that we call mediatization of everyday experiences, changes the way of studying and analyzing the contemporary ways of living and being.

When we take such devices as research tools, a number of possibilities and challenges that include ethical and epistemological issues come up. In this context, we are challenged to see how this new relationship between scientific practice and use of information and communication technologies is being established, having as a starting point the researcher and their practices.

## **The Narratives We Infrastructure By**

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*Raoni Guerra Lucas Rajão (Lancaster University Management School, UK)*

The literature on information systems (IS) can easily give the impression that IS in industrialized economies and in developing countries are two quite separate matters. Though widespread, we argue that such separation is arbitrary, and that taking it for granted empirically also skews theoretical views. Further, we contend that analysis of IS in resource constrained settings can help to shed light on phenomena that are normally discussed mainly in OECD-type contexts, leading us to propose a view of knowledge sharing across such assumed boundaries.

Specifically, this article explores how the narrative surrounding Free and Open Source Software (FOSS) can provide material and symbolic affordances to enable information systems development and implementation within the field of public health in developing countries. We propose to look at FOSS as an enabling narrative which can serve to make the diverse activities of a series of actors (e.g. health ministries, research and health care institutions, programmers, consultants, NGOs, WHO and EU personnel, related software projects) mutually understandable and convergent, transcending the usual dichotomy of developed and developing parts of the world. FOSS principles (e.g. of openness and sharing) can thus contribute to making health information systems meaningful and viable in new contexts. Thus, FOSS can be seen as an infrastructural narrative which can make a variety of assemblages (Lanzara 2008) coherent enough to perform distributed and coordinated activities across developed and developing contexts. This explains our title. We seek to analyze knowledge sharing and learning for IS development and adoption based on the case of a global action-research project, aimed at implementing FOSS-based health information systems in several countries in Africa and Asia.

The issues of how FOSS projects are organized (distributed software development and debugging based on open feedback loops) have been thoroughly debated in the literature (e.g. Fitzgerald 2006, Grand et al. 2004). Scholars have also argued that software licensing has constitutional implications for FOSS communities (Weber 2004). Beyond this, Camara and Fonseca (2007) point out that “adoption of [F]OSS is not only a choice of software, but also a means of acquiring knowledge. Developing countries have to use [F]OSS as a way to gain knowledge about the technology itself and as a way of creating technology products that fit their specific needs.” This stance conceives FOSS as a way to achieve emancipatory knowledge, which creates and is created by new inter-organizational relations and patterns. Such knowledge cannot be purely technical, nor purely organizational.

We draw on the literature on information infrastructures (Hanseth et al. 1996, Star and Ruhleder 1996) as networks of socio-technical actors, whose evolution goes through incremental change linked to the interplay between human and technical elements. Taking the notion of “assemblage” from Lanzara (2008), we ask how a FOSS narrative keeps information infrastructure-supported assemblages together. This aims at going beyond the idea of “narrative network” (Pentland et al.: 2007) as long as that is limited to existing patterns of action –such as buying an airplane ticket, and look at entrepreneurial activities of boundary spanning and federation (Miscione and Staring 2008).

## **Re-thinking Intelligent Mobility Constellations – Promises and Constraints of Intelligent Traffic Systems**

*Mitrea Oana (University of Klagenfurt, Germany)*

*Kyandoghere Kyamakya (University of Klagenfurt, Germany)*

The “rising ‘agency’ of artefacts and the ‘distributedness’ of activities in hybrid constellations”(Rammert, 2002) highly characterizes advanced technologies such as intelligent transportation systems. Future intelligent agents of traffic safety, respectively traffic coordination are meant to observe our mobility behaviour and check it according to specific rules inscribed in the system. Their agency is to be understood in the context of heterogeneous constellations involving humans as users and developers and other interacting technologies.

Our paper deals with the pragmatical dimension of intelligent transportation systems. The system engineering approach will be combined with the examination of the technological agency and distributed activities across humans and other interacting technologies.

The analysis is concretized to a novel mobility service and operation concept developed at the University of Klagenfurt from the Transportation Informatics Group. This uses the intelligent information system technologies/mobile communication to coordinate mobility needs, mobility demand, goals and actions in real-time through the efficient combination of multiple urban modes of transportation (that are individual cars offering lifts on their normal trips) and public transportation means (i.e., bus, metro, trams, and taxis). It enables both the integration but also the dynamic optimization of a virtual mobility that will use and integrate as much as possible available mobility systems, infrastructure and capacities.

The technical “agency” of the system in terms of connection, real-time reaction, and situational behaviour will put in relation with needs, expectations and behaviour patterns of users and developers leading to specific choices. Particular attention will be paid to the possible embedding of processes of categorization, selection and exclusion into the system and to the alternative strategies of humans (users and developers) may choose to cope with its complexity.

## **Locutorios (telephone calling shops): domestication of technologies beyond the household**

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The “domestication model” has become a widely adopted approach to study the place and meanings of Information and Communication Technologies (ICTs) in everyday life. One of the key features within domestication research is its focus in the process and the context involved in the “taming” of technologies. Thus, it offers a model to study this process. A process that is usually broken into four stages: appropriation, objectification, incorporation and conversion. The model is useful for analysing how users shape technologies meanings and practices explicitly taking into account the concrete context where domestication takes place. It’s important to note that the context is not thought of as something static: the process of domestication may shape the meanings and use of technologies, as well as the meanings and use of the context.

Most domestication research has focused on the processes at the level of the household. Although we can also find interesting domestication studies within the workplace, domestication has become a synonym for bring technology into the domestic sphere. Indeed, home is a key site where new technologies come to be familiar and embedded in everyday life. Nevertheless some scholars begin to emphasize the need to study domestication processes beyond the home sphere.

In these sense, the past few years have witnessed the emergence of different spaces that provide services involving access to the new ICT’s in our cities. They are spaces such as cybercafes, phone shops, and telephone calling shops that allow customers to connect to the Internet or to make cheap calls.

Our research is focused on a kind of telephone calling shops known as “locutorios” in Spanish. They are open to everyone, but they’re especially used by immigrant population. In this paper we investigate the growth and nature of locutorios in Spain, and the networks of relationships created through these sites. Using data from an ethnographical research on a sample of locutorios we show how immigrants move from being non-users to users of different technologies, what sort of users they become, and the distinctive meanings and effects of locutorios as techno-social sites for the consumption of new technologies.

The aim of the paper is not merely to adapt the domestication model to the context of locutorios as a “public space” (as opposite to a private-home space). Our study shows also how the definition of a context as “public” or “private” is something that is itself involved in the process of contemporary domestication of new technologies.

## **Aggregation and Selection: Analyzing Socio-technical Epistemic Systems through their Mechanism of Closure**

*Simon Judith (Institut Jean Nicod, Ecole Normale Supérieure, France)*

### **METHODOLOGY**

From February till March 2010, seven focus group interviews have been carried out in Germany to identify relevant and influencing indicators for acceptance of mobile communication systems, using the mobile phone as an example. Volunteers in two cohorts, aged 25 to 40 and 50+, were interviewed in same-sex and mixed-sex groups. Furthermore, the interviewees filled out a short questionnaire after the interview. It was created to gain information about 1) private and job-related usage behaviour of Information and Communication Technologies, 2) interest in mobile communication systems, 3) attitudes towards mobile communication systems, 4) mobility and 5) demographic data. This design enables us to analyse gender and cohort differences and effects concerning technology acceptance.

### **FINDINGS**

Based on first findings, we hypothesize that people with high spatial mobility demands have a higher probability of being accepting of mobile communication systems. For example, a higher acceptance of mobile devices like smartphones or mobile phones, netbooks, and mobile services like social networks like facebook can be identified among those who are also highly mobile. Furthermore, gender differences in terms of use and acceptance of mobile devices will be elaborated in the presentation.



## **Mobile Phone and Wireless Infrastructures: the case of Tiscali wiPhone**

*Simona Isabella (University of Cagliari, Italy)*

The proposal has the purpose to present some first results and theoretical reflections of an empirical study on Tiscali wiPhone. This application seems to represent a good example of the convergence between an old and a new technology, that is both fixed and mobile communication. Downloading the wiPhone software on their mobile phone users receive a wiPhone number they can use connecting to a Wi-Fi network. WiPhone application allows people to use free (or secure) Wi-Fi areas to surf in the Internet and to make phone calls without any further cost.

The research uses an STS approach and focuses on users and on the reciprocal configuration between them and a technological artifact. It is well known how often users' integration in a technical device could influence the work of technical designers especially in the phase of first release of a new device as Tiscali wiPhone is, and when categories as mobility and immobility in everyday life are challenged by a new device that introduces a new convergence between fixed and mobile phone.

However, no everyday life practice of mobility is possible without informative infrastructures which give a new configuration to the topography of places: new hybrid landscapes, composed by technological infrastructures and social practices, emerge and reconfigure the way people experience public and private places in the cities. WiPhone users could modify the way they move through the city on the basis of the relevance wireless networks acquire for their connection and communication practices.

## **Community communication practices in an urban slum in India**

*Singh Abhigyan (Aalto University, Finland)*

*Sayed Salil (Aalto University, Finland)*

This paper presents a fieldwork done in an urban slum in Bangalore, India in 2009. The use of mobile phone among a mixed community of non-literate and semi-literate individuals below poverty line exhibits interesting patterns of communication which are not expected or intended in the design of the devices and network services. The community where the fieldwork was conducted is one of the isolated pockets in a large urban conglomerate where economic immigrants from the underdeveloped countryside settle and build their intricate networks of support. The community has achieved a stable state where a new generation has grown up going to school, local NGO's have developed their support systems and the elders themselves have secured social and economic connections in the urban world outside. A spectrum of generations exhibits varying degree of literacy, economic activity and mobility within the settlement and the outside urban world. More over the struggle to survive in a fragile income and social security creates an intense interdependence among the individuals of the community leading to creative utilisation of the affordable communication infrastructure. The mobile phone devices which they can afford provide only a certain level of functionality. The network services' tariffs allow a limited use of airtime. As a result a pattern of communication emerges which is very specific to its locale and time.

In the analysis of the data generated in the fieldwork we can see how individuals assume their locations in the infrastructure of this community using the possibilities of communication afforded to them by their literacy, income and networks. The observed pattern of communication is emergent from the ever evolving infrastructures of the community and its support systems, and that of communication technologies. The thick descriptions of this community of practice in this article demonstrate that mobile phones with the certain technologies embedded inside them do not define the possibilities of communication. Rather they form a malleable element in the intricate web of possibilities that local life generates.

The landscape of mobile communication is changing rapidly in the as transient economies of places like India. The study presented in this article provides an insight into the current state of this evolution thus bringing in a valuable dataset for STS. It is an ethnography of a communicative ecology of an Indian urban slum in 2009.

## **The new map of Transmilenio: representation, mobility and the city**

*Valderrama Andrés (Technical University of Denmark)*

On the 29th of April of 2006 Transmilenio S.A. introduced three major changes in the operation of the mass bus transit system of Bogotá: they began the operation of the second phase of the system which doubled the coverage; they reorganized and renamed the totality of the bus routes; and they introduced a new map. Although the experts in charge had announced the changes and had advertised the features of the new route-names and the new map, passengers were generally confused, stations became overcrowded and several incidents took place. As a consequence, the control room of the system was modified with the introduction of a “crisis room”, where the top officials of the system could discuss at will, define emergency measures and coordinate the crisis reaction force also in collaboration with the metropolitan police.

Since this change, Transmilenio has become the most complex urban transportation system in the world in terms of the choices available to passengers when moving from one point in the city to another. Four groups of actors have struggled to provide adequate tools to service passengers: Steer Davies and Gleeve consultants have promoted a notion of segmenting information and providing the minimal amount of information at different points; Transmilenio officials have promoted the idea that all passengers should have the possibility of understanding and seeing how the whole system works; the start up [www.surumbo.com](http://www.surumbo.com) has developed an interactive map to facilitate the navigation of the system, and in fact the navigation of the city; many users and user groups have interacted with the designers through the web log of [www.surumbo.com](http://www.surumbo.com) suggesting changes, corrections and improvements to information and operation.

Using constructivist approaches from STS, this paper shows how the conflict between three teams of “experts” and the users shapes the map of Transmilenio for Bogotá, redefining also the visual reference of the city, as this is the first transportation map ever used in a city where oral tradition and personal contact have traditionally been the principal way of communicating knowledge about the structure of the city and the way people can move. The argument concentrates on how the socio-technical shaping of a mobile inscription reflects the transformation of the system itself and the city and introduces a new powerful reference for both: in other words, this paper explores the manifold character of the agency of an inscription developed during the operation of a transport system and continuously transformed by passengers, operators and designers.

## **The Relation of Mobility to Technology Acceptance**

*Witt Nadine (RWTH Aachen University, Denmark)*

*Hofmeister Heather (RWTH Aachen University, Denmark)*

### **PURPOSE**

The mobile communication system expands the opportunities and options of social communication and relationships; in principle anyone with a mobile device can communicate with anyone else who has (mobile) technology anywhere in a variety of ways at any time.

The purpose of this study is to analyse the acceptance of mobile communication system and the reasons people have to accept or reject this technology, using the mobile phone as an example. The central motivation of the study is to identify single influencing indicators for acceptance or non-acceptance.

### **THEORETICAL BACKGROUND & RESEARCH GAP**

The importance of a sociological analysis of the mobile communication system grows because the proportion of mobile communication usage is increasing, and because it's an excellent example of rapid innovation that changes societal norms and lifestyles. At the same time, the spectrum of new ways of communication is ever increasing through the development of new devices, networks, services and applications.

International social science research on mobile technologies is also on the rise (e.g. Fortunati/Manganelli 2002; Katz/Aakhus 2002; Ling/Haddon 2003).

However, there are a lack of studies that combine mobility research and technology acceptance. To date, studies either deal with technology acceptance (e.g. Venkatesh et al 2003) or with spatial mobility (e.g. Schneider et al 2008; Hofmeister 2005; Lück et al 2006; Meil 2008). Identifying spatial mobility as a possible influencing variable on mobile communication systems is the research gap that will be filled through the research in this paper.

We have the following objectives to fulfil the aim of our study: first, we investigate the role of the mobile phone in people's everyday life in order to gain insight into determinants of mobile phone acceptance. Second, we explore whether the factors contributing to mobile phone acceptance differ by gender and mobility. Finally, frame a new hypothesis about whether mobility promotes or reduces technology acceptance, using the mobile phone as an example.

### **METHODOLOGY**

From February till March 2010, seven focus group interviews have been carried out in Germany to identify relevant and influencing indicators for acceptance of mobile communication systems, using the mobile phone as an example. Volunteers in two cohorts, aged 25 to 40 and 50+, were interviewed in same-sex and mixed-sex groups. Furthermore, the interviewees filled out a short questionnaire after the interview. It was created to gain information about 1) private and job-related usage behaviour of Information and Communication Technologies, 2) interest in mobile communication systems, 3) attitudes towards mobile communication systems, 4) mobility and 5) demographic data. This design

enables us to analyse gender and cohort differences and effects concerning technology acceptance.

## **FINDINGS**

Based on first findings, we hypothesize that people with high spatial mobility demands have a higher probability of being accepting of mobile communication systems. For example, a higher acceptance of mobile devices like smartphones or mobile phones, netbooks, and mobile services like social networks like facebook can be identified among those who are also highly mobile. Furthermore, gender differences in terms of use and acceptance of mobile devices will be elaborated in the presentation.



Practicing science and technology,  
performing the social  
September 2<sup>nd</sup>-4<sup>th</sup> 2010

## **TRACK 12**

# **Performing Places**

**Convenor:**

**Katharine Willis (University of Siegen, Germany)**

## **A Conception of, and experiments with, “Heterotopia” as a Condition of Stable Unpurposive Everyday Movement**

*Bankovskaya Svetlana (State University, Moscow, Russia)*

The main point of the experimental design (ethnomethodological in its intention) was to explore *in vivo* the heterotopical properties of the urban environment as the condition of this environment's creativity and *interaction* with the mobile actors. Creativity of the urban environment was interpreted as a particular kind of spatial order accumulating counterfinal effects of collective behavior into the unique constellation --“heterotopia”. Counterfinality (using introduced by Jon Elster term) refers to the situation where each actor pursues an individual policy which is bound to be frustrated by their joint predicament, or in other words: in cases where it is rational for a single agent to follow a given policy, provided he does so alone, all may come to ruin in doing so.

Urban environment acquires the properties of a subject in the mobile interaction since it embodies the unpredictable counterfinality of the overall effect of multiple mobilities. And the mobile actor, in his turn, acquires the properties of the manipulated object of the environment. As the most appropriate actor displaying the properties of an object and of a receptive mobile interactant the flâneur was chosen.

Thus, the object of the experiment was the fragment of the metropolitan environment (one of the central squares in Moscow -- Manege) which combines the logic of the urban social organization (embodied in its concrete place) and the paralogy of the counterfinality of the mobilities inside this place.

Two modes of interaction were provoked in the experiment: first, intended, but unpurposive action – passage through the ambiances of the specific fragment of the city by the flâneur focused during this action on his affective states (the affective profile of the place thus was achieved); and second, observing and mapping the flâneur's movements (as a purposive interaction with the same fragment of the environment, but in the form of *dérive*: observation of the movement by the means of movement). The end of the observation in movement was to hold on the flâneur's movements and to depict his route in the observable details of the spatial/social order of the place.

## **New mobility? On the paradoxical consequences of the mobile technology's progress**

*Fillippov Alexander (State University, Moscow, Russia)*

Mobility has become a theme of interest in sociology long ago. Mobility was considered to be either the opposite or the complementary part of residency. With the progress of what is referred to as globalization new patterns of mobility were found. First of all, this is tourism which is the overwhelmingly discussed as a typical phenomenon of the new global world. Along with the increased interest towards journeys, with the new comprehension of speed, etc., there appeared an aspiration to make sense of the new means of communication facilitating the unity of the new global society as the means of space elimination. "Space as a territory has no meaning any more" says those who prefer to refer to the E-mail, E-money, teleconferences, etc. Surprisingly, but the researchers of the so called "new mobility" agree with this assertion: state territories lost their meaning. Meanwhile the obsolete notion of society confined into the state borders also loses its meaning. New mobility performs itself in the spaces of networks and fluids, not in the movement between the locuses of the residency.

New mobility, as it turns out, could be embodied one. The accessibility of the electronic means of communication does not cancel the desire to move one's body and to travel in. Thus the question must be put in a more wide perspective: what is the meaning of the electronic (mobile) means of communication for the bodily movement conceived not so much as the residence alteration, migration and tourism, but rather as the everyday journeys. When we analyze certain significant trends, we can make the inference that the new mobility has been substituted for *new immobility* which is the effect of the new mobile means' use. A lot of different things (work, purchases, payments, etc.) could be done *staying at home* now, but this is not a novelty as it is. Much more interesting tendencies occurred as a result of the new generation mobile means' use are in the focus of my argument. The main point is not the fact that the considerable part of the office operations could be performed staying at home, but the fact that wherever *the user of the mobile gadget* could be located, he can do without the bodily movement for the most of his tasks' fulfillment. New immobility does not mean that the user of the mobile gadget having an intention to send a letter, or to make a payment, or to talk with a friend, or to see a new movie, will not live the confines of his home. He might be both at home and out of it, in the office, on his way to the club or wherever else: his movements are not anymore bound by the typical tasks. New immobility means the new way of the space mastering, new locality of the everyday movement, complete incoherence of the life world and the work operations world.



## **No Sense of Place at War: Information and Communication Technologies for Military Uses**

*Guzzetti Luca (University of Genoa, Italy)*

Information technologies for military purposes were the less visible and less sensational, but they have probably been the most important throughout WWII (beside the radar, think of the decoding of Enigma by the Allies) and they have become crucial in recent years. It must be considered that electronics – whose development has been hugely financed by the Pentagon - has become the most important generic technology, finding applications in all fields of the economy and of the military apparatus - from tanks to drones, from missiles to smart bombs. And, as it is well known, internet was developed in the US within a military research project, and it has now become the most important mean of communication in all fields.

Information and communication technologies are now crucial also in the context of the so-called Revolution in Military Affairs that is transforming the ratio of warfare in the post-Cold War era. According to theorists of RMA, it is only the software and not the hardware of war that really matters, and information is going to take the place of weapons as the central feature of any future war. The near perfect clarity assured by the perfect and complete information about the situation on the battlefield (something reminding one of the illusory premises of contemporary economic theory) would lift what Clausewitz called the “fog of war”.

At present, the U.S. drones flying over Afghanistan - responsible not only of intelligence, surveillance, and reconnaissance duties but also of missile attacks - have their command center in Nevada. A missile strike commanded from thousand of kilometres away by “soldiers” who go home for dinner, clearly introduces a “video-game effect”, where the responsibility for the war action and its casualties is further displaced by technology. We have here an especially interesting case of electronically linked separate physical locations, where the transmission of information thanks to satellite communication can bring death in almost real time. The paper - to be presented at the EASST 2010 Conference - wants to investigate the dramatic effects of such an application of ICTs to warfare, the specific character assumed by the military communication power in contemporary societies, and the further transformations occurring to our sense of place after the development of new information technologies with military uses.

## Exploring Spatial Practices in Augmented Reality

Harle Joshua (School of Design COFA/Faculty of the Build Environment UNSW)

This paper examines emerging micro-blogging, geo-coding, and Augmented Reality technology as a channel for spatial practices, and explores the consequences their adoption will have to our conception of space. In particular, it will analyse the spatial practices associated with the “Tweak the Tweet” initiative responding to the 2010 Haiti Earthquake [1], social media activity around the Virginia Tech shooting [2], and Nike's recently released “True City” Augmented Reality application.

Current mobile technology and Augmented Reality applications allow near-realtime publication of geographic information; a typical journey through the city may involve consulting GPS map information, geo-tagging a favourite café, and checking the location of friends.

Drawing on the work of Michel de Certeau and Henri Lefebvre, this paper explores diverse spatial practises as the basis of an account of space as “practised place” and socially produced.[3] It adopts de Certeau's model of the institutional, panoptical *Strategic* and everyday *Tactical* power, and spatial practice as allowing a renegotiation of meanings of space, beyond its proscribed meaning.

The open nature of most social media technology vastly extends de Certeau's understanding of spatial practices as “phatic” (essentially communicative), however posing the role of emerging digital spatial practises as purely *tactical* is problematic. Experiencing space through abstracted representations (such as an on-phone map) places the traveller in a *strategic* viewpoint, appealing to their “scopic and gnostic drive”. Focus on visual cues pulls us away from *perceived space* (what Lefebvre considered the space of spatial practice) into the *conceived space* of abstract representation, while privileging visual engagement (which is fundamentally *strategic*).

While distributed social media challenges a monolithic, static representation of space, a *strategic* reading of this technology sees the documentation and digitisation of elements of the world as a form of autographic surveillance. For de Certeau the *strategic* fundamentally involves the demarcaof territory within which to control, survey and order, and hence Science – with it's “reconnaissance missions [...] exploring the frontier regions and linking the light to the darkness” – is thoroughly *strategic*. In *The Question Concerning Technology*, Martin Heidegger describes the essence of both technology and modern science as a drive to create standing-reserves, ready to be used [4]. For example, through technology a hydroelectric dam creates a standing-reserve of electricity from the river, and science creates a standing-reserve of ordered knowledge from the world. Micro-blogging and geo-tagging tools could be seen as creating a standing-reserve out of the social and spatial elements of our lives.

The danger for de Certeau and Heidegger is that we become alienated from the thing in its poetic, lived sense. The abstracted, ordered representation – the “trace” – cannot fully capture what it represents.

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**Track 12**  
**Performing Places**

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**(De-)Constructing performative places - Interactionist and material entanglements**

*Koch Gertraud (Zeppelin University Friedrichshafen, Germany)*

Thinking about places as performative entities is grounded in an interactionist understanding of the social. Using the one place in many ways at the same time refers to the dis-embedding and re-embedding forces in late modern societies that make spaces more fluid and more flexible, permanently re-shaped and re-constructed in ongoing social practices and events of various actors. Furthermore the interactionist approach seems to be more adequate in considering the complexity, flexibility, temporality and variety of communities and social situations. Still, the new flexible practices and interactions need to be connected to material qualities of places when places are understood as a locus and not just as “container” of social interaction, as the urban anthropologist Ulf Hannerz has pointed out (Hannerz 1989). With the spatial turn in social studies thus the socio-material qualities of spaces have gained relevance. The attention is drawn to properties and knowledges that are inscribed in the physical appearance and the social structure of a space, i.e. the infrastructure, the buildings, the shops, architectures of cities and landscapes, the population etc.

Yet, both traditions in (de-)constructing spaces, the (mediated) interactionist and the materialist, are not connected systematically. But both are constituent for performative places. Interaction and material dimensions are related to each other in Actor-Network-Theory. Here social interaction is not restricted to human beings but also performed by things. Human and non-human actants are understood as contributing to the social and as both being involved in the construction of social facts. Through the lens of the Actor-Network-Theory the performative places can be observed in their interactional and their material quality. The paper will analyse how performative places are co-constructed by interactionist and material practices and furthermore ask in the tradition of Post-Phenomenology how these constructions address the perception of people sojourning at a place. Based upon ethnographic fieldwork on spatial practices in diverse social settings (vocational education, tourism and virtual communities) it shows how material and interactionist entanglements are constructed, that new options for social practices emerge with them, that these practices become relevant for a larger population and reversely gains impact on the socio-material qualities of the place.

## Space and Place in the Local Community: The Virtual Turn

*Vicari Stefania (University of Sassari, Italy)*

*Elisabetta Cioni (University of Sassari, Italy)*

*Rodolfo Bonesu (University of Sassari, Italy)*

Ninety-four, as many were the definitions of community in the sociology of the Fifties. In his *Definitions of Community: areas of agreement*, Hillery actually added that "the 94 definitions used in this analysis are not all of the definitions of the community" (1955: 112). And many more would mushroom in the following fifty years.

With the general concept of community remaining problematic, contemporary literature has gradually focused on the notion of "social network". The attention has then shifted from the controversial ideal-type of community to the more specific and less cumbersome concept of social relation, or "community tie" (Wellman 2001, Wellman, Leighton 1979, Wellman, Wortley 1990). Albeit this theoretical turn has eased the empirical approach to different types of community, a new social process is currently challenging its strength: the overlapping of local and virtual. In other words, if we can still map social ties and networks to study the relationships between distant actors interacting on delocalized virtual platforms (Wellman et al. 1996), how can we adapt the same theoretical construct to communities which are both local *and* virtual? In territory-based virtual communities, how do we recognize and measure the reciprocal influence between online and offline dimensions in community living?

To approach these questions the paper looks at a territory-based virtual community grown up on the most recent platform for online community building: the social network site (SNS). With the Sardinian industrial town of Porto Torres being the local community, and Facebook the virtual platform of interaction, this study specifically approaches the question of how and to what extent territory-based online interaction can impact local political participation and social capital. The focus is twofold: we both frame a virtual local public sphere and measure its impact on offline community living.

Porto Torres is a small town in the Italian island of Sardinia currently undergoing a phase of industrial decline. Given its socio-economic status, Porto Torres is representative for several small-scale industrial hubs within the island and the whole country alike. The analysis is specifically focused on a sample of Facebook groups emerged, bottom-up, to mobilize around questions of common interest for the community of Porto Torres. A Computer-Mediated Discourse Analysis - enriched with a Social Network Analysis - of online wall-messaging allowed us to approach the emergence of a "Facebook public sphere". A series of in-depth semi-structured interviews to central actors (Freeman 1979) provided information on the impact of this peculiar public sphere on Porto Torres' offline community living.

The paper shows that SNSs' use can differently bolster the emergence of a virtual public sphere in the local community, the main influencing factors being the original aim of the group, its contingency to the local society, its bridging to institutional political actors, and its exposition to traditional media channels. Concerning the impact of this SNS-shaped public sphere on local community living, the analysis shows that online mobilization does ease the engagement in offline informal politics, involving - albeit at diverse levels - most members of the community.

**Performing the web: blog as practiced place**

*Yalcin Senom (Indiana University, Bloomington, USA)*

Basing on de Certeau's (1984) analogy between walking in the city and rhetoric, this paper explores blog writing as an everyday act of constructing a space –a practiced place- through narration. I examine the constructed spatial trajectory using a model (Schuh, 2003; Yalcin, 2006) that is based on a rhizomatic model of mind (Duffy & Cunningham, 1996), that defines trajectory construction by building connections to the environment, through diverging from what is present and adding one's own idiosyncracies. The model enables to identify points of cognitive connection, thus place the individual within the network that surrounds him and that he constructs. Blog posts of 3 randomly selected months from an academic blog are analyzed, and results show that the blog writer under study is establishing a territory first of all by publishing the posts. Through cognitive connections made by divergence from firstly his social network (social interaction), and secondly himself (self referencing) he is drawing lines of flight, deterritorializing. He creates a territory that is in flux, which is the nature of his performance. This performance, going back to de Certeau, corresponds to the triple enunciative function of pedestrian speech acts– the appropriation of the system, a spatial acting out of the place, building relations among differentiated positions.



## **TRACK 13**

# **The Social Study of the Information Technology Marketplace**

### **Convenors:**

**Neil Pollock (University of Edinburgh, UK)**

**Gian Marco Campagnolo (University of Trento, Italy)**

**Amany Elbanna (Loughborough University, UK)**

## **Information Technology, Investments and Interests. The Case of the Global Market of Applicant Tracking Systems**

*Beljean Stefan (University of Konstanz)*

While large ERP Systems have recently attracted quite some interest in the field of Science and Technology Studies (e.g., Pollock & Williams 2008; Kitto & Higgins 2010), others types of contemporary information systems are still largely understudied. In this paper, I intend to start filling the gap by drawing attention to the case of corporate applicant tracking systems (ATS) and the global market that has emerged around them.

Roughly speaking, ATS's are information systems that are designed to support the employee recruiting process of organizations. Historically, these systems began as mere repositories for application documents, but in the meantime they have evolved to powerful information systems incorporating multiple functions. Today, a typical ATS is a digital archive, an administration tool, a communication medium and a measurement instrument at the same time. In 2009, nearly 70 percent of all Fortune 500 companies were said to be using some kind of ATS. While there are many niche players in local markets, the global market is dominated by only a handful of system providers (Gartner 2009). In this paper, I will focus on these global players and try to conceptualize the kind of market they are engaged in.

In doing so, I will argue that the market of ATS – and, arguably, the market of large information technology in general – can only be understood properly if we recognize that it differs fundamentally from traditional good markets. For, the purchase of a certain ATS solution implies more than an isolated and temporally confined exchange of money for a product. Rather, it represents an articulation of a mutual commitment that represents the starting point of a long business relation between two companies. After all, even the most powerful ATS needs to be configured and customized according to the concrete processes and work practices of the buying company. Moreover, IT systems are constantly evolving, requiring frequent updates including new interfaces, new functions, or even entire new modules. All of this configuration, customization and updating work takes a lot time – often several years.

For this reason, I will argue that a focus on decision processes and heuristics preceding large investments in IT systems is not enough. Rather, we need to take into account the post-implementation phase following investment decisions. In the paper, I will adopt such a post-implementation perspective by analyzing various strategies and methods used by system vendors in order to deal with the expectations and demands of their clients. Particular attention will be paid to the divergent interests of vendors and buyers and to the fact that they do not find each other in a merely dyadic relationship but are embedded in a complex network of other system providers, potential buyers and consulting companies that constantly scrutinize their peers and the overall market.

The paper is based on a combination of participant observation, ethnographic interviews and document analysis. Research was conducted at a large multinational corporation in the Netherlands and a higher education institution based in the United States.



**An interactional approach to IT markets: how organizational actors mobilize consultants to legitimize their views in negotiations over technology choice**

*Campagnolo Gian Marco (University of Trento, Italy)*

Given the spread of commodified industry applications software, the major concerns organizations may face when adopting enterprise-wide systems such as Enterprise Resource Planning Systems (ERP) have turned to consumption. The issue has become the choice whether to keep the system in its packaged format or to modify it through a process of 'customization'. Organizational configurations of ERP systems consumption choice could take various forms: configuring the package, customizing the package, partial, selective implementation of the package, add-ons, bolt-ons or 'extension software' and 'best of breed' multi-vendor systems. Some scholars begun to address organizational consumption of large scale technological systems by adopting a market based perspective (Sawyer, 2002), emphasizing the role of consultants (Newman & Westrup, 2005; Hislop, 2002) in providing organizations the relevant knowledge to perform their choice. However, as suggested by Clausen and Koch (1999), in order to understand what the role of consultants in organizational decision-making is "we have to understand how, where and when and under what circumstances the choice is taking place" (Clausen & Koch, 1999: 464).

A central question I wish to address in the light of these evolutions in the conceptualization of information systems adoption is how to rethink interactional assumptions to deal with organizational projects of technological choice that yet appear not well served by the existing global and institutional paradigms.

Interactional assumptions spread across micro-sociological writings on information systems implementation in organizations (for a review see: Pollock&Williams, 2009: 83). However, the territorial focus of the received notion of interaction order neglects temporal formats (e.g. how organizations incrementally learn from previous implementation projects). In addition, their strength remains the situational reversal of and escape from the macro-order, with phenomena such as standardization going unnoticed.

Our approach consists in conceiving organizational projects of technological change as illustrations of 'articulation processes' (Strauss, 1988) taking place in organizations a global social forms (Knorr Cetina, 2009).

The approach that will be illustrated by the case is one that includes multiple levels of analysis to capture different actors taking part to the technological project over time. By focussing on an organizational project of SAP implementation in a public sector organization - let us call it 'Dante County' - taking place across a 10 years time period, involving multiple consultants changing over time and consisting in the incremental implementation of different SAP modules, the paper illustrates how the changing nature of client-consultant relationships was mobilized as a source of legitimacy by organizational actors to impose their goals on the ERP implementation project.

## **The Naming, Framing and Delivering of Information Systems. The Case of Business Intelligence**

*Dar Ravi (Department of Business Studies, Uppsala University, Finland)*

The term *Business Intelligence* has become established within Information Systems and heads a multi-billion dollar industry. As phenomena of business and information technology, BI has appeared for well over two decades as an answer to needs and a necessity to desires. Yet trying to pinpoint what the term “BI” means in the mouths of different people, in the information systems of different organizations and in analytical definitions for market segments; is complex, can be contradictory and is always vulnerable to an undermining corrosion of key elements. This paper pursues the view that this multi-facial character of BI is analogous to an ANT perception of assemblages of elements that structures and narrates ‘things’ into order.

What BI ‘is’ is at very least contested. The process of claiming a word and building a frame of cognitive definitions is only part of a coming together that holds. Comparing the fates of Business Intelligence anno 1989 and anno 1958 is more than just an idea that took off and an idea that didn’t. The later date involved a framing of much more than just an idea or a name. The concept of *delivering* is advanced in this paper as the intentional work of enrolment that attempts to achieve an accepted and used term. The field of Information Systems, with its heavy influence from vendor discourse, is characterized by continual work in developing and protecting new (often abbreviated) terms. The discussion on what is Business Intelligence though is itself continuous: as organisations try to make economic and practical sense of it; as investors hope to make financial value of it; and vendors try to push perceptions in line with the products they sell. Each position reached by each actor of interest is performative in the sense that the sense it attempts to make, is a sense given and an indexicality claimed. The role of Gartner Group in this sense is particularly interesting, yet every vendor and best practice is similarly in performance.

It is though important to avoid a simplistic social construction of BI as if it were only about words and discourse. This paper assembles the continual naming, framing and delivering of BI in terms of vendor expressed product potential, technological functions, material properties, professional perceptions, organizational needs and nostalgic causal orders. Sources are mainly interviews with persons of various perspectives on BI phenomena, but also word analyses of BI articles in IS magazines and data-bases in order to follow BI discourse over the last decade.

## **From Real to Virtual and Back: Examining the Real Market in Virtual Worlds**

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A virtual world (VW) is a computer-based simulated environment over the Internet. It provides users with an advanced 3D technology. Users interact with this computer generated world in an immersive way where they are represented by Avatars, interact with others and move around the environment using a combination of real-life simulated tools such as cars, boats, etc., imaginary tools such as flying, and Internet navigation tools.

The business use of virtual world presents a phenomenon on the formation where many different organisations, institutions, NGOs, and governments are building virtual spaces in the environment and in the process of exploring its potentials through a range of different initiatives. It is predicted that nearly 80% of active Internet users and Fortune 500 enterprises will have presence in a virtual world by 2012 (Gartner, 2008). As more users, more businesses and more institutions join in or plan to join in, it becomes important to understand the business dynamics of virtual worlds.

This study examines the virtual world Second Life (SL). SL provides users with realistic simulation of reality, advanced chat and recently voice capabilities, and tools to design objects and surroundings. SL presents a flexible platform that allows for a wide range of possibilities. It is up to the users' own creativity and innovation to leverage it.

The paper presents a case study of the journey of e-Office in its interaction with SL. E-Office is a small business in the services sector that initially thought to demo its services using SL 3D features. E-Office later extended its services to SL platform. The paper details how e-Office came about extending its services and how it created and defined its product offerings and pricing. The case study reveals that the SL provider (Linden Lab), e-Office's owner, a contractor developer, and potential users managed to collectively shape the e-Office product offerings, suggest prices, and create different modes of use.

The paper applies the performative view of markets to make sense of this new phenomenon. It is suggested that Virtual Worlds brings different parties together in a collaborative way that crosses the traditional boundaries between producers and consumers. It unravels an interesting phenomenon where technology provider, technology consumer, product developer, and end consumer work together to create a product, discover its use, and perform a market of products and users. There is no definite line between consumers and producers or buyers and sellers as they all collaboratively innovate to improve technology and its use and in the process a market evolves. The immersive nature of technology facilitated communications between all parties and provided a platform for new product ideas to emerge and new use of SL to be created.

## **Achieving cross-organizational integration in the healthcare market**

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A western health care infrastructure is distributed across several institutional boundaries that typically include general practitioners, hospitals, nursing homes and home care services. This poses challenges for healthcare personnel who need a complete picture of the condition of a patient who is transferred between the different settings. As a result, many governments have increasingly targeted their strategies towards these challenges in order to achieve better integration between systems located in different institutions (Department of Health 2002; The Directorate for Health and Social Affairs 2006; National E-Health Transition Authority Ltd 2009).

However, despite these initiatives, only minor steps towards the improvement of electronic cross-organizational collaboration have been achieved (Cross 2006; The Directorate for Health and Social Affairs 2006). In the Netherlands, a number of national projects met pitfalls and challenges (Roos 2007). Evaluation- and status reports in Norway conclude along similar lines (Auditor General 2008; Norwegian Health Directorate 2008).

Due to the lack of progress, many have questioned the approaches on how such projects should be managed, organized and run. On the one hand, there is a call for more top-down governmental control and coordination (Auditor General 2008; Norwegian Health Directorate 2008). Others have promoted a more careful bottom-up approach, reflecting strategies outlined in the IS and STS communities. Still, many local initiatives have been criticized for not being able to take off in the market as such systems are largely designed for a particular context, making it difficult to transport them to another (Berg 1999; Hanseth 2001).

In this study, we contribute by carving out a middle position on large-scale integration. We elaborate on how easily top-down initiatives fail. At the same time we point to some core challenges for bottom-up initiatives, and claim that these need to be grounded in regional and national strategies to ensure sustainable use and growth.

Empirically, we compare two initiatives from the Norwegian healthcare system. One is a national project on electronic prescriptions, which has been running since 2004. The other is a small local project on electronic laboratory requisitions initiated in 2006 by one hospital and a local vendor. This latter system has managed to get a foothold in the healthcare market and is now used by ten Norwegian hospitals. However, further diffusion to new customers is currently hampered as several of the regional health authorities have initiated a coordinated call for tenders on electronic requisitions.

We are particularly interested in how new integrated systems takes off in the healthcare market. Specifically we analyze how and when do the users participate, and who are actually involved in the process. We explore how these factors shape the progress of integration projects. Further, we discuss at what stage in the development phase a new system should be put into use, and explore to what degree technical configurability is important for diffusion across heterogeneous contexts (Pollock et al. 2007). We also discuss the strategies of the authorities and the vendors and critically examine how their actions influence the market situation for new integrated systems.

Methodologically, we adhere to an interpretive approach (Walsham 1995; Klein 1999), based on participant observations and interviews over the last three years.

## **The normative and performative character of technology - a study of purchasing systems**

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The use of internet based technology in private as well as public organizations has increased dramatically the last decade. The systems are often based on a step-by-step principle and include a normative as well as a performative character. As the systems contain descriptions regarding what and how to do, it is expected that work processes will become standardized. In addition, it is likely that the new systems will increase opportunities for observation and control of work.

Our view of technology is guided by a social constructivist perspective. It is assumed that the implementation and usage of new technology always is performed in political, economic and cultural contexts. Technology frames the acting in organizations, without being deterministic. The aim with this paper is to explore how organizing of purchasing practices in two different organizations relate to the normative and performative character of new technologies. We will discuss results from two ongoing studies. The first is a study of a public sector organization which implemented eGovernment. A preliminary examination has put the purchase process of the very eGovernment system in question. Personnel responsible for purchasing the system turned out to have limited knowledge of the systems and subsequently limited knowledge of what to request. Ordering and development of the systems thus became committed to consultants and the systems finally implemented became far more expensive than anticipated. The purchase process in which locals had limited knowledge became publicly questioned by national audit organization.

The second study is a follow up of a private organization, Volvo Car Corporation, in which we studied the implementation of new technology since year 2001. Originally the plan was to transform the present platforms for purchasing into one. The technological fashion in being by then was "e-business", which appeared to be perfectly adapted for purchasing of car manufacturing parts in a multinational organization (VCC was then owned by Ford). When adjusting the system to car manufacturing procurement, it turned out that it was a far too complex process to be handled by the system which subsequently was abandoned. In the meantime, the organization as such was reorganized to fit the structure of the system. As a result, Volvo Car Corporation ended up with a new way of organizing procurement, but still, the organization, professional roles, hierarchy, management, processes were kept changed to the American way of doing procurement.

A shared problem in these two cases was the shortcomings among those who ordered the systems. Being seduced by the contemporary fashion – e-business and later eGovernment -, lacking knowledge of Internet based systems and their organizational consequences, and being forced by the global demand of increased transparency, decisions appear to have been made out of hand of those knowing the organizing context. In the paper we are going to discuss the normative and performative character of these technologies, how they encounter the practice in each organization, and how the seductive character of new technologies risk to lead organizing astray.

## **Integrating Systems and Shaping the Information Technology Marketplace**

*Kaniadakis Antonios (London School of Economics and Political Science, UK)*

Systems Integration (SI) is a key activity to the marketisation of information technologies (IT) and relevant resources, through their assemblage and implementation in a variety of user contexts. SI, however, is not merely a technical engineering task. It has rather evolved to become a business activity and a new model of industrial organisation (Prencipe et al, 2003). In this emerging model, new types of business firms and groups of firms join together different types of knowledge, skill and activity, as well as, hardware, software and human resources to produce new technological products for the marketplace (Prencipe et al, 2003; Hobday et al, 2005).

In the field of Science and Technology Studies and Social Studies of IT more particularly, little or no attention has been paid to SI mainly due to a preoccupation with narrowly situated analyses of IT implementation in users' organisational contexts. A current shift in focus beyond implementation studies and into the broader IT marketplace (Pollock & Williams, 2009; Williams & Pollock, 2009) brings SI to the centre of attention. More particularly, questions are raised in relation to the significance of SI in structuring, configuring and performing networks of diverse actors (international software vendors, hardware component sellers, business consultants, user organisations) within the broader IT marketplace. Additionally, the role of systems integrators (as firms), which emerge as important actors themselves, needs to be systematically explored.

Based on the concept of Agora of Techno-Organisational Change (Kaniadakis, 2007) which suggests a 'viewpoint' understanding of the IT marketplace, we present empirical evidence from research in a SI firm. The research explores the viewpoint of this particular actor as it evolves over time and the ways they engage and perform the IT marketplace, while integrating components and developing technological solutions for their network of customers.

Findings point to the following conclusions:

In this new model of industrial organisation of technology production, each solution which is the product of SI represents an alternative configuration of the broader market environment and in that sense the activity of SI, and systems integrators as the actors performing it, are central in shaping the broader IT marketplace.

These alternative market configurations are commercial technological products and when bought by certain customers they serve as a user-viewpoint to the IT marketplace, that is, they offer a way for user organisations to understand and engage the IT marketplace.

The variety and form of alternative technological products for various customers, and in consequence the variety and form of alternative IT marketplace configurations, is highly dependent on the strategic positioning of systems integrators in the competitive marketplace and on their marketing orientations as they evolve over periods of time.

## **The role of micro powers in the evaluation of information systems. An actor network study**

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*Wilson David W. (Birkbeck College, University of London, UK)*

Current practice in IS evaluation draws from a variety of reference disciplines including the quantitative approaches of corporate finance and economic evaluation, qualitative approaches embracing organisational development and transformation, approaches that embrace human and sociological values such as intuition, perceived imperative and sponsor directive, and contingency views that hold that the evaluation method is informed by the investment setting. This research focuses on the less well explored role played by *power* in the IS evaluation. Central to this is the notion of micro power (Foucault, 1977) and the analytical toolkit of Actor Network Theory (Latour, 1987). Specifically this paper seeks to throw light on the role played in the evaluation process by the threads of 'micro power' that manifest themselves on the journey between the summative evaluations of the ex ante and ex post IS business cases in an organisation.

IS Evaluation is a long-standing topic in IS research. It has been argued for example that perceived imperative and sponsor directive play a role in some IS Evaluations (Farbey et al, 1993). This work demonstrates that these notions can be underpinned by the consideration of actor micro powers in the IS Evaluation setting. Whilst the techniques of quantitative and qualitative analysis undoubtedly have a major role in IS Evaluation this research presents evidence that IS Evaluation may also be a social and political process.

The results of this investigation have implications for research and practice. It supports the view (Bannister, Remenyi, 1999) that the absence of clear answers concerning IS Value is likely to be a function of a lack of understanding of process and decision making complexity. This research suggests that micro powers play a significant role in IS Evaluation and that analysis of these powers may throw light on the complex relationships between multiple stakeholders (Farbey et al, 1999). Manifestations of 'multi-strandedness' (Gellner, 1991) in IS Evaluation where stakeholders often stand in multiple relationships with each other and where decisions can represent social rather than individual choice can be complex to analyse. The research highlights the role that may be played by Actor Network Theory in this regard. This paper is also relevant to managers and IS evaluation practitioners since it draws attention to the necessity of ensuring that the goals of key actors are inscribed into the actor network and that strong mobilisation is established *and maintained* throughout the lifecycle of the IS Evaluation.

## **Negotiating Promises, Expectations and Risk: The Performativity of Clinical Evidence in the Adoption of Innovative Health Technologies**

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Healthcare and medicine are changing at a rapid pace today. Developments in genetics, stem cell research, telemedicine, imaging and screening techniques have broadened out the arena of medicine and health technology. These developments in sophisticated technology, it is suggested, have the potential to revolutionize the practices of medicine and healthcare by providing more proactive and powerful tools for the diagnosis, treatment, and even prevention of illness and disease (Kings Fund, 2008; Webster, 2002). One example is retinal imaging, a tool for the early assessment and monitoring of a range of retinal conditions

At the same time new innovative health technologies (IHTs) and markets present challenges and issues at many levels. In recent years there has been a continuing debate around issues of public trust, patient safety, clinical resistance, proven clinical effectiveness and, more widely, around the ethical and social implications of techno-scientific innovations in medicine and health (Williams and Dickinson, 2008; Webster, 2006; Ferlie et al., 2005). These debates have given rise to many new and diverse questions related to the diffusion and trajectory of emerging medical and healthcare innovations. Clinical and cost-effectiveness evidence is now required to inform decisions about the funding, availability and procurement of new healthcare technologies. Moreover, the clinical utility of these technologies has to be proven in the process of demonstrating that they are capable of being embedded in concrete interdisciplinary work practices. Promises, expectations and uncertainty are clearly all associated with the adoption pathways of innovative healthcare technologies. These wider cultures of ambiguity are of central importance in understanding the context within which these innovations are envisaged, adopted, implemented and deployed.

This paper aims to shed light on the dynamics and complexity surrounding the evaluation and assessment of innovative healthcare technologies in clinical settings. Drawing upon ideas from the sociology of expectations, this paper aims to explore the contingent nature of the interactions between expectations, values and clinical evidence influencing their procurement (Pollock and Williams, 2010; Borup et al., 2006; Brown and Michael, 2003; Brown et al., 2000). In so doing, we explore the role, structure and dynamics of technology demonstrations in the framing and constitution of decision making. Demonstrations of technology are organized events where the capabilities and features of technology are revealed to potential adopters and users (Pollock and Williams, 2007). They represent a defining moment in the adoption pathway, designed to provide evidence to various stakeholders about the efficacy of technologies and systems, either under development or ready for use (Smith, 2009). However, demonstrations are not simply about evaluating technologies (i.e. providing evidence for or against adoption). Nor do they straightforwardly evaluate suppliers (i.e. assessing the 'status' of vendor and suppliers' 'track record'). They play a crucial role in the 'negotiability' of uncertainty and risk of adoption. Indeed, much of the promise of new healthcare technologies depends on masking such uncertainty and mobilizing a range of claims and expectations about the capabilities and future trajectory of innovation. In this context, it is suggested



that expectations mobilised in the representation of technological innovation do not simply describe these future technologies but also help bring them into being (Pollock and Williams, 2010; Brown et al. 2000; Michael 2000).

The empirical backdrop to this discussion is provided by exploring the contingencies and socio-political particularities surrounding the evaluation and assessment of a new retinal imaging technology by a UK NHS hospital Trust. The central claim of the technology is that it is able to provide, within a matter of seconds, a wide-field digital image of the retina of sufficient quality to enable an ophthalmologist to identify pathology and make a diagnosis. The promise of the technology is two-fold: to replace the current practice of diagnosis by direct visual examination of the retina after dilating the pupil and to provide the prospect of patient pathway redesign. Following the Trust's Chief of Business Development's interest in adopting the technology, onsite visits and demonstrations of the technology were arranged between the vendor and ophthalmologists and imaging specialists at the Trust. However, emerging tensions between the need to provide clinical evidence for the adoption of the technology and to manage the inherent uncertainty resulted in insurmountable difficulties in negotiating promises, expectations and risk.

## **Professionalism through information technology? The case of the military institution and its struggle for survival**

*Persson Per-Arne (Swedish National Defence College)*

This abstract is based on ethnographic work in the military institution in a small Western nation state, Sweden, with a long record of mastering information technology (IT) and its military applications. State funded military R&D, like in several nations, has led to large-scale investments which have been driven by the fear of becoming second in case of war, and by not being perceived as professional among equals and in society. Failures might lead to rapid disgrace or annihilation. During the last decades, large IT- projects systems and technical concepts have not 'delivered' but tend to 'hang on', their basic purposes and drivers being unaffected. The purpose of the paper is to illustrate how belief systems are exploited, and to exemplify some mechanisms for dominance. This points at the need for professional critical thinking based on, for example, modern sociology and socio-technical theory rather than systems theory and engineering, and computer science.

Since decades the military have set the standards, and been the target for massive import of technology, specifically IT, seemingly satisfying both demands for what is rational and what is normative. The military organization is vulnerable for marketing. Information technology has many entrances. In peacetime the pressure is hard to rationalize in order to survive, in war to survive by means of rationally responding to sudden demands for action, conquering uncertainty. Recurrently, technology is the primary response.

When trying to change, the rationalized, lean military organization with limited in-built theoretical understanding of technology and power becomes dependent on vendors. The use of terms like 'system' and 'information', combined or alone, and technology being perceived as objective and neutral, attract the military mind. Once 'information' was defined as the raw material for knowledge, 'information processing' became the means to discover, tailor, pack and distribute knowledge. The dominating engineer's mind-set neglects informatics and critical IS theory.

One of the central aspects of change concerns language, which provides new perspectives, crafting concepts that can resolve conflicts, bridge interests and communities. Military operators and vendors share interests but the language in use, often a kind of 'newspeak' and metaphorical, resists inspection and often favour the latter. Metaphors and commodification hide complexity through objectifying intangibles. Creative use of concepts whose qualities lead to a deceptive clarity ('situation awareness', 'information object', 'information superiority', 'knowledge support') is common practice.

Terms colonize, mask changed power relations, establishing dependencies on external competence. Part of the marketing is business modelling according to methods with deceptive neutrality and objectivity. Modelling defines problems to fit technical solutions rather than the other way round. It is not a matter of creating true or corresponding descriptions but rather an agreement on how to effectively perceive and communicate about things in the business. The meaning of 'effectively' is not evident. Subsequently, institutional amnesia evolves due to the replacement of traditional professional concepts. The meaning of professionalism and the benefits of IT rests to identify when concepts and norms are defined by vendors rather than the military community.

## **Give Me a 2\*2 Matrix and I Will Raise the Market: The Intermediaries and Devices that Create Product Categories**

*Pollock Neil (University of Edinburgh, UK)*

There is apparently no more socially constructed category than the 'product category'. Technology vendors routinely promote and distinguish their offerings from those of their competitors and previous generations of products. This appears to be particularly the case in the software industry where, because of the lack of a physical product, product terminologies and classifications are constantly shifting. Between 1990 and 2002, for instance, vendors developed nearly 400 different concepts to describe their offerings (Pontikes, 2008). This is despite the fact that the actual differences between these variously named technologies remain amorphous. The complicated, ambiguous and often changing nature of product categories has not gone unnoticed by scholars within disciplines such as institutional theory, economic sociology and marketing. Rosa et al (1999), for instance, write that it is easy to forget that product categories are "...nothing more than theoretical constructs, developed and agreed to by market actors to make sense of producer and consumer behaviours" (64, 1999; see also Rosa et al 2002). Modern product markets and how we define them, they argue, are no longer as "constrained by time or place but instead are agreed-on loci of transactions with few if any *physical markers*" (*my emphasis*, 64, 1999). However, we wish to query the specific mechanisms identified. For instance, to simply identify product categories as 'social constructions' fails to appreciate the *material processes* also involved in their production, reproduction and use. Product categories are very much a 'socio-technical' phenomenon.

With this article, we join with the recent growth in interest by sociologists of science and technology in the material production of markets (Callon 1998, 2007; Mackenzie 2006, 2009). Here it has been persuasively shown how 'devices' make markets possible (Callon 1998, Muniesa et al, 2007). We investigate the role of a group of intermediary experts (the industry analyst known as the Gartner Group) and their production of a simple ranking device called the 'magic quadrant' (Pollock & Williams 2009). Our contribution is to show how this material device provides both 'constraints' and, adopting Gibson's (1977) term, 'affordances', for these market intermediaries. In particular, we show how the material constraints of the tool force its authors to continuously update and reconfigure their conception of the market (in particular through generating new product categories). To say this in different words, the tool demands that its authors configure the market in ways that were not originally anticipated.

The wider aims of the paper are twofold: firstly, to give impetus to social scientists in understanding how highly simple devices like these have virtues in 'performing' marketplaces; secondly, to point to the enormous growth in dedicated intermediaries (experts and professionals, organizations and bodies) that are not solely reporting on the qualities of product categories but are creating those classifications.

## **Turning buyers into sellers: The spread and spreading of ERP in American higher education**

*Rowland Nicholas (Pennsylvania State University, USA)*

This presentation draws on literature in the sociology of expectations and science and technology studies (STS) to explain the spread of Enterprise Resource Planning (ERP) in American higher education. Analytical emphasis on ERP implementation seems to have eclipsed equal attention paid to how these systems were sold to higher education.

Research on implementation dominates the contemporary ERP literature. Authors say the promise of ERP means determining how troubled systems can be made to function (Wagner and Newell 2006). Software vendors promise flexible off-the-shelf functionality, but malleability brings with it the well-documented burden of “work-arounds” and “technological adjustments” (Pfaffenberger 1992; Pollock 2005). More than a step in a linear model, implementation now implies managing the interpersonal, financial, and temporal aspects of ongoing system maintenance and any idiosyncrasies leftover from previous implementation efforts (Light 2005; Thomas 1994).

Less attention has been paid to how ERP spread throughout organizational fields. This paper suggests that early Latourian (1987) ANT is particularly suited to develop a sociology of expectations perspective (cf. van Lente 1993, Selin 2007) within the diffusion of innovation literature (cf. Rogers 1983).

Drawn from 62 in-depth interviews and internal documents collected from a multiyear inter-organizational case study of ERP in American institutions of higher education, a generalized issue-focused analysis was conducted to isolate and contribute one interpretation of how ERP vendors “move” their (soft)wares – part of the story is recognizing how vendors convinced committed universities to start selling the vendor’s software for them.

Since early adoptions, the vendor encouraged enrolled universities to show-case its products in-use and to openly share their implementation experiences. This helps to explain why advertising campaigns in higher education were almost non-existent. A university official concisely noted:

R6: [the vendor] didn’t need advertising, they had us; they had working laboratories!

An implementation project manager added:

R51: ... you asked yourself: “what are your colleagues doing?” and if they can demonstrate it for you, it’s even better, and that is regardless of whether it was a good or bad product, you might as well get in the boat with your colleagues, because there’s more strength in numbers.

The actor-network theory maxim that there is “strength in length” – or “safety in numbers” – was clearly understood by adopters. Before ERP universities were masters of their own fates regarding information technology. What happened at one university’s IT division did not matter much for goings-on at another university. However, IT systems in higher education became intertwined as soon as universities started to share a common product adopted from a common vendor.

**Track 13**  
**The Social Study of the Information Technology Marketplace**

The collective problem for universities to overcome: their software provider had to continue to grow in prominence (and profit) in order to stay commercially viable. If the vendor went bankrupt and their product was discontinued, then universities committed to ERPs would suffer collectively. In this messy field-wide web of interests, promises, and investments, it became a reasonable course of action for adopting universities to take-up the interests of a vendor, believe the vendor's promises, and promote the vendor's products to peer universities.



## **TRACK 14**

# **From a "Social Raw Matter" to the Production of Stabilized Collectives: Tracking Institutions of Knowledge**

### **Convenors:**

**Virginie Tournay (Institute for Political Studies in Grenoble, France)**

**Severine Louvel (Institute for Political Studies in Grenoble, France)**

**Céline Granjou (Center for Agriculture and Environment Studies, France)**

## **Socializing a computer program. University interfering with a digital system**

*Abriszewski Krzysztof (Nicholas Copernicus University, Poland)*

The wide spread, common view on computerization of various parts of the social world usually says this: social institutions are relatively stable phenomena, and the very function of computers and computer programs boils down to reflecting the institutional reality (or parts of it). One usually assumes, that social system is autonomous and only source of agency, and action. Thus, digital systems are perceived as passive, predetermined, and subsidiary.

However, things look differently. In my paper, relying on ethnographic studies on introducing a digital system USOS (University System for Studies Management), I will point out various areas of interfering social system and the digital system. I will focus on processes of decision making, agency prescribing, and social change. Interfering of the two does not look like a process of mirroring something by something else, but rather as a series of tensions and conflicts locally negotiated, which in result change both in an unpredictable way.

## **Domestication and performativity of a time management system in the Finnish universities**

*Arminen Ilkka (Department of Social Research, University of Tampere, Finland)*

The presentation concerns the appropriation of the time management system in the Finnish universities. It is a project management tool that enables the allocation of working hours to specific projects or duties. The Finnish universities introduced the task of working time allocation by appealing to the admonition of the reliability of cost estimates in the university by the National Audit Office, to more reliable cost and performance estimates required by the Ministry of Education and to the instructions of the State Aid framework of the Commission of the European Union. The time allocation received a critical reception. It was claimed that the allocation of working hours changes the traditions and conventions of academic work so radically that its necessity and functionality should have been discussed with the whole staff. Despite criticism, the system was introduced in 2007-8, and the staff was obliged to use it. I discuss the background of the system, and relate its introduction to more general trends in the academic research and institutions. The paper focuses on the domestication and performativity of the system. The notion domestication refers to the processes by which users make new, novel media and technologies practically and symbolically their own by inventing them usages appropriate to their own home environment and life style and/or working practices. During recent years the notion of domestication has been increasingly abstracted so that it does no longer refer to processes of 'domesticating' alien artifacts at home, but it has also been successfully applied to workspaces, systems and regulatory structures. Performativity refers to the processes in which regulatory models, structures and software are adopted in practice so that the practice itself becomes shaped by these regulatory ideals. The time management system in the Finnish universities is a regulatory software that aims at shaping the perception of university staff towards their work so that they can produce clear and distinct allocation of their working hours to the categories appropriate to the system. However, the competent use of the system seems to require its domestication so that the users can not apply their common sense and take for granted the categories offered by the system, but they have to learn the instructed wisdom to carry out the task in a manner appropriate to their own goals, or what they have been instructed to consider "wise". Consequently, through the domestication the usage of the system becomes routine and automated and the categories inverted in a manner that the results of working hours allocation do not anymore correspond to everyday categories, i.e., allocated hours have formed a reality (ontology) of their own. On a metatheoretical level, the paper aims to discuss the relationship domestication and performativity. On an empirical level, the paper brings up the users' perspective, discuss their views, and show the ways they have appropriated the system individually. Based on interviews, ethnographic and videotaped data on the usage of the system, it is analyzed how users have ended using the system, i.e., how they write down the working hours in the system. It seems to appear that the usages of the system develop, i.e., users domesticate the system, which enables the performativity of system. In this case, the domestication of the system may have shaped its appropriation in a manner that may seeds for counter-performativity, i.e., in contrast to the official goals, the system may not be able to provide more reliable cost and performance.



## Photojournalism(s) of the digital age: the case of the World Press Photo

*Barradas Carlos (Centre for Social Studies)*

During the last 54 years, the World Press Photo (WPPH) Foundation has been one of the most important institutions in promoting and setting high professional standards and criteria in press photography from all around the world to the general public. The itinerant exhibition, composed by the award winning photographs, is visited by two million people over 45 countries worldwide annually ([www.worldpressphoto.org](http://www.worldpressphoto.org)), an estimate that mirrors its relevance at a popular level. This global success is highly related to two factors: the New Information and Communication Technologies that, through various mediascapes (Appadurai, 1998), reinforce the impact and success of the initiative; and second, the representation and conception of photojournalism as the “faithful reporter” of the real and truth. Yet, photojournalism itself and its representation and conception have changed over the last decades due to profound technological changes, namely the hegemony of digital photography over film that made photographic manipulation easier through specialized software (e.g., Adobe Photoshop). Therefore, its relation to the dominant paradigm, composed mainly of values such as objectivity, ethics and neutrality has been severely threatened.

The purpose of this communication is to expose the perceptions/assumptions/convictions/ideas that become embedded in WPPH's success as well as understand changes in photojournalism stirred by new technological resources and how these influence professional practices and imperatives. Hence, it is important to question how do photojournalists face such changes, (such as the easiness to manipulate photographs) and how these interfere with the spectators/consumers perceptions and representations of photojournalism in general and the WPPH in particular.

These profound changes demand some questions to be asked, such as: how have these new photographic technologies changed societies' perception and impact of photojournalism? How have these new technologies allowed for different interpretations of the concept “photojournalism”? Does the compromise to the dominant paradigm contribute to a positive representation of photojournalism and, therefore, to the popularity of photojournalism in general and photojournalism awards in particular? As a global cultural actor, does the WPPH lead to the establishment of relevant articulations between photography and social critique based on the discourse about closeness to truth? What is the visitors' perception about the link between reality and the exhibition, mediated by digital software and hardware?

To answer these questions, the empirical work included interviews to visitors of the exhibition, testimonials of awarded photographers, staff from the WPPH, cultural mediators and curators responsible for the organization of the exhibition in several Portuguese cities and an extended press analysis, in order to be aware of the intra-medial discourse on the WPPH and of the social conception of photojournalism as maybe the last “truthful” translator of reality.

## **Professionalize or perish: the current transformation of academic journal work in the field of management and organization studies**

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This paper will aim to explore the current moment in the life of particular institutions of knowledge – namely academic journals in the field of management and organization studies. In the recent years, a growing body of literature has tried to address the changing character of academic work and knowledge within what has become referred to as the emerging context of the ‘new higher education’ (NHE) (Jary & Parker 1998). Critical commentators (eg. Hayes & Wynyard, 2002; Shore & Roberts 1995; Strathern 2000; Willmott 2003) have been discussing the developing configuration of disciplinary relations, as part of which increasingly sophisticated systems of auditing, monitoring and surveillance (for example, research monitoring in the form of the Research Assessment Exercise (RAE) and the Research Excellence Framework (REF) in the UK) are being introduced into academia. Within this context, academic journals have increasingly become important actors, arguably even ‘obligatory passage points’ (Callon 1986) in the nexus of academic practice, whereby academic resources and careers are more and more channelled through the narrow passage of (journal) publication. This paper will attempt to open up the black box of academic journal work, and show the latter as itself in the process of being shaped by the wider context of the NHE. On the other hand, by doing so the paper will discuss the process of current further black-boxing of academic journals as key institutions of knowledge. The paper will draw on an empirical study of four leading European journals in the field of management and organization studies and will highlight the current pressures necessitating (according to the journal editors in the study) the ‘professionalization’ of journals in the context of the NHE. Given the role of academic journals in the disciplinary matrix of the NHE, such crystallization of journal practices is likely to have consequences for (other) academic knowledge production and consumption practices and is therefore in an urgent need of examination.

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## The Data Revolution and the New Social Contract for Science

*Chunglin Kwa (University of Amsterdam, The Netherlands)*

In this paper, I focus on the large international scientific programmes on climate change, and the institutions with which they interact. The programmes, in existence since 1986 and with at least ten more years to go, can be considered as semi-permanent organizations of science. Formally they are coordinated by the International Science Organization (ICSU) and they work closely with national funding agencies. The programmes are geared to data gathering: we are witnessing a new 'avalanche of data', and fears of becoming 'drowned in data' have been repeatedly expressed. The proximate cause of the data revolution is technology: remote sensing equipment mounted on satellites orbiting the Earth are conspicuous examples. New technologies of data handling, data storage, data retrieval etc., have come into existence.

The new riches bestowed on the sciences in the form of data collecting and data handling technologies (mostly made available through public funding) point to an interesting paradox: the financial room for autonomous science at the universities is decreasing at the same time. The programs operate under criteria which do not come out of peer-reviewed 'little science' but are formed instead within state-funded bureaucracies and/ or entrepreneurial cultures (Shapin 2008). For the resulting projects a more direct form of public approval is solicited: science operates under a 'new social contract' with society (Brooks 1993; Lubchenco 1998). The terms of the new contract are to either lead to the development of marketable products or to contribute to more generally conceived societal goals, the elucidation of climate change and the mechanisms of global warming obviously being a case of the latter. The big international programs may be said to fulfill a dual role: they help steer the academic sciences toward societal relevance while the management and the structures of the programs allow for transparency and accountability.

Can a link be established with the way sciences operate under the new social contract and their increased orientation toward data? Today, the legitimacy of public funding of science is much less taken for granted than before 1980, inducing science policy officials to find new uses and audiences for what they once conceived of as autonomous or 'fundamental' science. They find, among other things, that at least some segments of the public identify 'sound science' with corroborated data rather than with theory.

We should not see, therefore, technological development in data collecting and data handling as a blind force. In the case of climate change research, NASA took the lead in defining the technological needs and standards for remote sensing equipment beyond the wildest dreams of climatologists, oceanographers and ecologists. For many practitioners of the latter sciences, the flood of geospatial data that was poured out over them seemed a mere instance of 'technology push'. But for NASA it was rational to engage in it, as it was for NSF and NOAA to ally themselves to NASA.

**Policy delivery mechanisms: techniques of governance or tools for policy change?**

*Corvers Fabienne (European Commission, Directorate General for Research)*

*Doria Francesca (European Commission, Directorate General for Research)*

This paper will try to establish - for European research policy - the extent to which policy objectives, policy instruments and policy delivery modes are interconnected phenomena and to assess what the implications of this interconnectedness are for policy change.

One school of thought argues that the choice of policy delivery modes (e.g. executive agencies) is a mere technical matter defined automatically through the choice of instruments and objectives. Alternatively, it is acknowledged that abstract policy objectives "come to live" through the choice of instruments (Larédo, 2004); in any case, relatively little attention is dedicated to the "techniques of governance" (Howlett et al., 2006).

Far from being a mere technical matter, this paper will demonstrate that the choice of policy delivery modes will construct its own sociomaterial ecology, inducing change in the system which might result in a radical turnover of both instruments and objectives' rationales.

In order to do so, this paper will look into theories of policy instrument choice to determine their usefulness vis-à-vis the research question of this paper and in particular reference to the main instrument of European research policy, the Framework Programme (FP).

The methods of empirical analysis will consist of describing and mapping the changes in EU research policy objectives, instruments and delivery mechanisms over the past 25 years. The paper will analyse to what extent these changes correlate and what the impact of these changes have been on the overall logic of intervention of European research policy in general and of the Framework Programme in particular.

The paper will present the main findings and conclude that the "techniques of governance" are not mere "techniques", but tools for sociomaterial constructions of reality that can catalyse policy change as demonstrated by EU research policy practice. As such, they deserve a more prominent place in the research agendas of sociologists, historians, economists and political scientists.

**Adaptative struggle in "institutions of knowledge": constructing internal orders in the chaos of social transformation**

*Fallon Catherine (Université de Liège, France)*

Since the 19th century, universities are the locus of most public research in Belgium, with a ongoing interaction with industry. After WWI, a group of industrialists succeeded launching a privately financed "Research Council", the FNRS (Fondation Nationale de la Recherche Scientifique) with the support of the highest political authority, King Albert 1st. Historians (Halleux & Xhayet, 2008) documented how this specific institution emerged, from an industry based project towards a "mertonian" institution of knowledge contributing to unify the scientific community at the level of the country, while bypassing the historical divisions of the three worlds of universities (state; catholic; free).

Based on a recent field work on the transformation of the instruments of science policy in Belgium, this paper proposes to analyse in some depth the dynamics of transformation of the FNRS at its emergence as well as the transformations this institution had to go through in order to survive till now: under the same acronym, the institution had to transform itself in order to adapt to social change and pressure for transformation. The main steps were to maintain its independence while being funded by the state (after WWII); to reinforce its identity in competition against emerging strategic science policy instruments; to stand the pressure to democratisation which opposed its elitist model in the organisation of research; to survive the decentralisation process which affected all political structures in the country after 1968 onwards. This analysis will unveil some of the mechanisms of adjustment which it had to mobilise in order to survive, and particularly the practicalities of the forms of cooperation of the different stakeholders supporting the institution through 80 years of existence: the researchers themselves as members of the "community" this institution is serving; the authorities of the three main universities whose positions have continuously grown; industry partners and political authorities.

We propose to prolong this analyse by a comparison with the processes of emergence of the ERC (European Research Council), an institution also devoted to the identity construction of a specific scientific community (but a community without a real "polity") and also struggling with stakeholders for the definition of settings of community participation and administrative and political control. At 80 years of distance, we observe the emergence of two institutions similarly designed to support the emergence of a "scientific collective": they design autonomously their internal procedures of categorisation and hierarchisation, with identification processes contributing to the definition of institutional boundaries defining a specific field while ensuring its inscription in the society through a specific legitimating strategy (Douglas, 1986). A diachronic analysis helps underline how socially constructed are these institutions, and how the configuration of networks are continuously redesigned to better be embedded in a specific historic society (Laborier, 2003).

**Engineering knowledge, instituting the planet: geoengineering as ontology**

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A new wave of climate engineering ideas are currently taking centre stage, triggered by the urgency about the state of the climate and lack of progress in global efforts to mitigate emissions. 'Geoengineering', as it is commonly referred to, involves the large-scale manipulation of the environment to offset the effects of anthropogenic climate change, and is increasingly viewed as part of the solution to the climate problem (Royal Society 2009). Although the umbrella term 'geoengineering' does not adequately reflect the diversity of technologies of environmental manipulation, it usefully encapsulates the emerging configuration of disciplines, practices, methods, commitments and objects of study.

This paper presents and discusses the findings of empirical work based on semi-structured interviews with researchers from a wide range of disciplines involved in climate engineering, and participatory observation in a climate engineering workshop. We argue that the field of geoengineering contains multiple and overlapping paradigms in which opposing histories, distinct presuppositions, and a wide range of visions of possible futures are being negotiated. These exchanges and negotiations are, however, unspoken and unacknowledged, and to a great extent concealed under the assumed common commitment to 'save the planet'. The early stages in the production of an institution of knowledge are fundamental to how future research unfolds; therefore, critical enquiry of geoengineering in this preliminary phase of framework negotiation is vital.

By understanding geoengineering as techno-scientific innovation, we question how this transdisciplinary landscape of diverse epistemic commitments and ontological standpoints influences which research questions are prioritised and how technologies are ultimately envisaged. For example, one of the current priorities within the geoengineering community is the need to establish a framework to help in the selection of a combination of geoengineering technologies as an ideal deployment in case of climate 'emergency'. This 'set of metrics' are understood as essential tools underpinning and enabling future decision making. Understanding these metrics as 'stabilising devices' (becoming technologies themselves) we explore the process by which geoengineering is instituted as knowledge (how heterogeneity between disciplines is accommodated and what is afforded and/or ignored by particular examples of 'stabilising' practice). Our concern is that the side-stepping of multiplicity in favour of consensus and commensurability might appear to ease stabilization but might not keep open vital questions around what kind of engineered world we collectively become responsible for designing. Instead we explore the potential for transdisciplinary incommensurability in this context to open up the imaginary and practice of geoengineering to an alternative ontological configuration with important implications for global governance and issues of accountability.

**Detecting virtual 'institutions of knowledge' in the discussion of 'DNA profiling'**

*Madsen Anders Koed (Copenhagen Business School, Denmark)*

The Internet boasts with interesting data and recently developed analytical tools enables researchers to synthesize this data and thereby track and visualize the stabilization (and possible de-stabilization) of 'institutions of knowledge' in relation to a broad range of complex problems that policy-makers face in modern societies. Complex problems are here referring to problems where different value-systems meet and this means that decisions about them must be taken under conditions of uncertainty and controversy.

This paper will present a study using 'digital methods' to track and map 'institutions of knowledge' in the online realm in relation to the complex problem of DNA profiling and the discussion about the legitimate use of the resulting information. The concept of 'the online realm' is here understood as a conglomerate of different web-spheres that can analytically be separated into *semantic spheres* (e.g. the blogosphere, the newssphere' and the tagosphere) and *intuitional spheres* (e.g. the Danish web and the web of government websites). The paper will conceptualize these different spheres as epistemological *issue-spaces* and conduct a 'cross-spherical analysis' that can yield interesting results in terms of 'controversy mapping' that allows the researcher to detect closures in the 'politics of association' online.

The research questions guiding the article are as follows:

Are there important differences in the associative patterns and framings in the different semantic and institutional web-spheres in relation to DNA profiling or are there signs of stabilization across the spheres?

If cross-spherical stabilization occurs are there then signs of especially important actors that can be located as sources of the prevailing order?

What are the relations between central stakeholders in the issue-spaces and where are official actors, such as the government, located in the visualization?

Can differences in the relations be detected over time?

The central empirical objects of study will be 'hyperlinks' and 'search engine algorithms'. These are objects that are natively digital and they can therefore be analyzed using the logic of the web itself. Hyperlinks will be analyzed using an 'issue-crawler' that performs an analysis of links going in and out from websites and an 'actor-profiler' that graphs the top ten actors of the issue-spaces. Search engines pertaining to the different web spheres will be analyzed with tools such as 'Google scraper' and 'Del.i.cious tag scraper'. The outcome of the methods will serve as a basis for visualizing the issue-spaces of the different spheres in venn-diagrams. By using the 'wayback machine' to freeze the web at different moments in time it is possible to track the stabilization (or de-stabilization) process over time and compare temporally different venn-diagrams. The answers to the research questions will lead to theoretical reflections on processes of stabilization and destabilization in relation to DNA profiling and perspectives from STS and ANT will inform the discussion ending the paper.

## **The institutionalization of new organizational forms -the case of academic spin-off processes**

*Miele Francesco (University of Trento, Italy)*

This paper intends to focus on the processes of institutionalization of new organizational forms finalized to develop innovative knowledge and ideas, considering the specific case of *academic spin-offs processes*.

In recent years many contributions, mainly coming from new-institutionalism, have focused on the intentional actions engaged by different actors to legitimize new formal organizations that are active in productive sectors with high technological and knowledge content (Powell et al, 1996, Rao et al, 2000). Another set of studies, born from the encounter of Actor Network Theory and New-institutionalism, has instead conceived the institutionalized organizational forms emerging from *action-nets* as effects which are scarcely connected to the intentions of an actor or of a group of actors (Czarniawska, 2004; Czarniawska, Hernes, 2005; Bruni, 2008). This latter set of contributions has been particularly interesting, since it didn't assume ex-ante that institutionalized organizational forms correspond to formal organizations or groups of formal organizations in relation to each other. In contrast, these studies focus on the ways in which institutions shape organizational processes, resulting in institutionalized *action-nets* involving heterogeneous actors (individuals, technologies, formal organizations and fragments of formal organizations).

With the intention to contribute to this approach in the study of institutions, in this contribution I will consider the *academic spin-off processes*, involving the creation of private business (the spin-off company) created by members of a university, with the aim of commercial exploitation of technologies, ideas and, more generally, innovative knowledge developed in academic laboratories (Mustar, Wright, Clarysse, 2008). In these processes, teams of academic researchers start their own businesses, while maintaining strong links with the university and, in the meantime, seeking both public and private clients interested in purchasing services and / or products offered.

Following the approach of the *action-nets*, I will not focus on the characteristics of formal organizations emerging from the processes of *spin-off* (Dahlstrand, 2005) or on the inter-organizational networks woven from these (Castilla, Hwang, Granovetter, 2000), but rather on the sets of actions emerging from the processes considered and on the ways in which they are produced and re-produced by different actors (e.g: researchers-entrepreneurs of spin-offs, administrative employees engaged in technology transfer, the employees of R & D business partners, technologies commonly used by human actors, etc).

In this contribution I will consider the first case of spin-off process in the University of \*, a small town in Northern-Italy. Between April and May 2010, I carry on my empirical data gathering, employing the techniques of participant observation and in-depth interviews, with the aim to track action-nets emerging from the considered process. At the time of the workshop, I will have the first results to respond to the research interests central to my research.



## Neonatal Screening of Cystic Fibrosis in France: a socio-material configuration of biomedical diagnostics and therapeutics

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Neonatal cystic fibrosis screening (CF NBS) is a subject of debate in the majority of Western countries since the Crossley discovery of an early biological marker: immunoreactive trypsinogen (IRT). The incidence rate and gravity of this illness makes it a serious candidate for a global screening programme on criteria defined by Wilson and Jungner in 1968. Despite the advances in medical treatment that has increased the life expectancy of CF patients, the absence of curative therapy and the low specificity of the biological marker used in the diagnosis largely contributed in curbing the widespread use of this screening test. Reservations were finally overcome with new advances in these two domains: with the introduction of systematic neonatal cystic fibrosis screening (CF NBS) instituted by the public health authorities since 2002, France became the first country in the world to adopt nationwide screening. Leaning on this exemplary situation, our research partnership between academic researchers and medical teams specialised in cystic fibrosis, backed up by individual interviews and focus groups in 17 CRM (Resource and Expertise Centres for Cystic Fibrosis), half the active centres in France, seeks to document and understand the process of institutionalising a socio-material configuration through an understanding of this lethal, chronic disease with a long-term trajectory. We can consider CF NBS as an innovative medical technology that has enabled the 'geneticisation' of this orphan disease in the sense that, in its recent development, it can be considered as a new institutional and scientific activity singularised and characterised by high level interplay between epistemic and material components constituting the life sciences (in the Knorr-Cetina (1999) sense of constantly evolving technoscience). In this presentation, the NBS issue-area will be represented by an *epistemic community*, that is to say, a group of actors working on shared issues, the common aim of producing provisional knowledge, and subject to observational studies and clinical trials within multi-trade, multidisciplinary entities. We will refer to (1) the genesis of an extended biomedical and therapeutic collective in the sense that a sector has been structured *via* the systematic Neonatal Cystic Fibrosis Screening (CF NBS) instituted by the government since 2002, and the creation of Resource and Expertise Centres for Cystic Fibrosis (CRCM) at national level, followed by the institutionalisation of a well-ordered global care offer covering the patient, the family and the social network. (2) The principle of NBS is highly controversial as a tolerated waiving of the regulatory requirement for informed consent in disease screening, and contested in its utility.

The problem for health professionals concerns the side-effects of mass screening, notably the unforeseeable discovery of false positives and false negatives. There equally remains the worrying

problem of 'borderline' forms of CF where the genotype is apparent but the phenotypic expression remains unknown; in other words, when the clinical manifestation of the disease will occur, its nature and seriousness. In this sense, this technology redefined and amended an area of questioning and problems and in so doing, opened the way for revising the extended community concerned by reducing certain uncertainties and through its capacity to generate new prognostic uncertainties. These interrogations indicate that although combined biochemical and genetic analyses have enabled advances in the understanding of screening and its technology, it has raised the question of whether or not to reveal the identity of CF heterozygote carriers. In identifying them, screening has permitted these individuals to exist, to represent themselves through figures and analyses and be heard through health professionals or other actors (patients, families, associations, elected representatives, media) that voice their care requirements. On the way, we noted the vigorous controversy between CF NBS supporters and opponents and heated discussions around nosology, terminology, enigmatic cases and the underlying stakes involved in CF care including diagnosis announcement, follow-up, genetic counselling and also cost.

## Mapping emerging stabilisation in genomics

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With the rise of genomics we see conspicuous changes in the landscape of medical genetics research, including the creation of large scale consortia, the use of high throughput technologies, strategic public investments, public-private relationships, large genetic databases serving as links between academic and commercial interests, and a strong public policy emphasis on knowledge valorisation.

Our research aims at understanding these developments as the evolvement of a new 'innovation regime'. An innovation regime we define as a complex of coordination rules on how to act and interact in networks of innovation and value creation. These rules are embedded in knowledge institutions, such as visions, expectations, agendas and past achievements and result in particular patterns of innovation. Networks of innovation we consider as coordinated sets of heterogeneous actors - research institutes, universities, hospital clinics, firms, regulatory bodies and patients - which participate collectively in knowledge production, appropriation, translation, and valorisation.

Based on this conceptualisation we map regime changes in the landscape of medical genetics with a specific tool designed to trace emerging stabilization. This tool is developed in the context of the sociology of expectations and positioning theory, where it serves to characterise emerging technological fields. We adapt this tool by distinguishing four modes of institutionalisation: shared visions, shared expectations, collective agendas and collaborations. This distinction reflects a scale of increasing stability. An analysis of texts produced by various kinds of actors shows how interests in particular research topics or technological opportunities are governed by these modes of institutionalisation. Time-scale analyses thus reflect emerging (de)stabilisation of such interests. We also show how actor relations are subject to the same modes of institutionalisation. In statements about possible, plausible or desirable futures, actors position both themselves and others. This happens both among and between actors of various kinds (researchers, firms, clinicians, policy makers). Time-scale analyses are also done to map the institutionalisation of actor relations. In this way, spaces for learning and probing can be characterised in terms of emerging and established research topics and technologies in the field, the kind of actors occupying innovation networks around these topics and technologies, and the institutionalisation of relations between actors in these networks.

The results of this mapping exercise are used to explain how regime changes in the medical genetics landscape amount to new patterns of knowledge production, innovation and value creation. One of the final aims is to assess the role of valorisation policies in the emergence of these patterns.

**Exploring interfaces in complex heterogeneous project networks: early-stage conceptualisation of a PhD research project**

*Papadakis Dimitrios (University of Lincoln)*

This paper aims to outline emerging issues in an early-stage PhD research project, addressing questions of problem definition, contextualisation and boundary-setting. The research context is a large and complex European initiative aimed at developing global environment monitoring services. The initiative, known as GMES (Global Monitoring for Environment and Security), is a complex configuration of concurrent and sequential research and development projects, coupled with a nascent satellite development programme. The projects are funded by the European Commission (EC) and the European Space Agency (ESA), chiefly under the auspices of the Seventh Framework Programme and the GMES Service Element, respectively. There are three major components within GMES: space data, *in-situ* (non-space) data and service development (European Commission, 2009a).

The GMES initiative fits into a broader socio-political context, being a "geo-strategic" (European Commission, 2005, p. 4) effort on the part of the European Union. Firstly, the data and information services on the environment are intended to constitute a major part of the European contribution to the Global Earth Observation System of Systems (GEOSS) – a major international effort to create an integrated system of earth observation capabilities. Secondly, GMES services can supply data in fulfilment of certain European policy requirements. Finally, it is envisaged that the services will support environmental policy-makers at European, national and local levels. A key aspect of the discourse surrounding GMES is the "user-driven" characterisation of the programme (European Commission, 2009b), that is, the effort to ensure that the information services produced correspond to the needs of these disparate user groups.

GMES is characterised by the heterogeneity and multidisciplinary of the stakeholder groups involved in its implementation. This is largely due to the scientific breadth and ambitious scope of the proposed thematic services, and the concomitant range of potential users of these services. The objectives of the projects involved in the service component are, broadly speaking, to collect and analyse user requirements and translate them into information services. The process by which an information service or product becomes crystallised from a disparate set of initial requirements through iterative cycles of development is a potentially fruitful strand of research, of interest not only to academia but also to the programme participants. Central to understanding this process are the interfaces between project and user networks (Fröbeler et al., 2007), and the constraining or enabling forces which condition these interactions (Zeuner, 1999). The dynamic and interconnected nature of the GMES networks, coupled with their dependencies on policy and institutional (EU and Member State) support means that these interfaces are in a constant state of evolution, construction and re-creation. The current status of the GMES programme is one of transition from research to operational funding (European Commission, 2009a) which makes the study of such issues both timely and relevant.

The paper examines theoretical and methodological possibilities for exploring the complex issues emerging from this programme and the networks which comprise it. Given the early conceptual stage of the research, conclusions are limited to outlining viable and potentially interesting streams of research in this area.

**How rare diseases are made: platforms as mediators between collectives and entities**

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*Dagiral Eric (Université Paris-Est – LATTS, France)*

Our contribution aims at understanding how “institutions of knowledge” rely for their emergence and stabilization on specific practices and spaces, which bridge cognitive, technical and political dimensions.

A three-year empirical study of the French “Rare Disease Platform” (2008-2010) allows us to highlight the articulation work and alignment processes (Strauss *et al.*, 1985; Fujimura, 1987) needed for the creation and circulation of those sociopolitical entities known as “rare diseases”. We show how these processes are enabled by, and enacted within, a set of sociotechnical *agencements* (Callon, 2008), which in our case gathers online databases, peer-reviewed journals, biomedical research projects, and the International Classification of Diseases (among others). These material *agencements* are crucial components in the configuration and stabilization of a set of heterogeneous and institutionally fragile collectives (French and European patient associations, research institutions, information and care services). Following Keating and Cambrosio (2003), we argue that one of the main features of this “platform” is to help produce “rare diseases” as ontological entities, and empower the various collectives in their specific areas of expertise.

This allows us to discuss some of the key processes involved in the implementation of “institutions of knowledge”, namely the reconfiguration of *infrastructures* and their related path dependency effects (Star, 1999; Bowker, 2005; Edwards *et al.*, 2007), and the situated, contingent and precarious nature of these arrangements, which succeed in maintaining themselves at the price of an unending series of *trials* (Boltanski & Thévenot, 2006). Finally, we suggest to envision heterogeneity less as a problem to be solved, and rather as an essential tension (Hackett, 2005) to be maintained in the constitution of macro-actors and institutions.

## Knowing biodiversity, performing responsible forestry

*Peltola Taru (Finnish Environment Institute)*

Following the global concern for the loss of biodiversity, data on nature values has increased tremendously during the last decades. Yet, the loss of biodiversity continues. Obviously, knowing nature better has not helped in fulfilling the conservation goals. For example, it has been reported that nature values have been secured only in 6 % of the valuable sites during loggings in Finland even though ecological knowledge forms the basis of governing forestry. Various regulatory devices including the Forest Act, the Nature Protection Act, forestry recommendations, environmental guidelines of forestry and forestry certificates aim to incorporate nature values into forestry. It is highly unclear even to researchers how scientific knowledge is utilized. According to a European survey, around 50 % of researchers as well as representatives of administration and funding bodies said that they do not know whether scientific knowledge of biodiversity has an effect on decision making.

In this paper I present insights from a study which explores the routines, techniques and institutions through which ecological knowledge is applied in forestry, one of the most threatening socio-economic practices to biodiversity. Nature values are mapped by surveys, inscribed into information systems and guidelines, taught in training courses and negotiated by various organizations at logging sites. These knowledge practices engage citizens, forest owners, forest workers and other professionals including biologists, foresters, legal advisors etc. The study is carried out as a multi-sited ethnography and ecological knowledge is traced in the various contexts it emerges: How are nature values are addressed and worked out at logging sites, offices of forest administration, legal courts? How do forest owners, forest authorities, forest companies and loggers negotiate the interpretation of ecological data? What resources (formal and informal institutions, technologies) are available and applied? What socio-material transformations take place? What debates, procedures and routines have been initiated?

Focusing on knowledge practices through which biodiversity – a profoundly abstract scientific concept – is brought into being in practical situations, I analyze how social actors capable of acting responsibly are enacted. Special attention is paid to the moments when biodiversity does not materialize and nature values cannot be secured. These moments reveal the instability of expertise; expertise is composed or decomposed through access to standardized or informal arrangements, artefacts and practices that make the technoscientific natures comprehensible and liveable to the actors. The idea of expertise embodied in the material and social environment has important consequences. First, the effectiveness of scientific knowledge is dependent on the transformations of the socio-material environment through which cognitive capacities of individuals and organisations are built. Second, and following from the first point, the socio-material arrangements can be seen as empowering elements while social actors take responsibilities for the environment. Responsible action is not a mere matter of choice; it is dependent on constraints and possibilities which determine what turns out a successful behavior. Extending the materially and socially embodied capacities through new resources and practices improves also the effectiveness of environmental policies.

**What turns a space occupied by some trees into a forest: tracking continuums between the socio-ecological practices, institutions and policies of risk reduction in Portugal**

*Serra Rita (Centre for Social Studies of the University of Coimbra, Portugal)*

*Nunes João Arriscado (Centre for Social Studies of the University of Coimbra, Portugal)*

Why is it that an orchard is not considered a forest, but a hill occupied with bushes is a forest space without trees? Who defines what counts as a forest space, and what are the concepts, networks of associations, legal and political consequences of these definitions?

The interest on this topic strays from the episodic violence of fires in Portugal that reached its zenith in the years 2003 and 2005. These crises re-opened socio-technical controversies on the management procedures and intersectoral responsibilities for the prevention and recovery of burned areas, as well the re-arrangements necessary to place them in practice. The proposals are connected with the abstract ideals of what types of forests should exist, its ecological traits and species, its landowners, management practices and its uses. We combine a socio-technical approach with environmental history to analyse empirical cases of how the separated arrangements for forest management become stabilized configurations of heterogeneous relations, and how these resist to the crises, dynamics and heterogeneity of socio-ecological spaces in the Portuguese territory. The research work is part of a project funded by the National Science and Technology Foundation, untitled "SCRAM - Crises, risk management and new socio-ecological arrangements for forests: a perspective from science and technology studies".

**The ontological emergence of the Web 2.0 and the social construction of its meaning**

*Silveira Rogério (Polytechnic Institute of Setúbal/Centre for Social Studies, University of Coimbra, Portugal)*

Focusing the question of how knowledge is created and made dominant over many possible alternatives, the paper primarily aims to understand the development of knowledge around the so-called "web 2.0" movement – the new socio-technical system emerging around the Internet. When it was first proposed, the expression did not seem to mean anything significant, but it surprisingly attracted attention and convoked plenty of diverse contributions, more or less consensual, to its definition.

The origins of the expression, the plural and diverse contributions advanced, the discussion that followed and the attempts to state a consensual meaning, raised a vigorous debate among the information and communication technical community attracted the attention of users and experts.

The spiral of incremental and radical innovation, the variety of technological elements and human actors involved present thus an opportunity to understand the (social) construction of new knowledge according to the actor-network theory (ANT).

Methodologically the paper takes benefit of the main tools that the Web 2.0 intends to cover and that, at the same time, are contributing to its development. The observation of the definitions advanced and the contributes to its refinement, as well as of the discussions/comment threads that followed it, on blogs, communities of practice, wikis, broadcasts and other collaborative virtual spaces, the revision of the bibliography produced on the topic, and the historical synthesis of the creation of the main technological tools performing that new reality enables us to reconstruct the debate involved around the Web 2.0 movement and of the process of its translation into a consensual definition – the one that started to be more often used, including by public policy organisations.

Based in an ANT approach, following the main contributions of Latour, Law and Callon, the paper tells the story of the new concept, going back to the introduction of the expression, tracing the facts, the actors, the labels, the evolution and its crystallization as a stabilised concept. The approach of the ANT seemed particularly appropriate as privileged method of analysis, given the nature of the research topic and the main principles of the ANT: the rejection of the (reductionist) existence of a separation between a macro-social system and its agents and the alternative assumption that all that exists is interaction; the postulate that all networks are heterogeneous, suggesting that any manifestation of the 'social' is an effect generated in patterned networks, composed of diverse (human and material) elements (with the same ontological status); thus, entities are created and made real in the process of complex relationships leading to order effects such as devices, agents, organizations or institutions.

One of the main results achieved by the analysis is the recognition that Web 2.0 is undoubtedly heterogeneous, constituted by actors with different functions and roles and materially diverse, appealing the participation of a wide range of artefacts (such as the cyber-infrastructure of the Internet, hardware and software, contents,...), which is given equal status and importance in the performance of this reality. It is thus not surprising that the movement of people triggered around the knowledge of this new reality is also heterogeneous.



## How craftiness is slippery, or why woodwork never stabilizes

Teasley Sarah (Royal College of Art, UK)

This paper takes the continual constitution of an academic discipline known as *mokuzai kogeï* (literally 'wood craft' or 'wood industry') within social networks in early twentieth century Japan as a case study for articulating and further understanding the process of stabilization of institutions of knowledge. Through dialectic movement between understandings of the stabilization process as theorized by Latour, Bijker and Pinch, Butler's work with iteration and the hermeneutic reading of archival sources, the paper also considers the potential for mutual contributions between micro-historical analysis, which uses the specificity of individual cases to collaboratively construct inherently complex and contradictor images of history, and stabilization as a process common to any ontologically identifiable entity.

The objectives of this paper are thus to challenge and refine our conceptualization of stabilization, and to assess the extent to which the concept can be successfully employed within historical analysis (itself a shaky category undergoing perpetual formation itself), and vice versa. A third objective is to disseminate knowledge of *mokuzai kogeï* which, while a key element itself in the formation of the industry and products we know now as 'Japanese design', has received no attention in western scholarship, and only little attention amongst historians of design and technology in Japan today.

Like other disciplines, *mokuzai kogeï*, which became identified as a category of technical education consisting of the rational design and manufacture of furniture and other wooden objects in the late 1900s, and was institutionally codified through the naming of departments and professional organizations in the late 1910s, appeared through the convergence of heterogeneous individual and collective interests, historical factors, existing practices, tools and language, and was disseminated through technologies including textbooks, classroom teaching, law, exhibitions and public lectures. This constant reiteration of *mokuzai kogeï*'s specificity and relevance demonstrates the instability of its boundaries and authority within an already crowded field of architects, builders, vernacular carpenters and western-style furniture-makers, all working with wood to create the hybrid living environment of early twentieth century Japan both materially and socially, through their presence in education.

As a profession, discipline and area of applied research located in polytechnics, *mokuzai kogeï* lived and was identified through its position below or above university-based architecture and carpentry learned through on-the-job apprenticeships. On the larger scale, the identification of *mokuzai kogeï* as an area of practice was inseparable from Japan's imperial expansion in East Asia and state concern for optimizing the economic benefits of newly-gained territory (particularly its forests and markets).

I emphasize both the media technologies through which *mokuzai kogeï* was re-iterated and the class and geopolitical issues that complicated and fuelled those iterations. I draw on primary sources including textbooks, laws, exhibition records, technical manuals, diaries, photographs and design drawings. Reading these sources as constructed objects in their own right, I conclude by discussing the power of language within social networks to determine and maintain position--the power of language as a medium, used by people, and the power that language has as an actant in the system itself.

**Validation as collective practice: the case of biodiversity recording**

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In several western countries, including the Netherlands and the United Kingdom, volunteer or amateur biodiversity recording has long historical roots, going back to the 19<sup>th</sup> century. Recent developments in (global) environmental governance have lead to an increasing demand for biodiversity data. Subsequently, volunteer biodiversity recording has taken on new meanings as a form of citizen science, or as a form of public engagement or participation in environmental governance.

The increasing policy importance of biodiversity data has triggered the professionalization of recording organizations and the centralization of biodiversity data. Also, it has triggered the emergence of standards and quality criteria and procedures for validation. This is considered crucial for the reliability of biodiversity records, especially because it is volunteers, and not certified experts, that collect the data. The increasing centralization of biodiversity data and the emergence of procedures for validation attest to the ongoing rationalization of biodiversity. This has created tensions among those involved between motivations to be in nature on the one hand and a desire to engage in science and contribute to conservation on the other.

In this paper, we zoom in more closely on these tensions by focusing on the systems of quality control and validation that are in place in biodiversity recording and the social processes by which they operate. We conceptualize validation as a collective achievement that involves social processes of translation and alignment. This means that rules, standards and procedures for validation are not adopted and implemented in a linear fashion but interpreted and enacted in recording and validation practices. Together, these practices and the connections between them can be conceived as a collective institution of knowledge.

We use material from the Netherlands and the UK including interviews and document analysis to analyze the different systems of quality control and validation that are in place, the people involved and how they connect. We will analyze how validation of biodiversity data is achieved collectively and how different meanings and purposes of validity are aligned and enacted in the collective.

Our findings demonstrate how biodiversity records undergo mutual translations when they are transcribed onto standardized forms, subjected to quality control and digitized. This process involves purification and decontextualization, but it is not just a one way street. In this paper we will show the complex interactions between recorders and validators (in many cases, individuals play both roles) and between recording and validation practices and argue that this suggests the institutionalization of a knowledge collective. Validation rules and procedures as well as how to interpret and apply them are jointly discussed leading to the alignment of meanings and interpretations throughout the collective.

## **Paradigms, policies and 'de-mechanisation'. Knowledge assemblages in coastal and river research in the Netherlands**

*Van Hemert Mieke (Rathenau Institute, the Netherlands)*

In this paper, I will contrast the formation of two knowledge assemblages, one in river research and one in coastal research, both in the Netherlands. In river research, cooperation between ecologists, geomorphologists and hydraulic engineers has resulted in an interdisciplinary model of river dynamics and a division of labour between the specialist practitioners. The model couples the dynamics of water flow, floodplain sedimentation and habitat distribution. It is supposed to represent natural river dynamics and is also presented as a strategy for the management of safe and biodiverse rivers. A primacy of safety against flooding in river management has translated into a primacy of hydraulics in the model. The growth of forests, shrubs and grassland in the floodplain is seen as conditioned by water levels and inundation frequency, and data on vegetation structure are converted into values of the hydraulic roughness parameter. The coupled model is run until the water level exceeds the design water level, which is a fixed level in Dutch river management policy. The spatial distribution of units of vegetation, ecotopes, is assumed to be constant over time, within a stretch of the river. The model is thus 'mechanistic' in its coupling of biology and physics.

In coastal research, cooperation between ecologists, geomorphologists and hydraulic engineers is evolving along various research trajectories, involving exchange and various strands of modelling. Here, ecologists operate in a different paradigm than their colleagues in river research, which has radical consequences for interdisciplinary cooperation and modelling. In coastal research, ecologists think of animals and plants as 'ecosystem engineers'. Organisms are designated 'ecosystem engeneers' when they actively shape their habitat. Mussels, cockles, worms, seagrasses, saltmarsh vegetation - animals and plants that either destabilise or stabilise the bottom of the sea or estuary - are considered ecosystem engineers. Their shaping of the habitat changes conditions for themselves and other organisms, and also changes the physical conditions: geomorphology and hydrodynamics. In river research, the agency is with the physical conditions, in coastal research, the agency is with the organisms. In coastal research, the non-linear nature of the interaction between hydrodynamics, geomorphology, plants and animals is taken into consideration without constraints being set through coastal management policy. This leads to radically new views on the role of organisms in landscape formation, questioning the long held view that physical agency shapes the landscape. Ecologists speculate about two alternative stable states, the present state being detrimental to 'constructive' ecosystem engineers like mussels and seagrasses, a former state being favourable to the constructive engineers. The state favourable to the constructive engineers, a reference state for nature restoration, also appears to be beneficial for coastal defense purposes. In this way, interdisciplinary modelling in coastal research may, like in river research, stabilise as a result of the constraints set by coastal management policy. A functional view of nature dominates in both cases, but in coastal research, 'de-mechanisation' of the world picture is visible.

## The Stabilization of New Knowledge: the case of monoclonal antibodies in the diagnosis of intestinal cancer

Veloso Luísa (CIES/ ISCTE-IUL)

Oliveira Luísa (CIES/ ISCTE-IUL)

Frutuoso João (CIES/ ISCTE-IUL)

Many sciences and technology studies refer to the impacts of inventions and discoveries on individuals and groups, and to the way they are expressed in the reconfiguration of societies. This paper takes a different perspective by focusing on the social construction and stabilization of scientific knowledge. Our starting point is the theoretical principle that the uses and, therefore, the social impacts of scientific discoveries are already contained in the objects that those discoveries produce to be used in other contexts. As Becker; Becker (1996) would say, an object is a set of frozen social relations. Applying this principle in the field of human health, the concept of *bio-objects* has been used to refer these hybrid entities that question the boundaries between human and non-human. The case of the invention that led to the discovery of a new intestinal cancer diagnoses methodology is a good example of the social construction of a *bio-object* which incorporates new knowledge and was also used to the production of further new knowledge. This bio-object is called *antibody*.

The paper proposed presents this case based on the analysis of the *life trajectory* of a research project (Kopytoff, 1999). In this research project, the above mentioned *antibodies* are able to discover molecules which identify different types of disorders associated with intestinal cancer/pre-cancer disease. This new knowledge had a great impact in the intestinal cancer diagnostic and destabilized previous knowledge on this subject. Before this invention "*Intestinal metaplasia was a well-established premalignant condition of the stomach that was characterized by mucin carbohydrate modifications defined by histochemical methods....*" The new knowledge incorporated in those antibodies as well as in the new understanding about the behaviour of human bodies in their relation with intestinal cancer, opened new scientific controversies in the field, as assumed by the scientists *enrolled* in this process, in the first Journal publication of this scientific advancement: "... *our results challenge the classical sequential pathway of intestinal metaplasia (from type I to type III via a type II intermediate step)*". This publication had a relevant impact factor in the scientific community. Following the social dynamics of this process, based on documental analysis, interviews and statical scientometrics analysis, our paper shows how this new piece of knowledge was produced, negotiated and stabilized by *enrolling* a diversity of *actants*, both H and NH. This case shows a split in the *life trajectory* of this process, through the emergency and reshaping of the technoscientific networks. It also shows that the institutionalization of scientific knowledge is highly dependent from market legitimation. Hence, to analyse the life trajectory of a research project demands to integrated it in the history and strategy of the research institution where it was developed, its actors and the scientific work organisation.

**Technologies for organising information and the implications for ways of knowing**

*Waller Vivienne (Institute for Social Research)*

This paper analyses the current challenges to the authority of the institution of knowledge that is the top-down classification scheme used to order library collections.

Throughout history, there have been numerous attempts to create a universal classification of knowledge with the classification systems used to structure the library collection the most enduring. Originally designed to be an inventory of a library's collection, an important function of the library catalogue was to map the knowledge held in the library. Like all systems of categories, the classification system used in the library catalogue supports and creates, a particular view of the world. Each system of classification of knowledge is partially a reflection of different ideas about the nature of information and knowledge, while also partially an active creator of these ideas. There is always the risk of domination by particular interests or the marginalisation of alternative views. However, what is at stake in the design of a classification system is more than just what is included or excluded, what is core or periphery. Winograd and Flores have remarked with reference to computer design that 'in designing tools we are designing ways of being' (1987:xi). The premise of this paper with reference to the design of a classification scheme, is that in designing these ways of organising knowledge, we are designing ways of knowing.

Classification systems such as the Dewey Decimal System and the Library of Congress Subject Headings are top-down ways of organizing knowledge. Materials are classified according to a predetermined scheme and using controlled vocabularies, such that there is a logical schema of relationships between different headings. New internet technologies make possible an alternative to the top-down structure of catalogues. A folksonomy is the outcome of user-tagging, whereby users label material in a way that makes sense to the user. Because cataloguing is such a resource-intensive and expensive process, the Library of Congress is considering discontinuing the cataloguing of materials using Library of Congress Subject Headings. This appears to be an example of Scott Lash's contention that we are replacing classification with ontology as a way of understanding the world. The proposal within the Library of Congress and the reality within many libraries is that the controlled vocabulary of the catalogue is being replaced with a living experience-based organisation.

This paper draws out the implications for our ways of knowing of these two alternative ways of organising knowledge, top down classifications versus folksonomies, or tagging. This paper analyses the assumptions about knowledge that are implicit within the different approaches to organizing knowledge. Drawing on empirical analyses of how people search the library catalogue and on the internet, it suggests the implications of these alternative ways of ordering knowledge for how we know things.

**STS and the formation of collectives for understanding and acting – the case of Loweswater**

*Waterton Claire (CSEC, Department of Sociology, Lancaster University, UK)*

*Tsouvalis Judith (CSEC, Department of Sociology, Lancaster University, UK)*

The paper describes a local forum currently being developed by a small upland community in the North of England together with STS researchers (the authors), geographers, ecologists and statutory and non-statutory environmental agencies. The aim of the forum has recently been debated and expressed as trying to understand the economic, ecological, and social problems thought to be connected to the occurrence of potentially toxic algal blooms in the local lake (Loweswater) and to explore the possibilities, not only of understanding, but also of acting. We trace the history of this forum, called by its members the 'Loweswater Care Project', and its development to the present day. Our experience in supporting this forum is closely connected to the track theme 'from social raw matter to the production of stabilised collectives' since the forum was initially conceived of as the 'Loweswater Knowledge Collective'. In design and principle it has drawn in particular on the ideas and insights of Latour (2004), supporting at the same time what Callon and Rabeharisoa (2007) call 'research in the wild'. It also performs as a sort of cosmo-politics in Stengers' sense (2002) as, through the Loweswater Care Project, sets of practices and knowledges are constantly re-ordered and re-organized through intra-active politics with things. Along these lines, we can characterise the Loweswater Care Project as a social/research technology through which representations of the natural and the social, and their interrelationships in relation to water quality in Loweswater lake, can be thickened up and can proliferate, forming the beginnings of future actions. We explore our role in partly facilitating this new collective, partly examining its unfolding dynamics, partly brokering relationships between different actors, partly aiming to create a forum in which all form of knowledge and expertise are encouraged as valid, without stripping the acutely felt politics of local pollution from debate.



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## **TRACK 15**

# **Socio-material Assemblages in Education**

### **Convenors:**

**Paolo Landri (National Research Council, Italy)**

**Richard Edwards (University of Stirling, UK)**

**Tara Fenwick (University of British Columbia, Canada)**

**Assunta Viteritti (University of Rome, Italy)**

## **The material enactments of identities in everyday community practices**

*Aberton Helen (University of Melbourne, Australia)*

The conceptualisation of learning is highly contested, tied in with constructions of who the learner is, what constitutes learning and where it takes place. However, lifelong learning rhetoric has extended to lifewide learning, and accordingly there is an increasing interest in learning outside formal learning contexts, both in the workplace and, to a lesser extent in the home and community. Meanwhile, some theorists recognise that embodiment, practice and performance play a constitutive role in shaping subjectivity.

My mother, with minimal formal education, spent a lifetime involved in community organisations through which she developed a sense of self and place, inspired me to investigate the learning of similar women in community organisations. Research on informal learning tends to be informed by the traditional construct of learning as an individual cognitive achievement, or with a social constructivist emphasis on the inter-relationships between ideas of identity, agency and structure. Furthermore, the assumption is made that the researchers and participants share the same understandings of 'learning', particularly with respect to the role of material objects in it. Learning theorists rarely frame these objects as having agency: they are taken to be passive recipients of human actions and intentions. I needed to find a way in which to focus on the learning and identity formation of women who did not self-identify as learners. Furthermore, my mother's life was materially complex. Her activities and participation in community organisations always involved preparing food and organising meetings, with attention given to various material objects and practices (e.g. minute books, invitations, guest speakers, places and spaces). Helping run community organisations involved, 'a mixing up' (Murdoch, 2003) of things and people in processes. Accordingly, I turned to the actor network theory (ANT) way of inquiring into the associations which link collectives of things and humans in action and began to focus up material enactments of identities ('learner' identities and otherwise).

In this paper I will outline my doctoral research (in-process) which focuses on women's informal learning in voluntary community organisations in an Australian rural district. Adopting a practice-based, socio-material approach, the practices are the units of analysis, not individual people. Selected empirical data will be examined to show how material enactments of identities make instances of learning (often too mundane to be articulated by the learners themselves) visible in different, complex, multiple and possibly unexpected ways. The data also demonstrate how the material enactments of identities are entangled with learning and how this entanglement is the emergent outcome of the collective work of people, processes and things. Although, in this study, adult identity formation and learning take place without formal or institutionalised pedagogical interventions, current understandings of knowing and learning in formal and workplace education practices and research could be extended by adopting a sensitivity to the material enactment of identities. This approach challenges the established individualised psychological perspective of 'learner' identities and universal representations of prior realities. Additionally, there is the possibility of making visible, as well as paying attention to, forms of power that otherwise may not be recognised in educational or related practices e.g. policy – making and the rhetoric of lifelong learning.



## **The Social Embeddedness of Mobile Learning: Case studies of learning using mobile technology devices in Japanese higher education**

*Akiko Hemmi (The University of Edinburgh, UK)*

Mobile devices have become increasingly significant platforms for delivering e-learning. It has been recognised in projects developing mobile learning (for example the EU IST funded MOBlearn project which linked industries and higher education institutions from across the EU and the US, Israel and Australia) that the successful implementation of mobile learning requires context-awareness because socio-technical and socio-cognitive elements interplay with the process of learning (Taylor *et al.* 2006). This paper looks at the Japanese experience of the use of mobile technologies for teaching and learning in higher education to explore how mobile learning has been shaped by the institutional context of Japanese education and the widespread use of mobile devices.

There have been Japanese initiatives to develop mobile learning within the government's strategy of uJapan ("ubiquitous Japan") and as an extension of its eJapan strategy, developed in the late 1990s to realise the vision of the Japanese information society. UJapan aimed to facilitate collaboration between the mobile telecommunication industries, software companies and higher education as well as workplaces. The Ubiquitous Learning Consortium (ULC), established in 2005, has been taking a lead in linking different sectors to promote extensive use of mobile learning practices. The take-up of mobile learning in Japan has been helped by the early adoption of 3G mobile phones, creating a cohort of learners with devices capable of supporting mobile learning applications. In this environment, mobile learning in Japan is now widely adopted in various institutional settings by a wide range of age groups, from school education to training and lifelong learning.

The paper will highlight the socio-cultural embeddedness of mobile learning practices at university using two case examples which include: 1) mobile learning using mobile phones as a part of on-campus learning at one Japanese university; 2) mobile learning using hand-held game-consoles in Japan as a part of exchange programme with the UK. As a theoretical resource, it takes a 'social shaping of technology' approach (MacKenzie and Wajcman, 1985; Sørensen and Williams, 2002), which sees the use of technology in the context of social, political and cultural negotiations among various actors and groups in the context of wider structural influences. Using this approach, the paper identifies how local social conditions are moulding the domestication of mobile learning, shaped by students, academics and the affordances of mobile devices. By doing so, the paper aims to broaden and sharpen our understanding of how mobile learning is developing and being appropriated by users for the benefits it is perceived to bring.

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## **Studying learning across sites: tracing inscriptions**

*Arnseth Hans Christian (Department of Educational Research, University of Oslo, Norway)*

In my research I am currently exploring learning in and between school, home and other sites (Silseth & Arnseth, forthcoming). How are knowledge or learner identities gained in informal settings taken into formal settings, and how is it negotiated and responded to in this setting, and vice versa, how are they taken up, negotiated or recruited into informal discourses. The general issue I am interested in concerns what happens when inscriptions of knowledge and identities travel between settings? What are the consequences for pupils learning trajectories in formal and informal settings?

In this paper I will explore how actor network theory and ethnomethodology can provide analytical tools for analysing how representations of self and knowledge traverse sites and become recruited into networks that connect materials and signs, networks that impact on pupils participation in settings where learning occurs or is supposed to occur. Drawing on these theories can enable us to overcome some of the problems with more socio-cultural approaches to learning, namely issues of transfer and how constructions of persons and knowledge travel between different situations including how participants in various practices take up, negotiate and manage their implications. ANT offer tools for understanding inscriptions and their relative agency when they become part of or go against particular networks or practices. A theoretical starting point is that the nature and functions of discursive and non-discursive constructions of learners and their knowing emerge through complex dialogical negotiations between persons and environments, and human and non-human actors. Packer (2001) has argued that in sociocultural theorizing of learning and transfer, there is a risk of “dissolving the person into whatever community of practice, whatever language game, they happen to be a member of” (p. 501). Focusing on how constructions of persons identities and knowing are inscribed into tools or encoded in language and taken up in other settings, enable us to address issues to do with what becomes of the person in sociocultural theorizing about learning and identity work (Roth, 1998).

In a recent article I and a colleague have emphasised that focusing on narratives, categories and inscriptions can be useful analytic tools for understanding identity construction across sites (Silseth & Arnseth, forthcoming). Here we have been particularly concerned with constructions of “identities as learners”. How are students described and constructed as competent, or the opposite, in various situations and what are the consequences for their participation trajectories. In this paper I want to push this argument a bit further in the sense that I am interested in focusing more on networks, that is, on how non-human actors in the form of pedagogical ideas, practices and strategies become part of actor-networks where transfer across sites also can become part of a normative pedagogical ideology. That is to say, as part of pedagogical practices teachers should actively draw on and make use of students everyday experiences and use this as a resource for learning in school. To scrutinize how these connections are established, maintained or broken have important consequences for pupils participation in the actor-network of schooling and beyond. I will

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develop my argument by focusing on a case where a computer game is utilised for science instruction.

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## **Mapping Genomic Experiences: a Topology of Individual Decisions**

*Brüninghaus Anne (University of Hamburg: Research Center for Biotechnology, Society and the Environment - BIOGUM)*

Through offering new analytical tools in health care about the individuals' future, Genomics have noticeably changed social life. This paper investigates how individual experiences can be mapped in form of a topology to reconstruct decision-making for predictive genetic testing for hereditary diseases. A network of experiences is proposed to help answer how individuals deal with the possibility for predictive knowledge about one's genetic constitution. Based on empirical data, this study underlines that these decisions must be understood as collections of step-by-step decisions that do not take place in a linear sequence.

Previous studies have focused on the impact of test results on individuals and their social context (the psycho-social perspective), or how test results are interpreted and understood (the psycho-social perspective). The test and the decision for the test have thus been seen as a single step for the individual. As a study by Scully, Porz & Rehmann-Sutter (2007) underlines, however, many small steps („micro-decisions“) are necessary to come to a decision about undergoing a genetic test or not.

The step-by-step decisions are linear in time, yet they contain many logical jumps and back-references. It is thus essential to understand this network of decision steps as a topology (Waldenfels, Deleuze, Guattari), mapping personal experiences and social relationships. In this topology, every step is based on some previous experiences made by the client. Only this back reference then enables her to cope with the challenging situation successfully. Therefore, the client engrafts experiences with the social, e.g. steps of his and others' experiences, into his own personal network. When one of these steps is changed by new knowledge and interpreted in a different way, the step-by-step decisions can change direction and modify the whole topology concerning both social embedment and self-perception.

The presented model is supported by an empirical analysis of fifteen biographical interviews with potential Huntington's and BRCA clients. The analysis follows a biographical perspective (Schütze) to identify critical experiences in the clients' recollected memories that are significant for the decisions. Thus, for each individual, a network of verified experiences is created that clarifies the retrospective changes in interpretation and their consequences for the development of a decision for or against a genetic test. Results demonstrate that decision processes vary widely, and that different types of decision processes can be discerned.

**Comparing cultures within established and emerging sciences: the interrogation of educational contexts as sites of disciplinary formation**

*Bulpin Kate J. (University of Sheffield, UK)*

*Susan Molyneux-Hodgson (University of Sheffield, UK)*

Ethnographies of scientific research produced within the field of science and technology studies have pushed beyond normative conceptions of disciplines to highlight the heterogeneity, multiplicity and fluidity of knowledge production practices, and consequently have challenged the arbitrariness and rigidity which accompanies notions of disciplinarity (e.g. Knorr Cetina, 1999; Fujimura, 1992; Latour and Woolgar, 1986). Yet, although these studies go some way to erode the significance of 'disciplines' in understanding the culture and practice of science, the presence of institutionalised disciplinary divisions, particularly in relation to education, cannot be ignored. For example, the scientists populating these accounts of "epistemic cultures" (Knorr Cetina, 1999) are carrying biographical baggage that will be marked by the disciplinary differentiation present within their educational training. Historical studies of science have also argued that it is the institutionalisation of a university degree course that often signals the birth of a new discipline. Moreover, the very origins of the term 'discipline' are derived from the Latin *discipulus* (pupil) and *disciplina* (teaching) (Krishnan, 2009), firmly situating questions of disciplinarity within the context of educational practice. In this way, the pedagogical sites of university education provide a specific locality in which to explore the construction, stabilisation and reproduction of disciplinary practice and how this relates to the research culture unfolding beyond these specifically educational settings.

When focusing on the educational practices of established disciplines e.g. electronic engineering we can investigate the ways in which the fluidity, fragmentation and disunity of scientific knowledge production is made visible (or not) in the processes of (re)producing disciplinary practice through the education and identification of the next generation of researchers (Hodgson, 2006).

In comparison, promissory disciplines, such as synthetic biology, are beginning to emerge in educational contexts with their norms, goals and boundaries still explicitly open and negotiable (e.g. see O'Malley *et al.*, 2007). This moment then, may provide a window into the processes of disciplinary enculturation through educational practices which are 'black-boxed' in more established disciplines.

Drawing on completed and upcoming empirical work we will compare what is possible, conceptually and methodologically, when studying educational locations of established and emerging sciences as sites of discipline building.

## **Cyborg and learning on line: a case study**

*Capogna Stefania (Università degli Studi di Roma Tor Vergata)*

With the *post-industrial society*, variously defined by some observers *risk society* (Beck, 2000) *late-modern societies* (Giddens, 1990) *post-industrial society* (Touraine, 1998), there is a redefinition of living spaces, social flows and division of labor. New social actor is, according to Levy (2005), the *cyborg*, who moves with ease into the new space-time determined by the advent of Internet; dimension where time is timeless (Castells, 2001). The Web becomes for this subject a new social life space, where everything is present with others. The advent of network has led to a radical change of social processes and relationships.

The proposed paper analyzes the way in which new technology embodied in their use new teaching practices, in order to delineate experimentation and innovation areas. Even more interesting is the use of social networks for educational purposes and work and the way technological and social dimensions intertwine in virtual spaces resulting in innovative practices.

The field of investigation has identified by the experience sponsored by Garamond that offers a range of advanced technological tools for educational systems (schools and universities), and which has promoted refresher courses for teachers and education experts conveyed only through the use of social networks and e.learning platform.

This work is characterized as a work in progress that aims to return the latest trends in use of these tools applied to teaching, and at the same time, emerging professional practices and experiences more interesting to look into the interests of study and critical reflection.

The results of which will render account to describe:

- variety of instruments used and applied to teaching, according to the experience reported here;
- multiplicity of perspectives and ambivalences that emerge in the encounter between social and technological dimensions;
- process of incorporation of new technology in teaching and social practices;
- reflective approach that guides these innovators within educational.

The goal that guides the research is a reconstruction of educational uses of new communicative technologies (and experienced by the subjects), with emphasis on the social network (example: FaceBook, Blogs) in order to describe trends in a social move to use these tools.

The work aims to analyse the innovative trends through our educational systems in the face of new communication technologies. We use a qualitative methodology through participant observation and in-depth interviews with these selected witnesses, in order to provide a more accurate description as this kind of "immersive" reality that changes the way people access, build and share knowledge, and at the same time, the very manner in which people relate and communicate.

## **Educational Policy and Teacher Training Reform: on Black Boxing and Stabilisation Mechanisms**

*Ceulemans Carlijne*

*Struyf Elke*

*Simons Maarten*

During the last two decades education turned out to be one of the central interests of national governments. Education is seen as an important lever for not only the social, cultural and economic development of a country, but also for the personal and professional development of its population (e.g. Vandenberghe, 2004). Therefore, educational quality, and more specific teacher quality, have become significant policy issues (e.g. Masschelein & Simons, 2008; Furlong, Cochran-Smith & Brennan, 2009). This striving of policy makers to further educational quality is being translated in several steering mechanisms (e.g. Kelchtermans, 2004), such as the articulation of the professional profile and basic competences of the teacher in the new Decree (2007) on teacher education in Flanders, Belgium. The Decree and the regulations that go with it explicitly present the 'professional profile' as an ideal, a standard and a frame of reference for teachers, schools and teacher trainers (Department of Education, 2008). Additionally, the evident use of the professional profile in educational policy and teacher training seems to indicate that a kind of black-boxing and stabilization have taken place; issues related to ownership, background, interests and time and space seem to be moved to the background and become invisible. As a consequence, the discussion about 'good education' and 'good teachers' is to a large extent a discussion within the framework of the professional profile and basic competencies.

Drawing on actor-network-theory (ANT), our contribution treats the above as a "process of naming, signifying and performing" (Usher & Edwards, 2007:109) through which the professional profile is being inscribed in reality as a single scale of meaning. In line with Latour (2005), Law (2007) and Callon (2005), our analysis is an empirical case-study that explores the 'actants' involved in the assemblage of the professional profile into a network of ordered practices and interactions. As a starting point, we take the information brochure published by the Department of Education (2008) that introduces the new Decree on teacher education to a large public. As an 'inscription device' that mediates between policy makers, teacher trainers and students, the brochure offers traces of the circulation of meaning (Latour, 1999), of practices of identification, and of stabilization mechanisms. By following these traces, this contribution presents practices of translation and obligatory points of passage specific to the context of teacher training, (including texts, procedures, persons, techniques,...) presenting the professional profile as an irreversible 'matter of fact'.

Our analysis, consequently, aims at destabilization; it wants to short-circuit the enactment of the professional profile by tracing the components of and the relations in the assemblage. Moreover, registering the network that makes a state of affairs into a 'matter of fact' opens the possibility to look at it in a different way. In line with ANT, the (critical) function of this study is not to debunk the coming into being of the professional profile but to present it as a 'matter of concern': as a matter that is being disputed and open to doubt and which, therefore, claims our attention.

## **Technology-mediated mathematics teaching: digital interactions, tool-use and identity-work**

*Chronaki Anna (University of Thessaly, Volos, Greece)*

The entry of technological artifacts into modern life raises new questions not only about the relationships between people and machines, but also about how individuals change or transform life-trajectories. The artifact named 'computer' is changing our conceptions of mind and self. Tool-use and identity-work are amongst the key issues of concern for some researchers both in the field of social studies in technology and education (including mathematics education). However, still much work needs to be done concerning, a) the interplay amongst tool-use and identity-work, and b) the significance of theorizing this relation in the course of human and digital interactions.

In order to address the above, the methodology employed in this study has abandoned a conception of mathematical knowledge and of technology-use as discovered through mainly the active cognitive efforts of an individual learner. Such a methodological stance can only serve to pathologise certain categories of teachers, student-teachers and children as being incapable of entering school mathematics or using efficiently technology tools. In contrast, technology and mathematics are seen as discursive constructs used by human beings to communicate about either abstract (imagined) or concrete, real life situations. This assumption means that mathematics and technology can no longer be seen as entities 'out there', primary to, and independent of human discourse, but they are rather a by-product of the individual's discursive growth. This view is strongly linked to the socio-cultural strand based on the assumption that *'there is no physical relation for any infant which is not always and already social'* (Walkerdine, 1988, p. 16). It espouses Vygotsky's view of the development of scientific concepts as part of interaction with 'more knowledgeable others' and as mediated by 'cultural tools' (both conceptual and material tools). But it also goes beyond this view by locating the social actors and the cultural tools within discursive social practices (see Haraway, 1997, 2004). In doing so, it gives salience to values and to the social-value facet of mediation.

The social-value facet of mediation is also strongly linked with identity-work. Back in 1976, Luria argued that learning is a long process that involves not only competencies but also the formation and transformation of identities. And more recently, Walkerdine (1988) has pointed out that the mastery of mathematics involves the construction of subjective positions within the mathematical discourse. Based on previous research (see Chronaki, submitted), the present study, analyses the experiences of student-teachers and their interaction with children as they produce knowledge of how to teach and/or learn mathematics by means of technology based artifacts (e.g. robots, dynamic geometry software etc). Data collection and analysis is based on ethnographical case studies of student-teachers interacting with children (as part of their teaching practice) using technology to teach/learn about mathematical ideas. A small number of case studies will be analyzed in depth, focusing in particular episodes as they exemplify the complex relation amongst tool-use and identity-work.



## **The virtual in the university and the university in the virtual? A socio-technological perspective on academic practice**

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*Masschelein Jan (KULeuven, Belgium)*

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Current discourses on globalisation and Europeanization, and the related focus on the emergence of a 'knowledge society', stress the profound changes European universities are facing. Multifarious communities of researchers have explored how the internal and external organisation of universities has changed over the last decades. Following patterns of change, though, often recur in the literature: (private) entrepreneurship displaces classic (public) academic virtues, de-localised flexible networks come in place of geographically stable settings and information and communication technologies inaugurate a virtual academic reality, hence constituting virtual, entrepreneurial, network universities (from now on 'VEN-universities') (e.g. Ball, 2003; Clark, 1998; Kwiek, 2009; Robins & Webster, 2002).

This contribution builds on a socio-technical approach that offers, in line with actor-network theory (ANT), the opportunity to investigate changes in academic life from a particular perspective that seems to be obvious for the field of education, but whose use is only beginning (Usher & Edwards, 2007). The general purpose of the contribution is twofold: 1) elaborating and testing to what extent VEN-universities actually manifest themselves (or, in ANT terms, are being assembled) in the concrete practice of academics and 2) contributing to the research field regarding changing universities.

Building on ANT, the contribution starts with an outline of the socio-technological approach adopted. At the core of this approach lays the conception that in order to study emerging assemblages of VEN-universities, and contrary to most of the literature outlined above, one needs to study the interplay of specific human actions and non-human devices in their material/immaterial environment (Latour, 1987; 2005; Law, 2004). Hence, this approach allows for the analysis of how 'being-an-academic' and 'technological devices' are shaped mutually in the concrete assemblage of academic practices. Given the central role of the computer in processes of VEN, and the close intertwinement between technology and being an academic today (Peters, 2006), investigating computer-usage enables to disentangle the assemblage of concrete academic practices. More particularly, we investigated specifically *to what extent and how are characteristics of VEN-universities intervening and enacted in computer-usage of one academic (and vice versa)?*

This approach demanded specific methodological guidelines such as a high sensitivity for technology-use, contextual differences and particularities (Law, 1992). Therefore, we developed a heuristic framework, loosely drawing on ANT, that distinguishes between 'institutional context' (as a centre of calculation), 'academic roles' (of a human actor), 'device features' (as a non-human actor) and 'computer activity' (as producing inscriptions of a particular kind). During a period of seven days, one academic's computer activity was monitored according to the dimensions of the heuristic framework (qualitative-interpretative case-study research). Based on this case-study research and thick description, results will be presented in the paper, in which we will investigate to what extent and how entrepreneurship, virtualisation and network-formation are actually taking place in the concrete life of academics.

### **The hidden curriculum of codes: it's a semantic question.**

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*Carmichael Patrick (Liverpool John Moores University, UK)*

There is a long tradition in educational studies of examination of the hidden curriculum, those elements which are implicit or tacit to the formal goals of education. This paper attempts to draw upon that tradition to open up for investigation the hidden curriculum and assumptions about learners and learning that are embedded in the coding undertaken to facilitate learning through information technologies. In particular, drawing upon an empirical study of pedagogy in higher education that is being supported innovations involving 'semantic web' technologies, we examine the ways in which code becomes an actor in both enabling and constraining knowledge, reasoning and representation.

The semantic web requires the translation of heterogeneous data from multiple sources into a certain form - typically 'triples': subject, predicate, object, – in order that it can then be translated into applications for use in pedagogic practices. This can be approached as simply a technical issue, a further extension of the processes of standardisation through which both coordination of data and its mobility are extended. According to this view, semantic technologies provide a 'lingua franca' to draw heterogeneous data into the classroom, but the nature, possibilities and limitations of the translations entailed become important for educators to engage with explicitly.

The practices of coding (including the structuring and conversion of data, programming 'logic' and the design of user interfaces) entail ways of articulating problems and also provide a space within which the problems are formed, approached and resolved. In the process of coding therefore are important negotiations and translations of how knowledge can and should be represented for pedagogic purposes.. A further aspect of semantic technologies is the opportunity this new uniformity offers for 'reasoning' across data from different sources; this too is both enabled and constrained by decisions enacted in code.

A further issue emerges due to the use of live data in semantic technologies, as the predefined categories that inform text-book representations of issues can be overtaken by events and their representations. Semantic technologies therefore have the potential to pose, as well as answer, problems. Therefore, while the coding can appear to standardise representation and pedagogy, it also has the ability to engender turbulence, by the dynamic representations it can set in play in the classroom. However, this depends on the data that are brought into play, the reasoning that leads to their selection and representation, and an explicit pedagogic understanding (on the part of both teachers and learners) of what is possible and impossible, trustworthy and questionable, static and changing, given the technologies and their hidden coding.

We want to suggest that in the naturalisation of semantic coding we inscribe particular possibilities for knowledge with important implications for education that can become an embedded part of the hidden curriculum. By examining the practices and effects of coding we open up for discussion aspects of developments in education that are often overlooked or left in the hands of computing scientists and information technologists and instructional designers that should also be the concern of pedagogues. The case is made for the importance for an educational discourse about the 'hidden hands' behind educational technologies and the need for inter-disciplinary teams to negotiate possibilities and limits in relation to explicit pedagogical goals.

## Metropolitan Academic Space

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*Fornari Rita (University of Rome, La Sapienza, Italy)*

The aim of this paper is to reconstruct the the concept of “academic spaces”. The intent is to demarcate the area activated by the university in terms of flows of knowledge, technology, learning, consumption. The idea is to examine the macro changes taking into account to redefine the traditional regulative model of University (Clark, 1983; Carnoy, Castells, 2001). Above all, starting from these changes, our analytic interest is directed to understand the role played by universities in metropolitan areas through the action of their professors / researchers.

In traditional models (Clark, 1983; Becher, Kogan, 1992; Kogan, Hanney, 2000; Benadusi, 1993; Capano, 1998), the form of regulation that was the basis of the interpretation of the higher education system focuses predominantly on one of three poles or sources of authority: the state, the academic oligarchy and the market. The interaction between these three poles must be reinterpreted through an analysis of the transformations of the concept of knowledge. In this view, at least, two questions arise.

The first, discussed in the article by Carnoy and Castells (2001), is the erosion of state power nation in the production of knowledge. If Poulantzas (1974, 1978) claimed a monopoly of knowledge by the Scientist State, through its institutions, for the two authors, globalization and economic infrastructure that characterize (networks of computer systems, telecommunications, transport systems, advanced technologies to process information), will mean to put beyond the control of the nation state the production and the power of knowledge.

The second question concerns the model of knowledge production and especially the criticism addressed to it by Science and Technology Studies (STS): the idea that knowledge is de-contextualized, a "black box" delivered from university to industry (Croissant, Smith-Doerr, 2008). On the contrary, according to STS point of view, knowledge must be considered as "construction," tacit, tied to the need of infrastructure, fundamentally embedded in social contexts and centered on relations between actors and artefacts.

Within these two scenarios, the university as an agency of knowledge reacts much more in terms of practices than in terms of rhetoric, establishing itself as a kind of “metropolitan hive”, within which old and new value extraction coexist able to speak the language of syncretism.

The case study consist in the analysis of the Sapienza University of Rome.

The research question is precisely how the university is able to activate “areas of exception”, special areas where they are able to enact flows of heterogeneous knowledge and culture.

Therefore the aim is to look at the university not as a producer of knowledge coded and immediately measurable, but as a producer of knowledge that is relational, social, contextual, linguistic and increasingly related to a redefinition of the work that emphasizes its communicative and interpretive elements (Butera et al., 2008).

In this paper intend to present:

- a conceptualization of University starting from the centrality of globalization and the emerging concept of knowledge interlaced with culture.

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- a conceptualization of University as "academic space" mapping the flows of knowledge, technology, learning, consumption and culture enabled by the institution or crossing it.

the results of two research actions. The first focused on the concept of knowledge emerging from the analysis of 50 qualitative interviews administered to researchers belonging to 4 disciplinary fields. The second, on the analysis of the evaluation Report where Sapienza departments have recently been classified.

## Tracing Standards in Education: Uncertain Objects and Multiple Enactments

*Fenwick Tara (University of Stirling, UK)*

In many systems, the governing of education is attempted through the circulation of objects across times and spaces. These objects inscribe standards through which to evaluate individual, organisational and systemic performance. The purpose of standards is to achieve orderings of practice at a distance. Standards aspire to ensure consistency and comparability in the everyday conduct that occurs at diverse locations in which a whole constellation of relations meet and weave together. In education, standards are achieving growing importance alongside growing concerns about system accountability and national coordination. Standards also enable social and regional mobility, for example by allowing students to move from one location to another by proving that their credentials 'match' the pre-established benchmarks. For any standard of practice to be 'mobile, durable and capable of inciting action at a distance' the idea must 'have the form of a trace, an inscription, a representation' (Bowers 1992: 117).

In direct opposition to discourses of standardization as control, actor-network theory (ANT) treats standards as contested and precarious multiplicities which order practices, bodies and identities through complex enactments. The key point is multiplicity – not just multiple views, but enacting multiple worlds – multiple simultaneous ontologies, as analysts have argued working with ANT resources (Law, 2004b; Mol, 2002; Moser, 2008). Further, and most important, a network in ANT *does not connect things that already exist, but actually configures ontologies*. When exploring the multiple enactments that comprise any one object such as a standard for practice, ANT provokes questions about the politics that constrain, obscure, or enable certain enactments to be most easily performed and recognized, and why.

Further, multiple heterogeneous possibilities remain embedded *within* the translations of such objects. The possibilities emerge as different actors are introduced into practices of standards use, as different material limitations and cultural expectations contribute to and resist the ideas contained within written standards, and as one set of written standards collaborates with other forms of standards at play in any region of educational practice. Heterogeneity is therefore contained within the standards themselves, revealing the *uncertainty of standards* as both rhetorical positionings and as a basis for governing educational activity (Fenwick, 2010).

There are as yet relatively few published studies employing ANT to examine educational standards. However, available studies indicate clear points for ANT's analytic utility. First, ANT-inspired studies accept the centrality of artifacts. Thus they can trace the negotiations and performances through which educational standards achieve and maintain some durable form as a consequence of the socio-material relations in which they are located and performed (e.g. see Gorur, forthcoming 2010; Nespor 2002). Second, ANT analyses can reconfigure the terms and assumptions involved in considering educational standards. Such analyses signal rifts and disjunctures in prescriptions of educational standards and so-called implementations (e.g. see Edwards, 2009; Mulcahy, 1999, 2007). These rifts open new

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possibilities, and recognize important ambivalences, oscillations, and transgressive enactments that are all contained within standards in practice.

This paper shows the ambivalences and contradictions as well as the possibilities that can be illuminated by ANT analysis of standards as networks. The discussion outlines the diverse network conceptions, considerations and sensibilities afforded by ANT approaches. Then it shows four phenomena that have been highlighted by ANT studies of educational standards: ordering (and rupturing) practice through 'immutable mobiles', local universality, tensions among networks of prescription and networks of negotiation, and different co-existing ontological forms of the same standards. The conclusion suggests starting points, drawing from these ANT-inspired network analyses, for examining processes associated with educational standards.

## **‘Solid Evidence’? The Civic Epistemologies of Quantification in Education Policy**

*Gorur Radhika (University of Melbourne, Australia)*

Since the 1990s, education policies have been increasingly presented as ‘evidence based policy’ (EBP). The hopes placed on EBP are epitomised by Slavin:

*With a robust research and development enterprise and government policies demanding solid evidence of effectiveness behind programs and practices in our schools, we could see genuine, generational progress instead of the usual pendulum swings of opinion and fashion. (Slavin, 2002, p. 20)*

But what counts as ‘solid evidence’? Blunkett’s words sum up a general trend:

*We're not interested in worthless correlations based on small samples from which it is impossible to draw generalisable conclusions. We welcome studies which combine large scale, quantitative information on effect sizes which allow us to generalise, with in-depth case studies which provide insights into how processes work. (Blunkett, 2000)*

Statistical data, comparative analysis and quantification in general have come to be seen as reliable evidence, as distinct from small-scale, qualitative, contextualised studies. National and international data using large scale surveys are daily generating data to inform policies. Quantification has become a self-evident feature of the type of evidence that can reliably inform policy, and EBP has become a self-evident form of policy-making.

Understanding EBP performatively, this historical investigation examines the socio-material arrangements that have effected the changing patterns of the production and consumption of statistical data in education on a global scale. It argues that although EBP is presented as a recent phenomenon, civic epistemologies of quantification (Miller, 2005) have been a feature in education since the 18<sup>th</sup> Century, and was immensely scaled-up after WWII. It examines how the colossal investments made over the decades have developed and deployed technologies of quantification, and how large-scale surveys and international education indicators have been re-mapping the world and rearranging political thought and action. It traces how metaphors of global progress have created a collective imaginary that requires, and is reified through, specific sets of routines and practices (cf Appadurai, 1996), and how these routines and practices present EBP as a self-evident form of good policy-making.

Shapin asserts that ‘we *can* write about the past to find out about how it came to be that we live as we do now’ (Shapin, 2008, p. xiii, his emphasis). By presenting EBP as an effect of sociomaterial arrangements that needs an elaborate infrastructure to maintain it, this paper hopes to open up closed-off debates and to introduce new elements to complexify currently simplistic debates surrounding EBP.

## **Creating opportunities to reconnect marginalised youth to learning by reassembling local discourses of schooling and community engagement**

*Hayes Deb (The University of Sydney, Australia)*

A youth centre in inner Sydney has provided a learning program for marginalised youth since 2004. In early 2009, after a period in which the program was forced to close because of lack of funding, a broad coalition of youth workers, volunteers, academics, community workers and local school leaders came together to lobby for a sustainable long-term funding solution. Later that year, a new program commenced with the aim of reconnecting young people to successful learning experiences that may lead back to formal schooling, a traineeship or apprenticeship, employment, or university. Fourteen young people not attending school, work or any other form of training enrolled in the project. Built into the funding criteria was an expectation that the coalition of stakeholders would continue to support the program.

The diverse group of partners who made up the coalition were faced with the challenge of assembling a novel learning program in the attic of the youth service. This required finding new ways of working together and docking different organisational processes around a set of shared concerns related to marginalised youth and their families. The purpose of this paper is to trace the efforts of the organisations, institutions and people involved to construct a network of aligned interests around this very specific, complex and challenging set of concerns. The working out of governance and procedures is outlined, as well as the mobilisation of intermediaries at various interfaces within the program and external to it.

A range of alternatives pathways exist for young people for whom mainstream schooling is not working. Some programs seek to change young people by compensating for a perceived lack of knowledge, skills, or 'proper' behaviour thereby facilitating re-engagement in a mainstream setting. Others attempt to change the curriculum and/or provide a different pedagogical approach intended to better meet the needs of young people, and thus enable them to learn and gain educational qualifications. The newly funded learning program at the centre of this discussion was an attempt at the latter while recognising the importance of developing new habits in young people whose stories reveal persistent hardships including problematic drug use and periods of depression and homelessness.

This paper focuses on how the new learning program also demanded new habits in partners, restructured relationships and the development of collective practices. This reassembling of local discourses largely took place in an in-between space that established itself within and alongside existing local circuits of schooling and of community engagement. This paper attempts to describe the procedures and practices that made it possible for the members of the coalition to negotiate their ways through one another's world-building activities.



## **Mind the gap: values in socio-material environments and educational regimes**

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*Olsen Poul Bitsch (CBIT, Roskilde Universitet, Denmark)*

In this paper we compare ways of materializing methodology of learning at two different universities. One of our sites of materialization is the basic studies program for social science and business studies students at a new university. The other site is the integrative methods course for communication studies students in a traditional university. Both business studies and communication draw on social science and have, to some extent an applied, focus

We use understandings of the construction of inspirational, civic, domestic and industrial regimes (Boltanski & Thevenot 2006, Boltansky & Chiapello 2005) and materiality (Law 1992, Suchman 2005) as organizing concepts. Different approaches to organizing education and how it may influence academic education are constituted as interlocked relations between the institutionalized formulations of academic values and the 'in practice' consequences of going through the education. Various coherencies and incoherencies appear.

We compare our two sites in terms of the underlying academic values that are propagated, as well as in the spatial and temporal materialities through which these values are enacted, as different roles of the various participants in methodological learning: students, teachers, teaching assistants or coaches, etc.; physical and spatial arrangements; technologies; time frame; cycles. In University A, project based work and "houses" are the cornerstones of the educational process. Knowledge is produced in relation to need and relevance, and academic practices are learned on the basis of academic standards and trusting organizing processes. In contrast, in University B academia is learned as a culture with norms, theories and sanctions that reproduce the knowledge and values of the culture through courses and control. In some respects, our sites are similar as courses are presented, preparation by the use of literature is significant in both environments. In other areas, however, these are major differences such as students' responsibility for learning, the construction of care and recognition of the students (Noddings 2007), the relations between students and between students and researchers and teachers, the meaning of 'report' and the way practical relevance of knowing is institutionalized.

We follow the construction of situations in education of methodology in both systems to describe how values emerge during the education and how it appears in the organizing process. We see the education as a continuous inclusion into an academic practice, in this case expressed as academic discourse and situations that structures the educational regime. In addition, we reflect on how researchers cope with the different types of regime they participate in. We observe how activities of compromise are carried out by the participants.

Finally, we discuss the role of materialities in framing knowledge practices (Law 1987, 1992, Star 1989, Suchman 2005). Law (1987) uses the term *heterogeneous engineering* to describe the alignment of groups of actors, objects and practices which allow the stabilisation of configurations and the reproduction of organizational patterns. Suchman (2005) points to the role of affiliative objects in engendering alignment and commitment. We illustrate how the material assemblages in evidence are both reflective and constitutive of educational values.

## ICT Experiments in Norwegian Educational Research

*Hetland Per (InterMedia, University of Oslo, Norway)*

In this paper, the author focuses on some of the interactive aspects in the process of shaping technology. The analysis takes as its starting point two important characteristics of the emergence of new technology: 1) the highly developed capability of the modern economy to produce and diffuse user-values with new characteristics and 2) quasi-experiments making an arena for interaction between users and producers. In quasi-experiments, potential user needs and potential user-values of new technology and new services are communicated between users and producers to facilitate invention and diffuse innovations. Three questions are asked in this paper. How are quasi-experiments with ICT framed in educational research? What are the most important lessons derived from these experiments? How are these lessons transformed into policy and practice?

I will describe the innovation process in quasi experiments as a number of translations outlining different strategies and dynamics involved in each of these translations. My aim in this respect is to develop an important part of the translation model, i.e. *how actors frame the context of quasi experiments and thereby also the interpretation of the same experiments*. A frame thereby provides the rules and principles that guide our understanding of meaning in experienced events. Framing as constitutive of, and constricted by, encounters therefore “makes sense” of the activities in which participants engage, both for themselves and for others. The framing of a test setting implies a selection of some aspects of a perceived situation to make them more salient in a test, in such a way as to promote a particular problem definition, causal interpretation, moral evaluation, and/or policy measures for the problem described and thereby also organize involvement in the inscription-translation-reinterpretation of technology.

In an earlier study I found that, when the experimenters' frames of reference are delineated by “technology push”, they would render non-epistemic factors of their own participation more important. A counterintuitive claim may therefore be made: technology push-strategies are the strategies “least” concerned with technology as such. Furthermore when one sets out to test technology within a strategy of demand-pull one ends up testing the ability for 'inside' recruitment of new allies. The next counterintuitive claim is therefore: demand-pull strategies are the strategies “most” concerned with technology as such.

The paper is a review of Norwegian ICT experiments in educational research to study what lessons are learned from these experiments and finally how these lessons are transformed into policy and practice.

**Socio-material practices of dissertation: putting ontological politics to work**

*Hitchin Linda (University of Lincoln, UK)*

This paper draws on collaborative ethnographic fieldwork undertaken with a group of final year management students in a UK University Business School. The fieldwork was informed by actor network theory and explored a particular innovation in final year undergraduate assessment. For over fifteen years, critical management studies staff have developed an undergraduate degree programme informed by post-structural theory that draws STS theory/empirical work into management to foreground socio-material assemblages of organising. Our approach politicises management practice and organising and insists on deep connections between theory, method and possibilities of practice. In developing such a programme reflexive attention inevitably turned to socio-material (political) assemblages of pedagogy. Materials were rendered relevant to our educational ethos, content and experience. In this context innovations in teaching, learning and assessment have been built into our educational repertoire and an equally innovative and somewhat shifting lexicon developed to firstly open up and then re-name pedagogic space/practice: for example we shift from the safe non-traditional assessment ground offered by posters, drama, biographies and oral reflective logs to the interpretative flexibility offered by comics, exhibition; event and 'beyond applications'. During the past five years we have moved toward more cherished terrain and allow alternative forms and practices of dissertations – albeit selectively, quietly and in careful agreement with regulatory assemblages. Initially, two students undertook to deliver their labours as 'alternative forms' of dissertation. For the past two years we have been actively developing alternative dissertations and now have eighteen of forty-two management finalists opting for alternativity. In the process of innovating on a dissertation theme we have produced an assessment space that is both exciting and risky for all concerned. This research reports on a project to trace the final stages of alternative dissertation submissions: that is production and assessment. Research focused on the overtly material character of this alternativity to reveal fragile socio material arrangements enrolled in radical assessment. In this context we reveal ontological politics of dissertation and ontological commitments inscribed in such socio-material assemblages.

## **Love and other relational things. The use of methodical devices in social science education**

*Höcher Bernhard (Science Communications Research)*

Starting the project «Tricks of the Trade» in autumn 2008 with a class of 12-14 year old pupils in Vienna, five social scientists entered the realm of a public secondary modern school for two years. Drawing on participatory action research, our project's aim was to do social scientific research with teenagers. Most of the children share a migrant and an underprivileged background.

This contribution traces our use of different (typically' sociological) technologies and materialities (audio recorder, photos, computer, protocols, etc.) in the course of the research process. On an empirical basis I want to reconstruct how they enrolled in socio-material assemblages, negotiating and promoting specific orders of (scientific) knowledge/s, people, objects and practices; critically reflecting on our own practices as well as on the potentials and constraints of engaging these pupils in the social sciences.

To give an example: We started the second semester with setting up small working groups of 3 to 6 children accompanied by 1 or 2 researchers. One group was interested in finding out more about: "love". It consisted of two girls and one researcher. The researcher suggested that observation of school activities during the break would be a good start, so she and the two girls met one day and did their observations. If we follow the use of the protocol, we find in the girls' first handwritten protocol suggestions, observations, symbolic drawings, names, local knowledge, spelling mistakes. This protocol travelled between the toilet (were they wrote it, invisible to other pupils) and the corridor and finally into our office. Around this protocol people aligned, doors were opened and closed, silence had to be organized, the teacher had to be kept at safe distance, names had to be changed (e.g.: some of the descriptions of their colleagues could be read as pejorative). Along its translations into a word processing software negotiations of friendship, hidden feelings, methodological questions were raised and discussed. Drawings disappeared, memories and exclamation marks were added, and circular writing became more linear – disciplined, one might say. While transforming from a protocol to a flip chart claiming final results the relationship between the researcher and the two (three) girls also changed. At the end of their project the two girls told the researcher: "Don't you know how important you are to us?!"

As this roughly shows, my question is how these devices enrolled specific socio-material assemblages, which enabled, established, distributed and arranged knowledge/s, practices, objects and people, while they might have hindered or competed with other figurations. Did the use of such devices include/ exclude someone or something and how? Furthermore, how did such material agents contribute to enroll/ stabilise what became our (shared?) experience, our (whose?) project and a version of (doing) social science?

## **Virtual learning environments: Stabilizing actants in the network of teaching practice?**

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*Habib Laurence (Oslo University College, Norway)*

The purpose of the paper is to investigate the role of virtual learning environments (VLEs) in teaching practice, with a focus on issues of power relations. The paper describes teaching practice from a social action perspective and its relation to the socio-materiality of the VLE.

The study uses constructivism as the main theoretical point of departure. Socio-constructivist theories, and in particular social construction of technology, constitute the core theoretical basis of the study.

From a socio-constructivist perspective, it is to be expected that the introduction of a major technological tool such as the VLE in an educational setting would have significant consequences on teaching practice. Such a practice is normally strongly inscribed with a definite pattern of action. At the same time, academics have preconceptions, norms and values that come into play when they use the VLE, and those are central in their interpretations and “translations” of the tool. Little is known, however, about the mutual influence of teacher practice and VLEs. The VLE can be conceived of as a focal socio-material element that is active in both “doing things” and in the “doing of things” within existing teaching practice. The existing literature on VLE in educational settings gives little attention to the issues of such socio-material power relations.

The data is presented as a case study involving lecturers from three departments in a higher education institution and teachers from three primary schools. The methodological approach to the data gathering is qualitative and interpretive, based on initial interviews, personal logs and post-log interviews.

The data is analyzed using Actor-Network Theory, in particular the concepts of negotiation, obligatory point of passage, enrolment and alignment, as these concepts are particularly helpful to shed light onto issues of power relations both at the micro (individual or group) level and at a macro (institutional or national) level.

The paper presents findings related to the agency of teachers and lecturers, i.e. their capacity to exert power or to “make a difference”. In particular, the agency of teaching staff is visible in the introduction of new didactical practice with VLEs. For example, VLE technology plays a role in the implementation of new sociocultural modes of learning. The use of VLE tools also facilitates the design of individualized instruction. The interviewed lecturers and teachers also report that the use of VLE has allowed them to be more creative in their didactical practice and, in some situations, more efficient. They express that, despite the technology being strongly inscribed with a sometimes rigid pattern of action, they generally hold on to their pedagogical belief and appreciate the extended control that VLEs provide them with. However, the interviewed academics often express resentment towards what they perceive as external control “from above”. They sometimes portray the VLEs as the embodiment of invisible forces since such systems often are inscribed with institutional or political objectives. The informants convey a certain understanding of VLEs as an unavoidable development in education, even when the technology turns out to be little appropriate to their needs.

## **Dissecting Open Educational Resources: An Exemplar for the Technological Blind Spot of Educational Science**

*Klebl Michael (FernUniversität in Hagen/Hagen University)*

This contribution investigates the educational endeavours of Open Educational Resources (OER), which target educational expansion and education for all. Among countless rationales, trends, policies and lines in research in the field of ICT and education, the notion of OER appears to be most promising for educational improvement: Computer technology, especially the World Wide Web, allows for the provision of universal and free (i.e. “open”) access to digital resources for learning, for example to course materials, syllabi, visualisations, recorded lectures, exercises or computer-based tools. Since the programme of OER relies on technology, it may serve as an exemplar for explicating the mutual relationship between technology development (including technology diffusion) and (envisioned) educational change (see Klebl, 2008). Starting from Actor-Network-Theory and based on seminal contributions as well as on expert interviews, this study explores reciprocal links between shaping technology and organising education.

Within the programme of OER, unlimited access to educational resources is believed to lead to economic growth: Skilled and thus employable citizens create wealth, or profit respectively, where universal access to educational resources provides the opportunity for life-long and flexible learning (see Geser, 2007, p.20; Hylén, 2005). Therefore, OER is on the agenda of influential private foundations (e.g. the William and Flora Hewlett Foundation) as well as it is part of public policy (e.g. within the former eContentplus programme of the European Commission).

The programme of OER has a direct technological counterpart: This is research and development concerning (technical) standardisation and interoperability for educational technology, leading to the notion of Learning Objects (LOs). Interoperability usually demands for dissecting complex programmes of study (like a course) into smaller bits and pieces (like an educational text, a descriptive simulation or a problem to be solved by the students). These elements are made accessible via regional or global networks, in order to facilitate recombination and reuse for teaching and learning in particular educational settings. Moreover, since different educational settings employ diverse information systems, there is the necessity to agree on (global) standards, not only for media formats and interfaces, but also for formal pedagogical descriptions of how to model teaching and learning. However, the development and diffusion of LO-oriented courseware soon revealed major challenges – both technical and educational.

Although the idea of LOs has been preceding the programme of OER – supposedly prompting it – the ongoing debate on OER scarcely considers technical issues. This is even more remarkable considering that funding for OER projects still largely facilitates technological development. Recent educational development relies on technological assemblages; however, educational discourse does not. As a result, it is possible to map how agents in the field of education consider technology an agent for educational change and, at the same time, undervalue the agency of technology.

## **(De)scribing Socio-Material Assemblages in Education**

*Landri Paolo (CNR-IRPPS, Italy)*

The debate on the decline - and the crisis - of the modernistic accounts of education (and the related way of studying education and learning, Usher and Edwards, 1994; Ball, 1998; Edwards and Usher, 2001), and at the same time, the increasing transformation of the educational settings, also by the massive inclusion of the information and communication technologies (ICTs) have the effect to call into question the socio-material assemblages which constitute the sites of education. As a result, socio-material assemblages of education are no longer a 'matter of fact', and become a 'matter of concern' (Latour, 2005). This displacement have theoretical and methodological implications, since it suggests a perspective of hybridisation of the vocabularies of the field of study of education as well as of science and technology studies, and a reflection on how to redefine research methodology in order to grasp the heterogeneous assemblages of knowing and learning in education. While the theoretical implication of this displacement has been addressed in previous contributions (Edwards and Fenwick, 2010; Landri and Viteritti, 2010), the paper intends to face with the methodological challenges of analysing the materiality of education. Here, I will argue that the (de)scription of socio-material assemblages implies the unfolding of a practice-sensitivity, i.e. the development of a sensibility to practice which prolongs and partly expands the ethnographic approach to education. The use of 'practice' in methodological terms sometimes is accompanied with a visual (and a representational view of knowledge) rendering of the nexuses of doings-and sayings of field of practices (Nicolini, 2009). Here, a practice-sensitivity is considered instead within a non-representational mode of knowledge (Osberg, Biesta and Cilliers, 2008) which tries to intervene and recognize temporally the complexity and the multiplicity of educational practice. It develops by following an emergentist approach to knowledge, where the practice sensitivity is intended as a pragmatic tool which enables researchers to engage with the world in a more complex and creative ways. In order to describe the situated conditions for performing this sensitivity, I intends to propose methodological reflections from a research program on the making-of and the use a platform of web-learning 'Federica', which helps in understanding the restructuring of the processes of pedagogising knowledge in academic environments driven by the massive diffusion of web based technologies by critically engaging with it. The analysis of this platform raises a number of methodological questions, and in particular: a) How to study the ways in which scientific knowledge become transformed within pedagogical devices provided by web based technologies of teaching and learning? b) How to describe the dynamics of these newly emerging networked socialities (Landri, 2009), and in particular the use of this digital formations inside universities? c) Should ethnography be changed as well in order to depict those modifications? The study of web based technologies represents a methodological challenge for traditional ethnographic research since it questions the notion of locality (Hine, 2000; Wittel, 200). In order to address this challenge, a set of research strategies has been proposed: 'virtual ethnography' (Hine, 2000), 'cyber-ethnographies' (Teli, Pisanu, Hakken, 2007)', or 'multi-sited ethnographies' (Hine, 2007). The paper will argue that (de)scribing of socio-material assemblages in education implies a practice-sensitivity not limited to visual imagery, but with an extension to sensible knowledge (Strati, 1999). This practice-sensitivity revisits the multi-sited approach to ethnography (Marcus, 1995, 1998; Hine, 2007) with after-ANT vocabularies (Sorensen, 2009; Hennion, 2008).

## **Concepts in practical activities: how to learn estimation of software systems.**

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Background: Concepts are seen as important assets in all kinds of human activity. The concepts that people use are deeply connected to the cultural and material resources that become activated in social practices. To understand the use of specific concepts, we need to see how they are part of certain activities and their boundedness. They are not general with some set of fixed meanings, rather they need to be understood in relation to what people are trying to achieve in activities with fellow participants. When using concepts we are able to cope with a high degree of complexity, through classification. To classify events, things and activities must be seen as part of the process of learning a specific discourse which include the formation of concepts and conceptual systems. We can claim that concepts in workplace and educational settings are loaded with history and politics.

Historical assumptions: In Vygotsky's (1978) work on higher mental functions, the relation between everyday and scientific concepts is central for concept formation (see also Luria, 1976). This relationship is fundamental for human activity. Everyday concepts are appropriated through social interaction within many different situations and settings through bodily experiences and talk. As humans we develop these kinds of concepts or categories which represent a set of cultural resources. Scientific concepts, according to Vygotsky, are of a different kind than their everyday counterparts. Vygotsky (1986) argues that scientific concepts have four distinct features that make them different from everyday concepts. These are:

- generality
- systematic organization
- conscious awareness
- voluntary control

Vygotsky's idea of the development of scientific concepts has been criticized because it focuses primarily on the vertical aspects of development – the ontogenetic process that the participants go through. The split between these types of concepts is less obvious in modern workplaces, but concept formation matters. The idea of concepts in practical activities can be seen as an extension and reformulation of the problem that Vygotsky formulated. Different types of concepts become the tools in specialized discourse in workplaces. In this paper we examine which types of concepts that constitutes and direct experts work in teams when they estimate software systems.

Empirical context: In the software industry the most frequently applied approach to estimation are 'judgment based estimation'. Within judgement based estimation different models of estimation is discussed like which of the models for estimation is most efficient; the top down or bottom up?

Most of these studies take the individual expert as the unit of analysis and only a few look at the horizontal aspects of how the software team make decisions. We analyse six teams of software professionals. The analytic focus is; which types of concepts direct the participants talk and how they reach decisions. This focus can also give new insight about which models that are most efficient.



## **Evaluation re-instrumentation in French-speaking Belgium**

*Mangez Eric (Université Catholique de Louvain, Belgium)*

*Mangez Catherine (Université Catholique de Louvain, Belgium)*

Our contribution is based on current research-in-progress where we study the construction of new evaluation instruments by schools inspectors in Belgium. We draw on a view of knowledge as socially embedded / constructed, in opposition to the view of knowledge as a set of disembodied, neutral, reified facts about the world. Sociologists tend to see most of the phenomena they study as “social constructs”. By this they usually mean that the phenomena in question are marked and shaped by the social processes and conditions of their construction. But what does it really mean for knowledge to be a “social construct”? There is a first important statement that needs to be made about the contextuality / materiality of knowledge. Understanding knowledge as a social construct means that it is constructed by social groups who can themselves be located in a context marked by its own past and by its positions vis-à-vis other actors and contexts. The same holds for knowledge about knowledge, that is: for our understanding of what knowledge is.

Our work is part of a wider large EU funded research project dealing with the role of knowledge in the construction and regulation of health and education policy in Europe (FP6). The issue of knowledge and how it operates across Europe emerges as the most challenging question that the project has been engaged in exploring. We are concerned with knowledge processes in education and the role of artifacts in these processes. Our framework draws on ANT as we understand knowledge and knowledge instruments as a co-construction or assemblage of human and non-human elements. In this sense knowledge is rooted, connected to places, communities, sites. It is not just about what we know; it is also about who we are. Knowledge is constructing us just as we are constructing knowledge.

## **The Presentation of Self in Second Life: an investigation of professional identity in higher education**

*Michaelson Rosa (University of Dundee, UK)*

As an ongoing enquiry into technological changes in educational settings, this paper investigates the current, and growing, interest in the use of virtual worlds for higher education (Kirriemuir, 2009; Hobbs, 2009). This interest is a manifestation of the cyclical nature of responses to educational technologies from within and outwith the university sector (Michaelson, 2010). Educational technologies form interesting loci for sociomaterial investigation where we consider the organising and everyday assimilation of technology into cultural and historical practises (Orlikowski, 2007).

Virtual worlds emerge from multi-user online game playing, pioneered by MUD at the University of Essex in 1980 (Bartle, 2003), and subsequent improvements in 2D and 3D graphical interfaces. Examples exist which take such game playing to a logical conclusion for education, such as teaching language skills to soldiers via the use of pre-determined scenarios and roles (Johnson 2005; 2009). Other examples from academia include those of virtual scientific experiments, and virtual laboratories, which have been the subject of research and development for many years in university education, leading to the building of multi-user environments in which students can explore, for example, Wireless Sensor Networks (Christou, 2008; Allison, 2007). These very specific forms of educational technology are seen as too constraining and expensive for more widespread development. As a result, the most popular virtual world in UK Higher Education is Second Life, where the users create all of the content including their own avatar, surroundings and objects.

Goffman's text on the Presentation of Self in Everyday Life uses a theatrical metaphor to examine how people make choices concerning their roles in life; props and scenery, and particular forms of speech, are chosen to inhabit a particular job or assumed social norm (Goffman, 1959). The interesting question is how someone who teaches presents themselves in a virtual world to those that they wish to teach. In a virtual world, this representation of self-as-teacher is mediated by technology, but also by the player's choices of representation and their uses of props and scenery. In the case of Second Life, a player creates an avatar and a name as a representation of themselves. These choices are partially determined by the options provided by the Second Life software, by the skill of the player in making an avatar, and by an element of wish fulfilment. What does this virtual representation, and the ethical and moral choices that thereby arise, tell us about how we take on the role of teacher in everyday life? Is it possible to present oneself as authentic in a virtual world, since the nuances of the real are missing?

## **The audit support system *Descartes 3* as a site for professional learning and work performance**

*Nerland Monika (University of Oslo, Institute for Educational Research, Norway)*

*Mathisen Arve (University of Oslo, Institute for Educational Research, Norway)*

Learning in professional work is in this paper understood as emerging from connections between knowledge, tasks, technologies and people in a given work practice. As a case, the paper explores how the audit support system Descartes 3 becomes a constitutive site for auditors' professional learning in everyday work. Descartes 3 was developed by the Norwegian Institute for Public Accountants to support auditors in their efforts to plan, perform and document accountancy work in relation to current standards of risk-based auditing. The technology integrates auditing standards which are updated on a continual manner. Moreover it is designed for archiving collective knowledge and information about clients which is carried over from year to year.

To investigate how professional knowledge is configured in Descartes 3 and mobilized through participants' enactment, the paper employs a socio-technical framework inspired by Star, Bowker, and their associates. Descartes 3 is in this perspective analysed as an infrastructure which allows auditors to identify, explore, share and secure audit information in professional communities over time, at the same time as these work processes are guided, displayed and sequenced in certain ways. The technology in hand holds static as well as dynamic qualities, and its socio-material relations are thus both prearranged and emergent. The concept of transparency is used to examine more in detail how professional knowledge is displayed, approached and transformed in auditors' work practices, with a special interest in how achieved transparency give directions for auditors' knowledge work and serve to mobilize practitioners' actions by bringing some aspects of work to the forefront while others at the same time are concealed.

The data derives from an empirical study designed around Descartes 3 as a digital technology. Data was collected through an evolving process which followed the audit support system in different phases and contexts for use, comprising interviews with one expert who has played a significant role in the development of Descartes 3; work-place observations and stimulated talks with novice auditors who have recently taken the support system into use; as well as an artefact analysis of the technology as a dynamic assemblage of standards, procedures and guiding models for audit work.

The analysis shows how the auditors orient themselves in Descartes 3 in different ways, and how these orientations again activate different configurations of knowledge as powerful in the auditing practices. Potentially, Descartes 3 constitutes a flexible infrastructure for audit work which provides and allows auditors to achieve transparency of professional knowledge by way of inquiries and orientations. However, to take advantage of these opportunities seem to require a willingness to let oneself be guided by the sequences of work tasks and problems incorporated in the technology. In this regard the study exemplifies and gives specificity to the argument proposed by Bowker et al (2009) that infrastructure and transparency are relational phenomena which is partly given and partly achieved in socio-material practices.

## Using ICTs for teaching and learning

*Nuno de Almeida Alves (CIES, ISCTE-IUL, Portugal)*

Educational settings are undergoing major technological changes in these last few decades, at least throughout the western world. Elementary and secondary schools are literally being invaded by computers, internet connections and interactive whiteboards. In spite of this, a straightforward pedagogical and educational strategy for the integration of these technologies in the educational curricula seems absent. Recent surveys and research outputs (CEC & Empirica 2006; Sigalés & Mominó 2008) show that ICTs are generally taught as a separate subject in the curricula, with a still limited classroom use as a research, demonstration and simulation tool for the classical subjects in the educational curricula as mathematics, languages or history. This probably demonstrates that the place and function of ICTs in the classroom is not yet clearly defined and perceived by all actors as an educational tool, which should be used according to a set of objectives, strategies and methods. However, some individual teaching experiences using ICTs in Physics and Chemistry, carried out by some resourceful teachers described in the literature deserve attention.

This rather brisk emergence of ICT in elementary and secondary education has also produced some tension in the pedagogical relationship between the fundamental actors of teaching and learning processes. Some of the teachers are not confident users of ICTs (not even in their everyday live activities), have not been pedagogically trained in the classroom use of ICTs and are firmly convinced that their pupils are born ICT experts. On the opposite, young students are determined believers that they are vastly more technologically savvy than their teachers and have little or nothing to learn from them on these matters. Certainly neither of these preconceptions is accurate and both actors have large benefits to acquire from the crescent integration of ICTs in teaching and learning processes.

Although extensive surveys and interviews with social actors have been the preferred method by many research projects, these tensions and benefits obtained from the integration of ICTs in teaching and learning processes can only be observable by an ethnographic research strategy in classroom context.

This paper will discuss these issues, based on an ongoing research project on the integration of ICTs in Portuguese secondary education ("Learn-Tech: ICTs and Learning") that aims to locate a researcher in a particular classroom setting observing and taking notes on the use of ICT during class. Through this methodological approach, we expect to obtain a detailed account of teaching and learning processes mediated by ICTs that will be presented in this session. This depiction will encompass a description of the general functioning of classes, showing the strategies and interactions interplayed by teachers and pupils. It will also identify the problems, and good pedagogical practices, as well as the motivation of students in learning with ICTs.

## Knowledge in networks - knowing in transactions?

*Rimpiläine Sanna (Institute of Education, University of Stirling, UK)*

A strand of Actor Network Theory (ANT) states that knowledge, as well as reality, objects etc, 'emerge as continuously generated effects of webs of relations within which they are located' (Law 2007), or come into being as enactments in practices (Mol 2007). Both characterizations amount to knowledge emerging as fluid, contextualized and constructed, produced within heterogeneous material-semiotic-human networks. While ANT offers ways of tracing these networks out of which knowledge emerges, it offers very little in terms of helping to answer the question of how does knowledge emerge.

This problem is pertinent to my PhD study which is linked to a large interdisciplinary research and development project called Ensemble, run between educational studies and computer sciences in the UK, and for which using ANT was a given theoretical frame. Ensemble studies disciplines that employ case-based learning in Higher Education and based on the findings of these investigations, aims to design and develop semantic web-applications in order to enhance and support case-based teaching and learning in those settings. The aim of my PhD is to study how this type of project between social sciences and sciences is carried out in practice: how do the educational researchers go about trying to answer the research questions on case based learning in one of the settings, the discipline of Archaeology, and how are the 'outcomes' of these investigations then translated into 'objects', semantic web applications, by the computer scientists.

One way to explore the 'emergence of knowledge' out of networks is through Deweyan pragmatism, whose transactional theory of knowing offers a view that as living beings we are always already in transaction, and thus in touch, with the world. This implies that no fundamental gap exists between us and the world, and thus our experiences and our knowledge are directly 'of' the world. Knowledge emerges from action and feeds back into action. It has to do with discovering the conditions and consequences of experience, the possible relationships between our actions and their consequences, which is where knowledge is seen as emerging out of. (Biesta & Burbules 2003; Biesta 2009). While ANT focuses on actors and actants that constitute the heterogeneous networks out of which knowledge emerges, Dewey's transactional theory of knowing directs our attention to action that takes place in these networks as the mechanism through which knowledge is constructed. Furthermore, taking research activities as particular ways of transacting with one's environment would have interesting epistemological implications for studying complex interdisciplinary research settings.

The paper discusses the two theoretical positions in relation to one another with a view of assessing how they could work together, and how this theoretical conjunction could help with studying interdisciplinary research and development practices where conflicting epistemological positions are at play.

## **Disassembling the Classroom—Methodological Approaches to the Materiality of Education**

*Roehl Tobias (University of Mainz, Germany)*

The ethnography of education is challenged by the materiality of the classroom. Ethnographic accounts of school lessons mostly highlight language and interaction and offer no suitable methodology for researching objects and their role in the classroom. Moreover, objects are part of complex and interwoven assemblages involving human actors, practices and things. As such, their contribution to human practices often remains unnoticed in the background of routine activities. In order to make the materiality of practice available to ethnographic observation, we thus have to analytically disassemble these assemblages. Three methodological strategies tackling this issue can be identified.

- Symmetry: Actor-Network-Theory (ANT) proposes a «symmetric anthropology» in which objects are treated as «actants» in a network comprising of non-human and human actors alike, thus providing a perspective that serves to emphasize the role objects play in education. Consequently, a blackboard is not a mere tool used by human actors, but part of a network in which neither human nor non-human actors are favoured. The school lesson, the blackboard, but also the teacher and the students are all fundamentally altered as part of this network. While some have criticized ANT's radical ontology—which treats objects on a par with human beings—the principle of symmetry is nonetheless a promising methodological strategy for researchers dealing with the materiality of education. It fosters an analytic approach to ethnographic observations by challenging our mundane view on education in which interaction between human beings is the focus of our attention

- Emergence: Another viable option is to observe how certain objects can become an important part of the socio-material assemblage of the classroom. How can, for example, a pen stop being a writing tool and become an epistemic object demonstrating the laws of gravity in a physics lesson? By taking a close look at the practices involved in bringing about these transitions, one can gain insight about the rather fluid nature of some objects in the classroom and the possibilities and limits of human practice and interpretation in dealing with them.

- Heidegger's «Broken Hammer»: A third strategy can be found in (post)phenomenological notions of materiality (Ihde, Heidegger). For Heidegger, objects are usually understood in relation to other objects and their use («readiness-to-hand»). As such their material quality is unavailable to reflection and they are simply used. Their material quality is however visible as soon as the object breaks or malfunctions («presence-at-hand»). Looking out for the «broken hammer» of school lessons is thus a way of making the object visible as a thing endowed with a material quality which restricts certain uses and allows others. If the experiment goes wrong, we can observe how objects are treated in terms of their material—non-semiotic—quality.

The merits of these strategies will be discussed on the basis of examples from an ongoing ethnographic research project on the role of epistemic objects in mathematics and physics classes in German secondary schools.

## **The Materiality of Learning: towards post-humanist learning theory**

*Sørensen Estrid (Humboldt Universität, Berlin, Germany)*

The past decades' debates on location of agency have not only been of importance to STS but also to learning theory. Scholars of situated learning and related approaches such as Hutchins, Lave, Pea, Suchman and Wenger have been ground-breaking in proposing a way away from theorizing learning as unfolding in the individual mind (or brain), to understanding learning as a social endeavour. While these learning theories have emphasised the social situation in the discussion of the location of agency, STS scholars – especially those applying Actor-Network Theory (and after) – have pointed to socio-material assemblages to investigate hybrid agency.

Approaches focusing on the socially situated character of agency have succeeded very well in presenting new and exciting theories of learning. ANT scholars, on the other hand, have only recently begun to study learning, and thus discussions on learning theory that thoroughly include ANT (and after) informed theoretical vocabulary concerning socio-materially hybridity are still rare.

The paper basically asks the question: how does a learning theory look that approaches learning as socio-materially hybrid? To answer this question we need to think about learning as spatially distributed across humans and nonhumans. With inspiration from Law & Mol's spatial vocabulary, I argue that we need not only abstract from sets of modern ordering categories such as human-nonhuman, knowledge-belief, culture-nature to inquire the hybrid identity of entities thus involved in learning. Rather, we should not focus on entities at all, but start inquiring the spatial pattern the learning practice in question takes. This allows us to characterise learning in terms of the spatial socio-material pattern this practice takes, and following from this we can identify different forms of learning that produce different knowledges and different human presences. Based on my recent book (Sørensen 2009), I present my (after) ANT inspired re-thinking of situated learning theory through empirical examples from my research into learning materials in primary school.

## **The materiality of educational practice: case studies of small-group case-based learning**

*Tscholl Michael (University of Cambridge, UK)*

Detailed observations of small-group work show that a 'final product', such as answers to questions, or a presentation, is developed by mobilizing heterogeneous resources, such as student's knowledge or printed learning materials. That development is best described as an assemblage of parts being drawn in, and with the final product being emergent. While a group work may appear as a linear sequence of events, an event may not about come only in direct dependence of a previous one, but result from a network effect.

How to model or explain such development has been studied intensely, but little research has assumed the (analytical) equivalence of ideas, material resources (and people), though it is clearly evident that all are important components. The assumption persists that these components need to be studied in terms of their informational content contributing to the gradual build-up of an understanding, conceptualization, solution (e.g. Roschelle, 1985). Little attention is paid to the material (re-)configurations that occur, and indeed the materials are relegated to an only secondary role or described as supporting human-centered pedagogical goals.

This paper presents accounts of small-group case-based work by assuming that equivalence, and drawing then more general conclusions about the role of materials forming educational practice. It presents detailed descriptions of how students of a management course develop answers to tasks and a short informal presentation. It will show how material and knowledge are mobilized and undergo change, in dependence of material forms used as well as developed during the work. The educational setting is considered as a location where heterogeneous and previously disparate elements are brought in, connected, re-configured and stabilized (cf. Law, 1989). The analysis will show, for example, how, under the constraint to produce a certain form of presentation, information and knowledge of various sources is compressed as well as expanded, and re-inscribed onto a different material form.

Actor-network theory, and in particular studies on knowledge production in laboratories (Knorr Cetina, 1999; Latour, 1987), and education at schools (Roth, 1996) and universities (Nespor, 1994) provide the theoretical framework and methodological guidelines for the analysis. The analysis contrasts with more traditional pedagogical literature (Malcolm and Zukas, 2001) where learning in higher education is framed in psychological terms and prediction of outcomes. In contrast the work reported in this paper is concerned tracing activities and the things, which come to matter in practice.

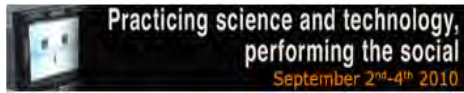
The paper will illustrate and provide evidential support for the argument that different material forms perform a specific kind of knowledge, and a specific kind of processing, and therefore that the material forms the educational practice (cf. Sorensen, 2009). It will contribute to the question of the role and significance of the material in learning: whether material forms only support, or engender or actually contribute significantly to, e.g. 'produce', learning.



## Socio-Material Assemblages in learning scientific practice

Viteritti Assunta (*Faculty of Sociology "La Sapienza" University of Rome, Italy*)

Learning is a socio-material “fact” that takes place in classrooms, lecture halls and workplaces. Scientific research laboratories are liminal places where formal learning, informal socialisation and expert practice intertwine, and educational places where knowledge is always a shared practice, being the product of human and non-human assemblages. The paper aims to describe the socio-material practices of science learning in a leading Italian research laboratory working on stem cells. In this particular research lab, the practices of science learning involve: learning to write; analysing, representing and interpreting data in laboratory; learning to look in the microscope to understand the status of cells; learning to communicate at scientific meetings; learning how to discipline bodies in the laboratory (how to stand at the bench, how to stay under the hood, how to use technological devices, how to take care of non-humans, such as cells, molecules, etc.). From a methodological point of view, the paper draws on an ethnographic study that follows the tradition of laboratory studies (Knorr-Cetina 1999, Goodwin, 2003; Latour 1987), whereas, from a theoretical point of view, it follows practice-based studies of learning and knowing in organizations (Nicolini, Yanow, Gherardi, 2003; Gherardi, 2006 and 2009; Schatzki, Knorr-Cetina and Von Savigny, 2001). The research practice is intended as a socio-material activity situated in networks of bodies and objects co-producing knowledge. Scientific research *constructs itself* “in the hands” of expert social actors: the ethnographic work proposed in this paper aims to understand the socio-material relationship between the *educational practice*, which takes place among biotechnological “objects”, and the researchers’ *sensitive knowledge*. Through the experiences narrated by young University students who are to be socialised into the activities of the laboratory, the paper aims to show how scientific practice is learned day by day. The idea is to examine the learning experience of scientific practice in the transition *between* the learning of academic knowledge in the lecture halls, where knowledge is codified and stable, and the appropriation of knowledge by doing, *in action*, in the laboratory, where knowledge is still hybrid, vulnerable and malleable, as it is developed in the relationship between humans and non-humans, between the materiality of technical devices and the sociality of experience. Through the narration of crucial events concerning the socialisation into the practice, the paper specifically focuses on some socio-material processes that are peculiar, but also exemplary, typical, of scientific practice, which is intended as: learning to stand at the bench, learning the gestures of practice day by day; learning how to recognise and treat valuable objects such as cells; learning to look cell cultures (embryonic, cerebral, human and animal cells) in the microscope; learning how to write practical knowledge (keeping laboratory notebooks, and learning how to write a scientific paper); learning the practice through the body; learning to handle technological devices. All these processes require the construction of a dense, sensitive knowledge, which is shared, processed, and embodied in bodies and objects. This sensitive knowledge will be observed while it is learned in practice, in the daily work, which is always both personal and relational.



## **TRACK 16**

# **Bio-Objects – Life in the 21st Century**

### **Convenors:**

**Sakari Tamminen (University of Helsinki, Finland)**

**Aaro Tupasela (University of Helsinki, Finland)**

**Niki Vermeulen (University of Vienna, Austria)**

## **Human at 99.9%? Contrasting frames of human-animal hybrid embryos in the Italian public sphere**

*Beltrame Lorenzo (Istituto Italiano di Scienze Umane, Florence, Italy)*

According to several political and social scientists, the opposition between catholic and lay people has become the most relevant socio-political cleavage in contemporary Italian public life. As every identity category also lay-catholic divide is constructed in identity-making activities emerging from discourses and social practices. Debates on controversial bio-medical objects are nowadays the most powerful producers of such identification practices. The technoscientific capability of manipulating natural things has made nature no more the final limit to human action, but an open field of action which needs a political regulation. Political regulations involve social conflicts and struggles for defining social order and bio-medical innovations are at the core of such conflicts. Controversial bio-medical objects – such as in vitro fertilized oocytes, GMOs, synthetic chromosomes and human-animal hybrid embryos – has been defined in several ways: hybrids and quasi-objects (Latour), liminal agents (Jasanoff) or boundary objects. Every definition implies a contested ontological status: such entities belong simultaneously to nature (as it is made by biological materials) and culture (as it is artificially constructed by technoscientific practices). When such entities enter into the public sphere give rise to process of regulation and re-arrangement of social order. In order to being regulated, new bio-medical objects need to be framed into cultural foundational categories – such as natural/artificial, sacred/profane, moral/immoral, purity/pollution and human/non-human – defining the structural symbolic boundaries of moral and social order. Nevertheless such categories are being modified by the coming of such objects. Framing such objects it is then a restoration of a symbolic order which is linked to an imagined social order with its values, norms, goals and so on. This is a conflicting process, because there are several imagined social orders. Every party involved in the debate frames such objects in different ways according to its worldview. This paper analyzes the Italian debate on human-animal hybrid embryos showing how different actors frame such objects in contrasting ways. Such diverging frames are consistent with different views of desirable social order. Catholic voices consider hybrid embryos as quasi-human entities, and then the production and exploitation of such embryos transgresses the human dignity principle, which is foundational for a traditional social order. Lay voices instead frame such objects as simple biological artefacts, less than human entities which produce compatible stem cells. Prohibiting exploitation is then a threat to a secular social order and to the legitimate goal of searching therapies and being competitive in global bio-economy. Frames of such chimeras are not only based on moral stances, but also on biological definitions of such objects. Such biological definitional work is then instrumental to the reliability of imagined social order outlined in such debate. This paper shows then how the contrasting frames of hybrid embryos partakes in a more general construction of social order including identity claims, the outlining of values, norms and ethical principles and, above all, a rearrangement of the cultural foundational categories of symbolic order.

## **DNA paternity typing: Co-construction of parenthood through science and law**

*Costa Susana (Centre for Social Studies, University of Coimbra, Portugal)*

*Helena Machado (University of Minho - Centre for Social Studies, University of Coimbra, Portugal)*

This paper is based on the assumptions of two research projects: one PhD dissertation based on the analysis of institutional actors and the uses of paternity profiling in Portuguese Judicial System and an ongoing project funded by the Portuguese Science and Technology Foundation called “Mothers and Fathers after biological truth? Gender, inequalities, and parental roles in paternity cases”.

The first project analysed the production and evaluation of scientific proofs in the cases of paternity claims imposed by the State; the ways of intervention of the judicial actors and forensic scientists and the production of public knowledge considered credible and robust in this type of cases. This work showed the co-relation between science and law in paternity claims and how it leads to the emergence of both a redefinition of law and science and conducted to a broader reflection on the way proof is incorporated in the judicial decision through the use of the co-production concept proposed by Sheila Jasanoff. The second project focus the social impacts of the uses of DNA tests, problematizing the concrete impacts of the biological paternity establishment. It aims to understand the lay discourses and practices of the receivers of the results of DNA tests, exploring the ways citizens take part in that processes and in which manner science affects citizens and the concept of citizenship. In that sense, an approach also based on the concept of civic epistemology, proposed by Sheila Jasanoff, will allow to explore the process of public knowledge that is associated with DNA paternity tests. In order to understand these relations between science, law and citizens, we will discuss some case studies that result from judicial processes and preliminary results proceeding from interviews to mothers and putative fathers. In both cases we will try to show how DNA tests in paternity investigations is conditioned by a sexist bias by which mothers are subjected to a scrutiny process aimed to their sexual and moral behaviour, emphasizing the complementarities and articulations between legal, bio-genetic and social conceptualizations of paternity.

## Defending/breeching the nature-culture divide - GM biocontrol agents

*Gilna Ben (GenØk - Centre for Biosafety, Norway)*

I want to examine a new 'class' of bio-innovations – bio-objects – that have emerged in the last two decades, and tease out yet another challenge to that persistent boundary, the nature-culture divide. These bio-objects are quasi-natural agents, genetically modified organisms that are intended not to sit placidly within well-tended fields (e.g. GM crops), but instead to infiltrate, invade and install themselves in the wild, where they will go to work – often corrupting their own kind. They include genetically sterile mosquitoes and other insects, viruses and parasitic worms that immunise against pregnancy, fish that wipe out females of their own species, and viruses that immunise threatened species against epidemics.

At first glance, these are the entities to which we would attach the label, 'bio-object'. If bio-objects are heuristic devices, then these are exemplar cases of the new ways in which we can imagine life and dream of intervening in vital processes. As momentous as was the invention of reliable, accessible vaccination and birth control in humans, these new objects are instances of radical reconfigurations of the ideas of reproduction and inheritance, infection and prevention that have been with us for centuries. For this reason alone, they are remarkable, but following the networks in which they are entangled, and from which they derive, they help us identify a much larger bio-object – the ecology, the landscape, the environment. That the environment, or wild nature, can be considered as a bio-object is not necessarily new; the manner in which these bio-objects are imagined to intervene in that nature, however, forces a reappraisal of what we can and may expect of ecosystems, and hence what we will understand as natural.

Each of these objects are envisaged to be deployed as part of a wider program of ecological management. They are devices intended to reduce, protect or otherwise modulate populations of wild creatures. In some cases, they are intended to keep the unwanted aspects of nature at bay, outside our settled, tamed modernities, like controlling malaria, or plagues of mice. In other instances they are attempts to restore ecological processes, to heal the damage of colonial action and resurrect a nature that was once vibrant, mysterious and diverse. But in the pursuit of these ideals of purity, the use of hybrid bio-objects forces us to confront the hybridity of nature and culture – urban zones are not free from the wild; nature can and will be managed. The novel prospect that such targeted interventions offer is not simply a bio-object that springs forth from a lab, but reconfiguring natures and cultures as hybridisations of control and contingency, threat and asset, known and mystery.

**On how states matter: Or what we might learn from a comparison of stem cell and embryo regulations in the UK and Italy**

*Gottweis Herbert (Life-Science-Governance Research Platform, University of Vienna, Austria)*

*Ingrid Metzle (Life-Science-Governance Research Platform, University of Vienna, Austria)*

In this paper, we will try to develop an understanding on the role of 'states' and different 'regimes of governance' for the emerging geography of bioobjects, exploring how states matter. We will base our interpretation on an empirical study in which we compare the 'practices of governance' with which in vitro fertilization (IVF) embryos and stem cells are governed in the United Kingdom and in Italy and hence in two countries which are placed on the opposite ends of the European regulatory spectrum. We will argue that these different regimes do not only attribute different meanings to a seemingly similar object, but actually contribute to the enactment of different objects. While an enabling set of practices of governance in the UK allows the disentanglement and circulation of embryos and stem cells, a much more orthodox regime of practices of governance in Italy impedes the circulation of embryos and stem cells. Drawing on these differences, we will argue that it is useful to frame 'regimes of governance' as part of the complex set of relations that enable the coming into being of forms of life as bioobjects. In other words, 'regimes of governance' and 'bioobjects', and 'states' and 'forms of life', mutually shape and coproduce one another.

## **Functional Food: Micronutrients, Marketing & Magic**

*Hendrickx Kim (University of Liège, Belgium)*

2010 promises to be a pivotal year for producers of food, since the European Food Safety Authority is to publish a list of accepted health claims made on industrial food products. The production of such a list, however, goes not without trouble. In the first part, this talk will outline the controversies and scientific uncertainties accompanying the development of a technological food category (allegedly) providing physical or psychological health benefits 'beyond basic nutrition'. In the second part, food will be looked at through the lens of power. Throughout human history, different authorities have prescribed what one should (not) eat. In that sense, food is related to moral power. What is at stake then, when health claims and food become technological?

To answer these questions, and to approach 'novel foods' and 'functional foods' in an original way, an anthropological approach will be outlined based on preliminary research results. It will be argued that functional foods as bio-objects are the meeting point of old beliefs and new ways of thinking. The beliefs have the structure of magical thinking: a specific ingredient will generate an expected outcome; the right procedure grants us the power to mold reality as we wish. If this way of thinking goes far back into human history, the technological and institutional context in which it operates is particular and relatively recent. Research institutes, universities, industrial companies and government bodies form a hybrid network in which each actor or set of actors is trying to define the 'right' procedures for the object to become magical. It is here that new ways of thinking and possibly new ontologies of the body and health are performed through science and technology. Workshops on 'designing clinical studies for success' are meeting places to give shape to a bio-object which is still partly imaginary. Indeed, functional food seems to be a knot where imaginations old and new, economic interest, scientific methodology, ontologies of the body and health, and materialities such as micronutrients converge and take on shape.

To make sense of this complexity, and to move beyond a descriptive level of analysis, the author wants to find a way to marry ANT and interpretative anthropology. What do functional foods become if we try to fit their description in terms of actors, translation and networks in an interpretative frame of power and magic? This methodological question is related to a hermeneutic one: where lies the difference between defining the right scientific procedure to have a health claim approved as part of a marketing strategy on the one hand, and performing the right ritual to make magic 'work' in order to obtain moral power on the other?

## **Mobilizing eggs – mobilizing women**

*Schultz Susanne (University of Hannover, Germany)*

*Kathrin Braun (University of Hannover, Germany)*

Regenerative medicine is at once individualizing and universalizing (E.Thacker). It is individualizing in seeking to bypass the problem of immunocompatibility by growing tissue and organs from the individual's own cells, and universalizing in seeking to develop universally applicable technologies of doing so. In the case of attempts to generate patient-specific stem cell lines, individualization and universalization are mediated through women's bodies and women's activity since this research requires a specific kind of bioobjects: (fresh, mature, good quality) human oocytes. Mobilizing oocytes involves mobilizing women, both literally and symbolically, which involves a series of social techniques and instruments such as recruitment, screening, motivating, advertising, reimbursement, compensation and payment.

This paper draws from an empirical study on the logistics, organizational principles, regulations, and governance mechanisms of human oocyte procurement for research in Europe, with reference to California as a comparison. We found a mobilization-continuum that ranges from mobilizing altruism via mechanisms of reimbursement and different forms of compensation, to concealed forms of payment. For reasons we will explain in the paper, there is a trend towards payment as a supposedly more efficient way of mobilizing. We will show that this move both presupposes and brings about a reframing of the bioobject at stake: from "waste" to the product of human activity.

The study forms part of an interdisciplinary EU-funded project on Regenerative Medicine in Europe: Emerging Needs and Challenges in a Global Context (REMEDIÉ).



## **Calculating Life: Making Foetuses at-risk in the Context of First Trimester Prenatal Risk Assessment**

*Schwennesen Nete (Institute of Public Health, Copenhagen University, Denmark)*

This paper focus on first trimester prenatal risk assessment (FTPRA) for Down syndrome in Denmark, and the emergence of a new bio-object, which this practice gives shape to: the foetus being-at-risk of having Down syndrome. In official guidelines and in professional and policy discourse, the foetus being at-risk is presented as an objective fact, which can provide the basis of non-directive and value-neutral counselling. This paper contests this representational image of knowledge production, by investigating “the becoming” of the foetus being at-risk in the clinical practice of FTPRA and processes of decision-making. Drawing on an ethnography of FTPRA, I explore the various ways in which boundaries around risk (high risk or low risk) and life (foetus/child) are configured and re-configured through the trajectory of FTPRA. In this process both spoken (interpretations) and non-spoken practices (visual images [the ultrasound scan], risk figures, bodies and technologies) are involved. Analysing different moments through which the foetus being at-risk emerges in clinical practice, the paper shows how this process shapes the pregnant woman both as object and subject at the same time. In the process of undergoing FTPRA the pregnant woman is simultaneously detached from a previous position of experience and attached to a new situation of experience through participating in the interpretation of risk figures and notions of life in the clinical encounter. If we take seriously that FTPRA is not only an act of representation but also an act of intervention, we have to discuss not only how to produce and communicate objective risk knowledge but also how to be accountable and take responsibility for the way FTPRA engages in a continual process of mattering, which has real consequences for those being involved.

## **Taming the wild life of genes by law? Genes reconfiguring solidarity in insurance**

*Van Hoyweghen Ine (HES – CAPHRI, Maastricht University, the Netherlands)*

This paper explores the connections between developments in the biosciences and the proliferation of the social. It does so by analysing the issue of genetics and insurance, which is particularly suitable for exploring certain mechanisms at work in the co-production between bioscientific knowledge, markets and states in producing solidarity. First, it seeks to understand the origins and rise of the important policy strategy of genetic nondiscrimination acts (GNDAs) in insurance and its stabilization and spread throughout European insurance markets. It argues how solidarity for the group of 'the genetic' in insurance, as cemented in GNDAs, has been the result of a hybrid coalition of emergent concerned groups. Secondly, it explores the unfoldings of GNDAs and the way solidarity is produced in practice. It argues how the 'new collective' that has emerged through genes and GNDAs has not been able to stabilize but may stimulate the emergence of new concerned groups in insurance and a proliferation of the social. The paper stresses the role of genes as operators of solidarity as well as of exclusion, in showing how genes are able to make, unmake and re-make the collective in insurance. The study of the role of the biosciences in re-configuring solidarity and in re-organizing economic markets are key research topics for the near future.

## **Apes as bio-objects: A case from 1920s' USSR**

*Vianna Beto (Universidade Federal de Minas Gerais, Spain)*

*Rubén Gómez-Soriano (Universidad Autónoma de Madrid, Spain)*

Because of the alleged phylogenetic proximity to humans, great apes (gorillas, chimpanzees, bonobos and orang-utans) have played and still play a major role in both medical and cognitive studies. In these researches most of the times apes have been articulated as having a double condition: (a) closely related to humans in anatomy but not in cognition for medical research (b) with a similar but less complex cognition than humans for cognitive research.

This work seeks to analyze some of the contemporary implications of this through the study of an ambitious and polemical project that Soviet biologist Ilya I. Ivanov set off in French Guinea in 1926: Ape and human hybridization. After several unsuccessful trials to inseminate female chimpanzees with human semen he returned to Sukhumi (USSR) where he would try the opposite process. However, as a result of new Stalinist policies, the experiment was cancelled even before getting started.

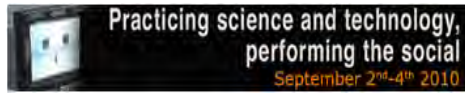
The present work aims at reflecting on the contemporary roles of apes as bio-objects in the construction of our identity as humans bearing in mind the commonalities of this not-very-known project with more contemporary primatological endeavors. What we would like to show is that 'the ape' is taken as an alterity or otherness which is used to define 'the human'. Hence, apes are taken as 'anthropological identity operators' (Despret, 200??). With this concept we mean that 'the ape' has served as the touchstone for the configuration of human identity as species (a role also played by the 'savage' or the 'mad'). But this is just one of the possible ways in which the relationship between human and non-human primates in those experimental settings could be analysed through the use of Despret's concept of 'anthropo-zoo-genesis'.

## **Framing Pluripotency: The Construction of hESC and iPS Cells**

*Weber Susanne (Ludwig-Maximilians-Universität, München, Germany)*

*Christine Hauskeller (Ludwig-Maximilians-Universität, München, Germany)*

In the last decade, 'stem cell research' has developed as a major field of biomedical inquiry. This paper focuses on an analysis of the construction of 'stem cells' as bio-objects which have at once been invested with hopes for the development of cures for major degenerative diseases while simultaneously being subject to ethical controversies across countries. Special expectations have been placed in research on human embryonic stem cells because of their 'pluripotency', i.e. their ability to differentiate into any cell of the body taken as potentially providing for an unlimited supply of cells for the repair of damaged tissues. However, the destruction of human embryos and the use of cloning techniques in generating pluripotent stem cells have generated widespread public debate about the range of legitimate research objects in cellular research and have been accompanied by the development of diverse national regulatory frameworks. Recently, 'induced pluripotent stem cells' have been created from adult human cells, which have been presented as possibly providing an 'ethical' alternative to human embryonic stem cells. Drawing on the comparative study 'Stem Cell Research in Context' carried out at the ESRC Center for Genomics in Society, University of Exeter, this paper shows how researchers in Germany and the UK – two countries with divergent frameworks of regulation regarding research on human embryos - negotiate ethical debate, therapeutic expectations and scientific uncertainty in their framing of pluripotent stem cells as research objects. The paper shows how researchers set the cells within a meaningful narrative of scientific development in which human embryonic stem cells and iPS cells are constructed at once as identical and different objects. We demonstrate how this rendering of pluripotent cells serves to justify the research practices of stem cell scientists and to stabilize stem cell research as a global field of scientific investigation. By illustrating the performative elaboration of research objects, the article contributes to an understanding of the discursive shaping of stem cell research as emergent scientific field. The paper argues that comparative ethnographic studies provide a crucial basis for tracing the socio-technical constitution of bio-objects at the intersection of local and global networks of scientific practice that complement as well as serve to problematize extant analyses of biomedical research in and across different national contexts.



## **TRACK 17**

# **From Biodigital Lives to Bioit Worlds: In-Vivo, In-Silico and In-Vitro Embodiments and Dissonances**

### **Convenors:**

**Adrian Mackenzie (Lancaster University, UK)**

**Kate O'Riordan (University of Sussex, UK)**

**Ruth McNally (Lancaster University, UK)**

**Lawrence Busch (Michigan State University, USA; Lancaster University, UK)**

## Mapping the changing contours of information exchange in the life sciences

*Bruce Ann (University of Edinburgh, UK)*

*Marsden Wendy (University of Edinburgh, UK)*

*Williams Robin (University of Edinburgh, UK)*

A compelling new vision for the life sciences is being proposed involving the large scale sharing of experimental data and research findings - made possible by the availability of new industrial scale analytical equipment and techniques (particularly in genomics-based studies) and by powerful Information and Communication Technology (ICT-based) tools and services bringing and given strong support by research funding bodies. This paper will draw upon a study that sought to map the changing contours of information use and exchange across the life sciences. A range of seven case studies across different life science research groups was undertaken. In contrast to prevalent discourses of transformation toward 'big science' and dry science, the cases reveal an uneven pattern as life scientists individually, and in their research groupings, grapple with the differing 'affordances' of emerging information tools and services.

Our research design sought to achieve something of the depth of insights available from ethnographic research within a limited timeframe and resource model; however we wanted to cover a representative range of life science settings rather than select particular instances as exemplary for all life sciences (which has been a weakness of some approaches to e-science). The cases were constructed using a mix of short term ethnographic approaches. The starting point for each case study was the use of 'probes' - specially designed 'Information Lab Books' - whereby individual researchers charted their information practices, followed by interviews and focus groups. Comparative analysis was carried out at each stage, and across the final case studies.

Our methodology has allowed us above all to characterise the overall flows of knowledge and information within each group and link these to the research challenges being addressed. Our studies reveal a huge, indeed 'Baroque', array of diverse formal and informal information discovery, collection, processing and dissemination activities. Though there are commonalities between all the cases, each of our cases had a distinctive fine-structure of information use and production. In this way our study has highlighted substantial differences between the life sciences research groups studied.

Implications for information service policy/provision

The significant gap we found between user practices and information service strategies suggests that the attempts to implement these strategies have had only limited and uneven impact on user awareness or preparedness within research settings. Likewise, policies for data sharing may need to be driven by their demonstrated value rather than from adopting a one-size-fits-all framework.

Implications for future research - towards a biography of e-science

e-science practices are changing rapidly – and continue to change with the emergence of new information services and tools and as research groups explore their utility for their information acquisition and exchange activities. The biography of artefacts perspective, developed to explore the evolution of (workplace) technologies as heterogeneous assemblages of artefacts, visions, suppliers, organisational adopters, argues for a shift from simple ethnographic studies currently fashionable within science and technology studies towards multi-local and multi-temporal. We see this project as part of a broader long-term collaborative effort towards a biography of e-science.

**Synthetic Biology: Can Standards be Developed?**

*Busch Lawrence (CESAGEN Lancaster University, UK)*

For at least a century the dream of shifting biology from a science that discovers nature to one that engineers new organisms has circulated. Its latest version, synthetic biology, has been developed over the last decade. Proponents have advanced a vision of biology in which it would be possible to construct organisms by putting together parts much as one constructs an object using Lego blocks. In order to accomplish this task biologists necessarily would need to develop standardized procedures to produce standardized objects that can be 'glued' together in predictable (standardized) ways to produce organisms with predictable (standard) properties. In short, an imbricated set of standards would need to be developed. This is hardly the first time that biologists have attempted to produce uniform organisms. Plant breeding, and especially the development of pure inbred lines, as well as the production of laboratory mice, provide some guidelines as to what must be done as well as illustrate some of the pitfalls and limitations behind the vision of synthetic biology.

## **Ownership, sharing and community-building in synthetic biology**

*Calvert Jane (University of Edinburgh, UK)*

In this paper I aim to throw light on the interconnections between intellectual property norms, open source, and the dream of engineering biology, and show how these are linked to a normative and community-building agenda in synthetic biology.

Founders of 'BioBricks' approaches to synthetic biology have their origins in the computer industry. They emphasise the inter-convertability of genetic information and material, enabled by DNA sequencing and synthesis technologies. I argue that these influences have led to an explicit attempt to make synthetic biology more similar to software code which is modular, standardized and re-useable. The modular entities produced by synthetic biology are ideal for open source because they can be worked on simultaneously by a large community of both users and producers, and this can speed the development of the field.

I link these findings to broader theoretical discussions of open and distributed innovation, where the distinction between developers and users is not sharp. This literature maintains that these types of innovation produce new knowledge and enable novel social structures that can redistribute agency, knowledge and power. I argue that we do see some examples of this redistribution of power in movements such as DIY biology, but that it is both pragmatic and normative motivations that lead to a 'diverse ecology' of both open and proprietary strands in synthetic biology.



## **Computational Biology and the Limits of Shared Vision**

*Carusi Annamaria (Oxford e-Research Centre, UK)*

Several studies have focused on the social sharing of visual practices as constitutive of evidence within a domain, while there has been relatively less attention paid to points where the social sharing of practices breaks down, or is resisted. This article argues that a study of both types of cases is necessary in order to gain a better perspective on social sharing of practices, and on what other factors this sharing is dependent upon. The article presents the case of currently emerging inter-disciplinary visual practices in the domain of computational biology, where the sharing of visual practices would be beneficial to the collaborations necessary for the research. Computational biology includes sub-domains where visual practices are coming to be shared across disciplines, and those where instead this is not occurring, and where the practices of others are resisted. A significant point of difference between these sub-domains is between visualisations that render the output of simulations, and those instead which are images taken during observations using the techniques of microscopy. A crossing over, compromise or sharing of practices relating to these different sub-domains is difficult and often resisted. This resistance needs to be contextualised in a far richer account of the relations between the visual artefacts, the scientists who use them within disciplinary domains, the theoretical and instrumental outlook of the disciplines in questions, and that towards which the science is directed, its domain of study. Social practices alone are not sufficient to account for the shaping of evidence. The philosophy of Merleau-Ponty is introduced as providing an alternative framework for thinking of the complex inter-relations between all of these factors. This philosophy enables us to think of the inter-constitutive relations between these different factors, which ultimately define an epistemological and ontological space in which the object of study itself has an active constitutive role, and in which the scientist as person and perceiving body within a knowledge domain is also constituted.

**Online sales of direct-to-consumer genetic testing services: commercial strategies and socio-ethical issues**

*Ducournau Pascal (Inserm, Toulouse, France)*

*Alexandre Bulle (Inserm, Toulouse, France)*

*Anne Cambon-Thomsen (Inserm, Toulouse, France)*

*Pierre-Antoine Gourraud (Inserm, Toulouse, France)*

*Emmanuelle Rial-Sebbag (Inserm, Toulouse, France)*

Online availability of direct-to-consumer genetic testing services for various diseases and behavioural traits appears to have been a sales success since its incipency around the turn of the millennium. What are the marketing strategies implemented by the companies commercializing these tests and the social expectations they feed on? From a quantitative and qualitative analysis of the websites offering such tests, it appears that these companies have based their expansion on a triple-branch market: “healthism”, contemporary claims revolving around the individuation of “biopolitics”, and bio-social bonding. Each of these three marketing strategies raises a number of socio-ethical issues that require careful consideration in the face of an unprecedented surge of the genetic testing market.

**Negotiating fidelity to biology: the relationship between know-ability, do-ability, life and infrastructure in the Barcoding of Life Initiative**

*Ellis Rebecca (Lancaster Environment Centre, Lancaster University, UK)*

In this paper I draw upon observations of the Barcoding of Life Initiative (BOLI) to explore the potential in contemporary global biodiversity science for questions of biological meaning (e.g. what is a species and how can we know it), to be shaped and/or displaced by practical questions of how to collectively authenticate and generalize a way of knowing and ordering the natural. The taxonomic sciences have been dependent upon advances in molecular biology and informatics since the 1950s. What BOLI has more recently introduced is an iconic simplicity of the barcode itself (648 base pairs works to faithfully differentiate between species and hence works as a species-level indicator) with ambitions to craft scale and universalise this form of taxonomic practice (one barcode = one species = all life). The global scale of BOLI coupled with the genetic reduction it depends upon introduce some new issues which build upon a long standing interest in STS in the various emerging configurations between flesh and digit.

The paper focuses on ethnographic material gathered at 2 BOLI meetings held in Taipei in 2008 (Plant Working Group and Data Analysis Working Group). I am particularly interested in 1 dimension of these discussions held in Taipei: the gradual replacement of exotic epistemic aims (including fidelity to biology's complexity) with the mundane establishment of informational infrastructure (bioinformatics commitments to universality and practical ease). For the latter point I draw insight from Bowker's concept of 'infrastructural inversion' (1994). Bowker wonders at the capability of big information managers such as Babbage and Schlumberger to shift from lyrical claims about the nature of the universe to pragmatic claims about the economics of information science. His analysis hinges on his more general observation that an oscillation between information and 'life-itself' is of course inevitable as all information is about the nature of the universe. The connection between the exotic and mundane for BOLI, might be more than a coincidence. Barcoding is perhaps a further vivid example of Bowker's argument that the world (nature) both is and is of information. In terms of BOLI, this is an important discovery as the replacement of wondrous claims with infrastructural pragmatism is firstly necessary to propel a technoscientific innovation of this proportion. But it is also important in that the infrastructure becomes the knowability, the science and the innovation.

**Growing a community of 'BioBrickers': standards and social engineering in synthetic biology**

*Frow Emma (ESRC Genomics Forum, University of Edinburgh, Edinburgh, UK)*

Standardization lies at the heart of synthetic biology, an emerging discipline concerned with bringing engineering principles to the design and construction of new biological devices and organisms. Standards in synthetic biology are often associated with particular imaginations of the future — for example, they are variously presented as facilitating an Industrial Revolution in biological engineering, or as a force for 'democratizing' biotechnology. This paper explores the relationship between standards, imaginaries, and social order in recent attempts to engineer life. Through a multi-sited ethnography involving participant-observation at synthetic biology meetings, interviews with synthetic biologists, and document analysis, I investigate the (re)orientation of knowledge, power and community values in relation to BioBrick design standards and imagined futures of synthetic biology.

Named with explicit reference to Lego® bricks, BioBrick™ standard biological parts are designed to enable easy and reliable assembly of modular, genetic circuits with defined and predictable properties. Furthermore, the design of BioBricks invokes a model of access and sharing that emphasizes their collective value and re-use — their 'success' is linked to the growth of a community that creates, circulates, recombines, and reuses standard BioBrick parts. A number of initiatives are thus being implemented to foster such a community, including the development of open-access physical and virtual BioBrick repositories, the hosting of an annual undergraduate competition geared towards populating these repositories, the founding of new journals and publication formats, and the creation of a bespoke intellectual property framework for BioBricks. Such initiatives provide spaces for community development, but also for challenging the technical and social orders imagined by early proponents of the BioBrick. By tracing the simultaneous evolution of BioBrick standards and the community of BioBrickers who use them, I will explore the enactment and modification of sociotechnical imaginaries in synthetic biology.

## **The (Un)Certainties of Digital Radiodiagnostic Imaging.**

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Medical images have come to be seen as interchangeable with the body being scanned, rather than as a construction of it: they appear to reflect the inner body 'as it really is' and to therefore render it knowable and controllable (Joyce 2008). The 'myth of transparency' (Joyce, 2008) rests on a long tradition of scientific endeavour that seeks to 'reveal' the natural world, without human mediation (Shapin and Schaffer, 1985, Haraway, 1997). Technologically extended vision and mechanically produced images lay claim to particular authority in knowledge production (Joyce, 2008: 51). Use of machines, such as Magnetic Resonance Imaging (MRI), Computed Tomography (CT), and Positron Emission Tomography (PET) come to symbolise progress, the 'gold standard' in care. However, this belief in 'mechanical objectivity' (Daston and Galison, 1992) erases the human values and labour involved in image production, the social, economic and political context of the technology and its use, the sociality of knowledge production.

STS scholars have critiqued this by drawing attention to the social and technological construction of radiodiagnostic images in laboratory and clinical practice, particularly through ethnographic studies (e.g. Burri, 2008, Dumit, 2004, Joyce, 2008). The aim of this paper is to review the existing literature through the lens of technological change and to ask whether there is now an opportunity to further explore (un)certainty in radiodiagnostic practice and to challenge the 'transparency myth'. The paper will consider advances in image production but also image processing, image display, recording, storage and transmission. Changes in technology mean that analogue images on film have been replaced by digital images, displayed on high-quality screens that can be extensively manipulated, e.g. to suppress noise in the image, or to increase contrast. Multi-detector CT can produce hundreds or thousands of axial images and these can be combined into 3D, or read in 'stack' (cine) mode; for certain organs, a 'fly-through' or 'image-navigation' technique is used (Doi, 2006). Do such techniques serve to remind us of the technological construction of an image? Do multiple images of the same body occasion more awareness of the role of human decision-making in rendering pathology visible or invisible? Where is (un)certainty maintained or lost in the process of image production, reporting and transmission of results?

## The Politics and Practice of Digital Specimens

*Hine Christine (Department of Sociology, University of Surrey, UK)*

This paper explores the increasing use of digital images of specimens in biological systematics. Traditionally, biologists working on the classification and naming of organisms have worked with collections of specimens. These preserved artefacts are used as reference points for naming and as material for exploring relationships between organisms, both living and extinct. A set of routinized practices for preserving, organizing, owning, sharing and examining these specimens are in place. Latterly there has been a growth in use of digital images of these specimens. A variety of factors have driven this expansion, including concerns about the inefficiency of traditional working practices and the inequities produced by collections largely located within developed nations rather than the biodiversity hotspots from which the specimens originate. Digital specimens have been promoted as a means to widen access to specimen collections and overcome inequalities between scientists from different countries. There are, however, considerable difficulties to overcome. Distributed access to digital specimens potentially threatens the remit of the existing institutions in which specimen collections are held. Also, despite the political pressure to digitise specimens and share data, it is often not entirely clear who is to use digital specimens nor what they might usefully achieve with them.

This paper explores the intersection of traditional working practices in systematics with the emergent digital technologies, focusing in particular on the qualities of the digital specimen. The data comes from an ethnography of working practices in contemporary systematics. In particular, a series of interviews with systematists on the possibilities and challenges of working with digital images of specimens is analysed and compared with official statements and manuals on the digitisation of specimens. The results show that the qualities of digital and material specimens are defined in context, in conjunction with one another, in quite fluid ways which depend on the notion of effective co-presence between expert and artefact. Whether the specimen is counted as effectively present when encountered in digital form is often a retrospective judgment, made on the basis of whether a robust taxonomic opinion could be produced (which is itself of course a flexible notion). In some cases the judgment is made in absolute terms, by reference to characteristics which the digital specimen can or cannot portray. In other instances the comparison is scalar, and the digital specimen is considered to carry the same information, but in less detail. The advent of digital specimens is portrayed as offering the chance to reduce the need for specimen loans and travel in order to achieve effective co-presence between expert and artefact, whilst not rendering the material specimen obsolete. In the process of adopting digital specimen images the discipline as a whole and the individuals and institutions which comprise it have encountered a potent reflexive moment, focusing attention on the nature of their own practices and the artefacts which they depend upon.

**From commons to markets. Property regimes of animal genomics and breeding services in Europe***Labatut Julie (INRA, France)**Allaire Gilles (INRA, France)**Aggeri Franck (ENSMP, France)*

This paper aims at relating breeding services organisation (quality regime) to the property regime of animal genomics information which is an essential feature of these services; this relation being studied through the analysis of changes both in genomics science and the commoditisation of breeding services. In France in particular, these services were under public governance (corporatist governance including farmers' professional groups) until a recent law allowing change. We refer to market institutional analysis (Allaire, 2009) and instrument based approaches (Labatut, 2009; Aggeri and Labatut, 2010). The notions of property regime, governance structure and conception of control refer to the structure and dynamics of markets; these institutions support quality regimes. We propose to unfold these institutions through the analysis of the devices, instruments and technologies which materialize and affect institutional and organisational services market arrangements (measurement tools, database, scientific technologies...). Using the case of the development of genomic innovations and the political changes in the realm of animal breeding, animal genetic services and markets, we show how the study of the introduction of a new scientific technology can help the understanding of the evolutions of property regime and markets. The effects of biotechnologies have been widely studied in the realm of plant breeding and GMOs, sometimes with a classical analysis of property rights (intellectual property rights, patents, etc.) (Buttel and Belsky, 1987; Swanson and Goschl, 1999; Zilberman et al, 2004; Gaudilliere and Joly, 2006; Marris et al, 2005). However, we argue that the emphasis on the links between genomic innovations and the traditional concept of property rights (patents, etc.) hides a sizeable part of the processes involved in the concomitant change in technologies, politics and markets under scrutiny. Our approach here is based on the analysis of the 'materiality' of these processes: how instruments, norms, rules and databases evolved and affect markets of services as well as research programmes. We identify two ideal type regimes of property: a common property regime based on an historical cooperation between Science, State and the animal production industry and farmers profession; and an emerging open regime of genomics. Our aim is to present the process of change between the first and the second one, its concrete expression in terms of types of actors and relation between them, market structure of corresponding services and expansion, and policy regulation involved. First, we explain why and how the first regime is 'common', thanks to a pooling of scientific and technical instruments and a specific mode of knowledge production: the information on animals is produced thanks to a national database, a "calculative device" (Callon et Muniesa, 2007); the qualification of animals involves both scientific measurement and owners evaluation; the scientific theories are based on probabilistic logics; the State, through several norms and rules as a principle of territorial monopoly of breeding companies, ensure the commonality of this regime. Second, we analyse the actual transition from this common property regime to the 'genomic' one. The genomic revolution in animal breeding is far more recent (2009) than in plant breeding. It implies a revolution on how animals performance is made calculable. We define how this change already reconfigures actors, competencies, database management and markets in animal genetics. We show how this technological change interacts with political changes (breeding law reform, European norms evolution) to produce effects on the property regime of animal genetic resources and on how the market of genetic products and services is changing. Third, we discuss how this analysis participates to a better understanding of the intertwining of property regimes and markets.

## High Throughput Proteomics: Infrastructures and Research Politics

*Lee Francis (Linköping University, Sweden)*

In the wake of the successful mapping of the human genome several new fields of inquiry have emerged. These new efforts draw on the new styles of research, the technological developments, and the organizational models of genomics. These lines of exploration have embodied the 'Big Science' approach to microbiology and depend on massive infrastructural investments. These infrastructures make possible high throughput generation of data, computational analysis and modeling of biological data, and the organization and classification of massive data sets. Proteomics and the sibling fields, structural genomics and population genomics, have been argued to embody a new research paradigm in biology (Diamond and Woodgate, 2005).

This paper explores a postgenomic research project, the Human Proteome Resource, in Sweden. The goal of the project is to create a Human Protein Atlas (<http://www.proteinatlas.org/>) that is to map all the proteins in the human body. This research project has received in excess of 1 billion SEK in research grants. In the research politics as well as the organization of the research project infrastructures play a pivotal role. The funding the project received was connected to development of infrastructure and the infrastructure is used to facilitate a global organization of the project (annotations to the Atlas are done in Mumbai, India; animal rearing in Korea and China). Hence infrastructures are of pivotal consequence for the organization and funding of the project.

Theoretically and methodologically this paper draws on the concepts of translation (Callon, 1980) and coproduction (Jasanoff, 2004). The point of departure is the coproduction of a group of researchers, a technical infrastructure, and a research political agenda which emphasizes big science, excellence and innovation. Here the focus is on understanding how the research infrastructure relates to politics, the organization of the research group, and intellectual property. This approach is meant to highlight the heterogeneous processes of research, which has led to specific modes of organizing research, patent strategies, and ways of creating scientific knowledge. The material that underpins the analysis are interviews, document analysis, and observations.



**Assessing the introduction of computationally intensive techniques to study disease causality – possibilities, limitations and additions**

*Leeming Bill (Faculty of Liberal Studies, Ontario College of Art & Design, USA)*

The introduction of computationally intensive techniques to study disease causality has been integrally linked to reductionist manoeuvres in scientific imaging to unify and subsume, on the one hand, all that is known about cells, genomes, chromosomes, genes, proteins, and enzymes and, on the other, all that has been observed in clinical accounts of episodes of various disorders and illnesses in order to explain the aetiology of an assortment of diseases. At the same time, even as it is apparent that the biological factors being studied are causally operative in determining phenotypic effects associated with disease, biological theories have not been able to fully account for how the presence of these factors affect the occurrence of disease. This has meant that the entities represented in associated biodigital systems of representation have been limited, possessing only a finite number of properties, and being otherwise indeterminate with respect to all those properties and dimensions with which the systems are immediately concerned (i.e., disease causality). The images and theories concerning disease causality, nevertheless, remain arguably serviceable for the principal reason that they produce a useful knowledge when they produce agreeable diagnostic, prognostic and, ultimately, therapeutic results.

This paper begins with a historical survey of biodigital imaging practices associated with the representation of disease causality. These practices have aimed at fidelity to what is observable in nature, and share in common a structure of part-and-whole relations with a topological component that has stressed relations of contact and connectedness; to the visualization of limit, continuity, surface, point, node, and so on. The paper then goes on to review the salient propositions surrounding the design of biomedical ontologies in support of the development of comprehensive, searchable databases and an integrated platform for purposes of computer-assisted information sharing and analysis of clinical data. The use of the term “ontology” is here taken from the computer and information science literatures. Ontology, in this context, concerns itself with generating general categories of concepts and systems of representation developed in specific knowledge domains in order to objectively portray relations which purportedly exist between certain entities in reality. This leads, in a final step, to a summary of considerations for future assessments about the usefulness of imaging and knowledge dissemination practices concerning disease causality. In doing so, special attention is paid to the distinction made by Ian Hacking, and more recently Lorraine Daston and Peter Galison, about the *vita contemplative* and the *vita active* in science. Scientific realism, as Hacking observed, is most often discussed in reference to representation but, on the other hand, scientists also talk about the idea of “reality” in terms of experimental intervention into what we can affect in nature. Use and usefulness, as Daston and Galison have argued, imparts “a robust realism.”

**How to become a synthetic biologist**

*Mackenzie Adrian (Centre for Economic and Social Aspects of Genomics, Lancaster University, UK)*

By what processes do contemporary scientists come into being? This paper describes some of the processes of subjectification occurring as scientists become engineers and engineers become scientists in the nascent discipline of 'synthetic biology' and particularly in the annual educational biological engineering competition, iGEM (International Genetically Engineered Machine) competition. In the life sciences, scientists increasingly 'engineer' and are engineered by what the 19th century French sociologist Gabriel Tarde described as contagions of belief and desire. Smooth and flexible cooperation derived from engineering are imagined as delivering on the long-held promise of effectively designed organisms. Yet these forms of cooperation, often figured more as 'design' than as truth or knowledge, cannot fully assuage an underlying and constitutive discord in the biological subject already described by Georges Canguilhem. Contending that contemporary synthetic biologists embody new forms of this discord, the paper describes the affective dynamics of the iGEM competition. It analyses overflows of existing biopolitical modes of subjectification, and the contagions of epistemic, technical, experimental and media experience that affect how 'the synthetic biologist' and the science of synthetic biology takes shape.

**Crossnational Biobanking: benefits and challenges**

*Mattsson Pauline (Technopolis group, Stockholm, Sweden)*

*Meijer Ingeborg (Technopolis group, Stockholm, Sweden)*

In the last decade there has been an information overload in biology. The driving factor has been increasing statistical power by increasing the sample size for research with the objective to gain further insight into individual factors that together constitute multifactorial diseases. Similarly, statistical power considerations drive the industry in drug discovery. The main reasons why this has been possible are the rapid progress of technology and the advances in computational biology which allow genome-wide projects, as well as studying complete molecular networks and whole protein families. High-throughput gene sequencing technologies can read hundreds of thousands of DNA bases per day and different types of “chips” are making the process even faster.

Scientific databases are an essential resource for the biological and biomedical research communities since they provide the possibility for data collection, sharing and storing. So far funding agencies have mainly focused their research funds to support generation of new data while the storing, maintenance and access have been given less attention.

The Biobanking and Biomolecular Resources Research Infrastructure (BBMRI) is a pan-European network, including both existing and de novo biobanks and biomolecular resources, funded within the FP7 research infrastructures initiative. The aim is to include samples from patients and healthy persons together with epidemiological and healthcare information, representing different European populations, but also to provide molecular genomic resources and biocomputational tools. In a study focussing on the question as to what health and economic impacts can be expected from the construction of BBMRI a number of challenges could be identified. These are not limited to this particular initiative but can be expected in the setup of similar types of scientific database infrastructures.

The driving factor for collaboration at the European level is, apart from statistical power, the belief that the current demands for performing research at such large scale is only possible in a well organised research infrastructure. Today it is difficult for individual national research groups from different countries to perform such work due to strict legal and ethical regulations.

The interaction between biology and computation has opened up a new field which requires training in both domains. Together with specific analysing and laboratory skills biobanking will have to create its own profession. Today the number of people having the combination of these skills is low.

Existing data management and analysing methods are still a step behind the exponential increase of data. There is a need to not only focus on data generation but also to allocate resources to the development of new mathematical methods such as suitable algorithms. Today, scientific journals have rather favoured articles of experimental studies based on data generation rather than publishing new methodologies.

In addition biology needs to define new population genetics concepts as the current results from Genome-wide analyses demonstrate that mutations contributing to multifactorial diseases are not spread evenly across the global population to account for the occurrence of disease. At the same time this confirms the need for large, cross-national networks of biobanks.

**Making mzML: Data exchange standards as instruments in the data economy**

*McNally Ruth (Lancaster University, UK)*

The ethos of publicly funded research in the post-genomic era is one of openness and sharing of data. Within this ethos, the development of data exchange standards is typically associated with the building and serving of communities of practitioners, by supporting and enabling the ideal of communalism and community data sharing.

This paper follows the development of data exchange standards as a method for studying knowledge production in proteomics. The method included participating in the Human Proteome Organisation's (HUPO) Mass Spectrometry Data Standard Working Group.

Proteomics has a 'wet side' and a 'dry side'. On the wet side, proteomics practitioners represent their world in diagrams called 'workflows'. These workflows feed data into bioinformatic 'pipelines' on the dry side. At the junction between these two worlds sits the mass spectrometer. The outputs of these 'inscription devices' are peak lists. Peak lists are the inputs for the specialized search engines that mark the entrance of the bioinformatics pipeline. However, there are various competing brands of mass spectrometer for proteomics and each encodes its data in a different format. This diversity was one (of a number) of justifications for developing a data standard.

The goal of data standardisation was adopted by HUPO in 2002 under its Proteomics Standards Initiative (PSI). By 2004, the PSI had written a draft XML interchange format for mass spectrometry data, called 'mzData'. However, that same year an alternative standard for proteomics mass spectrometry data, called 'mzXML', was released by the Institute for Systems Biology (ISB).

Both mzData and mzXML mediate and standardize the data that flows from the laboratory into the bioinformatics pipeline. However, the precise point at which each acts, and what they include and exclude, differ in ways that can be interrogated to explore the different interests each seeks to serve and enroll.

Analysis of the differences between these two standards, and of the actors who endorsed, resisted or merely ignored them, was used as a method to articulate these interests. The findings make it clear that the analytical framework of a 'community' of practitioners does not fully capture the constellation of interests that converge on this particular juncture in the proteomics knowledge production line. Apart from the practitioners, other actors with interests in how the flow through this juncture is configured include commercial vendors of mass spectrometers, journal editors, developers of search engines and data visualisation software, laboratory information management systems software developers, database managers, computer hardware vendors, and life science R&D companies (big pharma), and also professional bioinformaticians.

Rather than a community of practitioners, this heterogeneous network of actors can be conceptualised as a 'data economy' for the production, distribution and consumption of goods derived from the doing of research in proteomics. From this perspective, data exchange standards function as instruments for the redistribution of where value from the processes of data production can be accumulated and extracted, at what transaction costs and by whom.

## **Genetic genealogies and genetic memoirs**

*McNeil Maureen (Cesagen and Centre for Gender & Women's Studies, Lancaster University, UK)*

This presentation will explore popular personal narratives which recast genealogies and lives with and through genomics. It will focus on a recent popular memoir which revolves around genealogy and genetic decision-making. Masha Gessen's *Blood Matters* (2009) provides a life story of a woman who is advised to have drastic surgery because she carries a genetic mutation that predisposes her to breast cancer. It will consider how genealogy is represented and negotiated in this memoir and how genomics figures in these. It will also examine the representation of developments in biomedical practices that are linked to personal genetic testing including the evolution of genetic counselling and prophylactic surgery. A further thread in this presentation will be an examination of how digital interfaces (in the form of bio-digital social networks and high-level statistical risk analyses) emerge as particularly crucial in such stories.

## Scoring animal life

*Miele Mara (Cardiff University, School of City and Regional Planning, UK)*

*Veissier Isabelle (Inra, France)*

Welfare Quality® is an EU project that set out to deliver reliable, science-based, on-farm welfare assessment systems for poultry, pigs and cattle as well as a standardized system to convey welfare measures into product information. Farm animals differ in their genetics, early upbringing and temperament and therefore may experience the same environment in different ways. In the assessment of animal welfare the animal scientists working in the Welfare Quality® project focused on so-called performance measures that are based on measuring the actual welfare state of the animals in terms of, for instance, their behaviour, fearfulness, health or physical condition. They developed a large number of measures for the assessment protocols of the three species examined that provided a characterization of 12 welfare criteria (e.g. comfort at resting, positive emotion, appropriate feeding....) and four basic welfare principles (good feeding, good housing, good health and appropriate behaviour).

The on farm assessment generates a substantial amount of data and a software has been developed (so far only for cattle) to record on a laptop directly during the farm visit all the welfare measures. Then, all these data become part of a large European dataset. At farm level, the measures are aggregated on the basis of a hierarchical evaluation model, to be integrated into an overall score of the animal unit under evaluation. This software progresses from the 30-50 measures, through their integration into scores for each of the twelve criteria and then, through the grouping of criteria, to form four principles, to the final step where the scores for the principles are integrated into an overall welfare assessment (not classifiable, acceptable, enhanced and excellent)

In this paper we look at the construction of the scoring model: we trace all the key points of decision on how the thresholds of 'acceptability' of the model have been achieved and the scores that are generated. Ultimately we discuss how the evaluation of the quality of life of farm animals is rendered in this model (i.e. four ethical categories) and what are the promises (and the risks) associated with a standardized system of welfare assessment.

**The rise of Phenyx: analysing computational approaches to bioscience**

*Molyneux-Hodgson Susan (University of Sheffield, UK)*

An increase in the use of IT in biological research fields has been widely reported. The origins of this move are variously located in discourses of converging technologies, the huge proliferation of 'data' that has been generated by genomic research programmes and the rise of 'new' approaches to studying biosciences, such as systems biology.

In this paper I aim to interrogate the roles of computation, understood in terms of the increasing mathematisation of previously non-mathematical sciences. The process of mathematisation has been noted before, for example, in the transformation of geology from an interpretive and historical discipline, into earth science, a discipline that practices a more quantitative and interventionist approach to the world.

Drawing upon ethnographic work in laboratories, interviews and documentary analysis, the inexorable rise of mathematical manipulations of lifeworlds will be analysed. I suggest that what had previously counted as a valid bioscience - when the world could be described - is now becoming valid only if matter is subjected to mathematical modelling. Manipulations of biological data via algorithms and optimisation curves are seen by many scientists as the place where progress can now be made. Thus, what had been understood as biological research up to now is changing; words such as 'traditional' and 'conventional' are being used in a derogative way to describe the biology of the past. Systems, predictive and synthetic biology are the new futures and all of these involve computational interventions.

To evidence my arguments, I will present two case studies of everyday practice with computational tools. The first case centres on a piece of software called Phenyx. This technology sits at the locus of the outputs of large instruments like mass spectrometers, remote databases, and sophisticated mathematical modelling techniques. Such software enables macro and micro worlds to be linked in ways more commonly evident in physics and engineering than in biology. Algorithms embedded in the software work to sort and categorise, draw relations, and lead towards inferences that switch between the abstract and the 'real'. These tools also connect academic research and commercial worlds in new ways.

The second case focuses on how control engineers – more commonly found working on aircraft systems and such like – apply their approaches to the biological realm. Biological representations of the world are converted into engineering system interventions. Complex mathematical rules are then used to manipulate matter that no longer has a biological meaning. But in some ways the biological world also resists these moves. If the computational models do not ultimately deliver biological meaning, then it is the mathematics that has to change. Biology is making the engineers modify their theories – putting distance back in, between living and mathematical realms.

In sum, the rise of computation in biological research has more far reaching implications than just using IT to deal with large data sets. All scales of the world are being transformed and manipulated in new ways.

**Disaggregating convergence: the language of 2.0 in consumer genomics**

*O’Riordan Kate (University of Sussex, UK)*

In recent years web based personal genome sequencing, personal genotyping services and genome scanning have opened up into new consumer interfaces. Emerging in the context of internet based social networking technologies these services are framed in the language of Web 2.0 and in some cases appear as the exemplar applications of this milieu. In this context, personal genomes appear to constitute a kind of bioIT convergence.

This paper traces the forms that this convergence takes by paying particular attention to the strategies deployed by the personal genomics company 23andMe. This tracing contextualises the emergence of this company in terms of both its geopolitical location and its position in a digital media ecology.

Drawing on fieldwork including an analysis of materials generated through this nexus, and interviews with professionals in the industry and consumers of genomics, the paper steps back from the promises of convergence to look at the differential power relationships that are at work.

Disaggregating the use of shared terms – such as crowdsourcing – in the context of 23andMe provides a way of looking at what is going on under the sign of convergence. 23andMe puts ‘you’ into the digitised genome, through the affordance’s of Web 2.0 and this signals a different kind of consumer interface for genomics. This work opens up questions about the power of ‘computer language’ to inform the language when it comes to defining what is going on in political terms. In this context disaggregating convergence provides an approach for opening up much broader questions in relation to consumer genomics than those currently defined.



## An 'open' letter to GenBank: how to make representations for your organism

Tahani Nadim (Goldsmiths College, University of London, UK)

This paper takes as its starting point an 'open' letter (Bidartondo et al 2008) published in Science and signed by 250 mycologists that drew attention to inaccuracies affecting certain GenBank sequence records, particularly associated with sequences originating from fungi. The letter called for a new, community-led cumulative approach to sequence annotation, which was quickly seen to amount to a demand to effectively "wikify" GenBank. This was, not surprisingly, met with resistance from GenBank but also spurred a range of reactions from other science communities, such as a second open letter to Science, this time issued by the E.coli community.

Drawing from interviews with GenBank curators as well as current literature on gene annotation (see for example Salzberg 2007; Huss et al 2008), this paper examines the socio-technical practices of GenBank annotation, accuracy and wikification with a view to: a) mapping the multiple instantiations of in silico fungal fragments and in vivo fungi; b) examining the representational affordances of these instantiations within the debate; and c) re-appraising the open letter as an affective and effective device in addressing biological databases.

The paper argues that the debate that followed the publication of the letter constituted a controversy in the course of which apparently docile objects (such as the GenBank record), settled issues (such as accuracy) and coherent actors (GenBank, the fungal community, fungi) become re-arranged and, in some cases, unruly. Following Callon et al's (Callon et al, 2009) suggestion that controversies represent a particular genre of conflictual encounter in which actors and entities are constituted performatively, this paper pays particular attention to the affective registers (Stengers, 2000; Berlant 2008) at play in the practices of annotation, accuracy and wikification and their attendant (re)-constitution of GenBank records, in silico and in vivo fungi, authors and experts, and the public.

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**Genomics 2.0: Expectations and Convergences of Computing and Genomics**

*Tutton Richard (Lancaster University, UK)*

*Martin Paul (University of Nottingham, UK)*

The personal genomics market has been recognized as the latest example of the contemporary convergence between genomics and computing. Several of the leading firms, 23andMe and deCODEMe, utilize social networking techniques, allowing consumers to share information with others such as friends or family and to join 'research communities' dedicated to pregnancy and Parkinson's Disease. Moreover, entrepreneurs from the IT sector such as the founders of Google and PayPal have become key investors in the personal genomics market, and new emergent sequencing companies are modelling their operations on established web services. This paper examines this question of convergence by investigating the way that actors from the computing and web sectors are being enrolled in the construction of expectations about this market, forming what we call 'material promissory communities'. This paper will draw upon and illuminate discussions in the sociology of expectations literature on the relationship between aspirational discourse and material practice or embodiment. By implication, materiality is often subordinated to something that 'comes after' anticipation, as something that either does or does not 'live up to' the expectations once held of it. However, as Nik Brown (2005) argues, contemporary expectations are prefigured through a long history of events, material practices and previous promises. In a similar vein, Andrew Pickering (1995) suggests that future states are constructed from existing cultures and practice through a process of 'modelling'. This paper will therefore address these issues by considering the ways in which expectations of the personal genomics market are in part shaped by expectations and socio-technical practices of the computing and web sectors.

## **Animal Genomics, DNA verification and the transbiological**

*Twine Richard (ESRC Centre for Economic and Social Aspects of Genomics)*

The linkages and transitions between bio-digital being/s and associated emergent novel bio-IT worldings evoke the concept of the transbiological (e.g. Franklin 2006), the multiple social spatialities and forms of the biological. The in-silico elaboration of materiality most obviously associated with the molecular turn in the sciences of nonhuman animal domestication (and genomics and post-genomics more generally) is key to the corporate promise of new economic value. But what exactly is the in-silico enabling? There are similarities here to the novel combinations and 're-engineering' part facilitated by the preceding emergence of mobile in-vitro biology perhaps most obviously facilitated by the ability to freeze animal gametes and their agential role in the trans-national advance of Western animal agricultural scientific method seen, for example, in the normalisation of artificial insemination in the farming of several species.

In exploring the possibilities of the transbiological in animal agricultural science one could turn to the now commercialised techniques of marker assisted or genomic selection, or return to the on-going attempts to commercialise GM or cloned animals. Instead this paper focuses on the technique of DNA verification as a heuristic for exploring the multiple ways in which the bio-digital being of domesticated animals is being incited for new forms of capitalization. Firstly the technique is becoming important as a mode of tracing the source of meat to a particular herd or animal. This occurs in a regulatory context of increasing concerns over food safety, zoonotic disease and to a lesser extent animal welfare. Secondly DNA verification is being commercialised in the form of breed verification. Here genetic science is enrolled to provide 'factual proof' that a particular meat product does in fact emanate from the breed from which it purports. Thus prized breeds are now able to profit from the award of new quality assurance schemes and standards, for example, the USDA approved Angusure™ verification. This paper considers various corporate appropriations of DNA verification exploring both their tension with the opacity of the commodity and their relationship to the transbiological intersection of pure and impure and it's pre-occupation with functional, safe and marketable biology (Franklin 2006: 176).

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## Identity formation in biology as information science

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Genomics produces biological data much faster than we can ever hope to analyse and make sense of it. In the context of producing and analyzing this avalanche of data, biology has been transformed into an information science (Thacker, 2003; Zwart, 2009); a process that started with various smaller genome projects and accelerated with the Human Genome Project. Concentrating on human genomics, this transformation of biology could shed new light on human identity, leading to the question for this paper: how can we rethink human identity in the context of biology as information science?

Some authors identify the bioinformatisation of human life as a result of the increasing role of genomics and thus of bioinformatics in research fields that concern themselves with understanding (human) life and identity, such as brain research and the behavioural sciences up to archaeology (Zwart, 2009). It is this bioinformatisation of human life and identity that I want to focus on in this paper.

I will frame identity not as a (personal or collective) narrative about the self, but as a combination of material and discursive practices, a process where discursive - and material elements, mutually affect and overlap one another.

Kay's analysis of the introduction of the concept of information in biology (Kay, 2000) has triggered a discussion regarding the validity of the concept of information in biology (Brandt, 2005; García-Sancho, 2006; Griffiths, 2001; Moss, 2003; Smith, 2000). Rather than concluding in any definite way that seeing genes and the genome as information is correct or incorrect, I agree with Kay, who argued, that the concept of information changed as research progressed as much as the concepts of the gene did, in order to fit the requirements of contemporary biology (Kay, 2000 p. 26). A claim supported by Brand in a number of case studies (Brandt, 2005). Quite apart from its validity, the ubiquitous use of the concept of information has had its influence on genomics and, as I will argue, on identity.

It is likely that genes will primarily function as a source of information in human genomics, since it is increasingly unlikely that we will be able to transform the human species by large scale genetic modification, while the promise of genes to inform personalised medicine and diet, among others, is very much alive (Zwart, 2009 p. 135). Bioinformation then, is at the core of how genetics changes human identity. At the same time information has immaterial as well as material aspects that cannot be separated. Immaterial in that information can travel between media (e.g. body and database) and at the same time material in that it depends on- and changes with the medium that contains it; in biology in genetic, metabolic and magnetic processes.

The concept of information, its (im)materiality and its vicissitudes in contemporary discourse thus offers an opportunity to look at both the material and the discursive processes involved in identity formation and can offer some insights in the material-discursive boundary field of identity processes.

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#### Track 17

##### **From biodigital lives to BioIT worlds: in-vivo, in-silico and in-vitro embodiments and dissonances**

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## **TRACK 18**

# **The Struggle for Meanings: Representations And Debates in the Nanotechnology Field**

### **Convenors:**

**Arianna Ferrari (Institute for Technology Assessment and  
System Analysis, Karlsruhe, Germany)**

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France)**

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## **Framing Nano: Scientists' and Policymaker's Representations of Ethical Questions**

*Anderson Alison (University of Plymouth, UK)*

*Petersen Alan (University of Plymouth, UK)*

Nanotechnologies are surrounded by high expectations yet there is considerable uncertainty about their impact. Discussions about their likely ethical implications have often assumed that ethical issues and standpoints are relatively clear. Ethical issues arising from nanotechnologies have tended to be perceived from a utilitarian approach to 'benefits' and 'risks'. This shifts attention away from unpredicted or unknown effects (which are, by their nature, hard to anticipate) and neglects to provide publics with a real chance to express their perceived social and ethical concerns. This approach assumes that identified problems can simply be dealt with through further research and enhanced regulatory procedures, thereby neglecting the social complexity of nanotechnologies, the exercise of power in problem definition and the involvement of vested interests in certain 'framings' of issues. Drawing on data from a recent (British Academy funded) UK based study this paper examines how scientists and policymakers' representations of nanotechnology contribute towards thinking about the ethics of this field. The findings suggest that their particular framings may constrain debate on a range of important issues, including the direction of current research priorities and whether investments in particular areas are likely to have the desired social and economic impacts or result in deleterious effects. In general the respondents were positive about the perceived benefits of nanotechnologies and tried to distance themselves from broader non-technical questions. Scientists and policymakers, it is argued, need to reflect much more upon their own assumptions and examine how these may influence the trajectory of technology development and public responses.

## **The shaping of nanotechnology: performing techno-scientific promises, governing competing futures**

*Audetat Marc (Science Society Interface, University of Lausanne)*

*Kaufmann Alain (Science Society Interface, University of Lausanne)*

“Nanotechnology” proves to be an incredible attractor of narratives and visions, first maybe to obtain funding, although for many different reasons. Performing visionary discourse, producing narratives and images, making sense, advertising, are critical for any actor, from the R&D sphere to the governance one. In engineering, nanotechnology’s definition is deeply marked by the controversy between the bottom-up vision of drexlerian nanobots and the top-down approach in chemistry and electronics. Today, whole disciplines and laboratories are moving quickly to attract funds and take position in the field of nanotechnology. Institutions have discovered overnight they were specialised since a long time in nano. Nanoscientists need to envision their discoveries. Nano-innovators must enrol venture capitalists. Governance is challenged to produce discourses framing innovation and risk. “Folk theories” of nanotechnology are circulating (Rip, 2006). At the same time, behind the scene, many actors say that the tag “nano” will soon disappear, leaving place to specific innovations in the various domains.

Convergence of discourses, more than technology, is remarkable. In the “singularity” narrative, old technological utopias are merging with scientific promises. Nanotechnology brings in people disillusioned by the space programme, the old AI school, the enthusiasts in the biotech revolution, together with the promising neurosciences, electronics, materials, nanomedicine, accompanied by some philosophers and psychologists. All are captured, rearranged and realigned into new visionary perspectives. But the singularity discourse is only the tip of the bubble. Polls into the blogosphere and the mass media show the bulk of visions, promises, popular theories and aesthetics of the “Nano Age”.

“Struggle for meanings” is indeed an excellent method to analyse the current shaping of nanotechnology. Far from being defined by scale and size, nanotechnology is going to be the result of controversies about definition, promises, markets, acceptable risk, and other societal meanings. The production of speculative narratives of nanotechnology is bubbling. Maybe it is because actors are aware of the uncertain and opened definition of nanotechnology. As a result, and maybe as a distinct feature, the “nano” nebulae is unusually opening room for future visions and public debate about technoscience. Desirable and unacceptable futures are flourishing and diverging. Old technological determinism, from the most optimistic (NBIC) to the most dystopic (“Pièces et Main d’Oeuvre” in France), coexists with the uncertain visions produced by the environmental and climate crisis and the problems of inequalities in the present world. The unequal distribution of risk and healthcare is clashing with anti-aging and human enhancement claims.

In the domain of assessment and governance, the room opened by future visions and all possible scenarios must be exploited to forge societal meanings of nanotechnology. The calls to research to happen “responsibly” or in favour of sustainable development are short, and may remain pious vows. In this paper, we ask to what extent a more inclusive governance might shape, or not, emerging technologies. We also discuss how governance, mainly occupied with risk, is going to cope with all these “desirable” futures and policy choices.



## Multiple identities in nanoscience

*Baus Daniela (Department of Sociology, University of Lucerne, Switzerland)*

Do heterogeneous collaborations promote community building? Investigation of “interdisciplinary” research has shown it to be frequently a starting point for the development of new disciplines and epistemic fields. Shinn and Joergens (2004) argue that most heterogeneous collaborations have an innate tendency to homogenize. The outcome is a new group that incorporates the previously heterogeneous partners. Nanoscience, on the other hand, is an example for multidisciplinary research that does not seem to proceed along the path of homogenization. In fact, it shows such diversity that it is said not to exist but as an umbrella term for all kinds of research employed for funding purposes.

The paper focuses on identity construction in a heterogeneous research field between the formation of a collective identity on the one hand and maintaining internal differences on the other. It draws on findings from an ethnographic study of nanoscale research in Switzerland and shows the conflicting and inconsistent identity of nanoscientists.

Although the nanoscience label is popular among scientists for outward representation due to its ability to generate funding, it is not the preferred association when among peers. The ethnographic study has shown that internal boundaries are constructed mainly along disciplinary differences. Disciplinary affiliations are the principal resource for professional identity within the multidisciplinary field of nanoscience. However, the wider nanoscience research field still plays a role in constructing this identity. The multidisciplinary environment comes into play in the form of stereotypes. Cultural stereotypes foster group feelings as well as demonstrate distinctions from other groups. Thus, the nanoscientists construct their identity in reflection of stereotypes about the other participating groups. While there is no expression of an overall nanoscience identity, the mutual references towards the other groups located at the same university construct an imagined research field that includes a particular set of disciplines. It does not lead to the internal integration of a community in the strict sense as the researchers do not regularly conceive of themselves as nanoscientists in this context. But they construct the field of nanoscale research as comprised of their respective discipline together with those disciplines they refer to for distinction.

Thus, identity construction in nanoscience involves multiple and at time competing affiliations between which scientists switch according to context. There are no signs of homogenization but nevertheless a shared identity level is constructed that is applied in certain circumstances, such as funding, communication with the wider public about research interests and results, and student recruitment.

## **A World of Meetings and Events: Configuring the Swiss Nanosciences**

*Biniok Peter (University of Lucerne, Switzerland)*

The field of the nanosciences in Switzerland is characterized by a large number of mediating structures (e.g. “networks” or “platforms”) and a remarkable plethora of events (such as “industry days” or “tech days”). The analysis will focus on those events and meetings that do not exclusively address an academic audience but bring together heterogeneous sets of actors from science, industry, politics and public. The organizers (funding institutions and nanoscientists) state different goals for these conferences and meetings: they are supposed to enable science-industry-cooperation, render discussions on effects and impacts of nanoscience and nanotechnology possible, and educate the public about nanoscience and nanotechnology.

On the basis of these observations, the questions arise how (and to what extent) nanoscientists take part in and make use of these events and how (if at all) events of this type affect the development of the nanoscientific field. There is no one simple answer because each type of event has specific characteristics. One has to differentiate between the purpose and the subject-specific themes of the events. Two hypotheses will inform my analysis:

- 1) The nanoscientific field is supported by events because they make nanoscientific research visible and accessible. Most events primarily focus on the promotion of the organizing institution and not on the distribution of new scientific findings within the nanoscientific community. For nanoscientists to participate at such events as either speaker or guest seems to have a symbolic significance rather than a scientific one.
- 2) Events reproduce the heterogeneity of the national research community. Yet, at the same time they assist in linking up nanoscientists and foster their connectedness in the field of research. Events reflect the regional orientation and the research themes of the organizing institutions and emphasize the existence of different fields within Swiss nanoscale research. The type of nanoscientists in the audience varies with the event. Hence interinstitutional or interdisciplinary linkage among nanoscientists and between them and other audiences is furthered.

I will argue that nanoscientists selectively take part in meetings and conferences to use them as opportunities to promote the nanosciences, their specific orientations with respect to the nanosciences, and to construct and maintain personal networks.

The paper is based on a current research project conducted in the field of publicly funded nanoscale research in Switzerland. The project employs qualitative research methods, combining participant observation with interviews and document analysis.

## **Shaping issues or keeping them at a distance. Mobilizations on nanotechnology issues**

*Brice Laurent (CSI, Mines ParisTech, France)*

Nanotechnology programs are said to be based on « responsible innovation », meaning that risk and ethical issues are supposed to be taken into account at an early stage in technological developments, while dialogue with stakeholders is pursued. This integrative feature of nanotechnology policy raises issues for the social mobilization. How to mobilize on anticipated issues and/or a global science policy program ? How to maintain a critical distance in a field that seeks to integrate all stakeholders ? Using an empirical study of two French civil society groups, this paper explores what social mobilization means on nanotechnology.

Vivagora is an association that promotes public discussions about technical choices. It has been involved in nanotechnology for the past few years, organizing public debates and participating in collaborative projects. It currently leads a project that seeks to create a Citizen Alliance on Nanotechnology. Pièces et Main d'œuvre (PMO) is a Grenoble-based group which has been strongly opposing local and national nanotechnology projects – activities for which it was joined by various activist networks.

By describing the trajectories of the two groups over the past five years, from local controversies in Grenoble to the recent national public debate on nanotechnology, this paper argues that both Vivagora and PMO have built forms of mobilization that take into account the specificities of nanotechnology's science policy program – albeit in different ways. Vivagora has chosen to actively participate in the shaping of the social order implied by nanotechnology, which means that the relationship between the association and the actors of nanotechnology policy is to be negotiated constantly. PMO has been trying to maintain a position at a distance, in order to articulate a radical critique of nanotechnology policy and its participatory instruments. The description of the fine-grained arrangements that the two groups need to negotiate in order to stabilize their forms of mobilization shows how nanotechnology reconfigures the possible actions of social movements.

## **The struggle between different paradigms of nanoethics**

*Christiansen Karin (Department of Philosophy and The History of Ideas, Aarhus University, Denmark)*

In the DEEPEN project research report entitled: Reconfiguring responsibility - Deepening debate on Nanotechnology [2009], the field of nanoethics is being discussed with recommendations for new directions and approaches. The report raises doubts about the adequacy of describing and discussing nanoethical issues as a small set of standard questions revolving around the concerns about invasion and protection or privacy, safety from physical harm, the sacredness of 'life' and 'human nature', the threshold between maintaining and altering nature. Furthermore, the DEEPEN project works from the basic assumption that the field of nanoethics should not be conceived as another branch of applied ethics such as bio-ethics, environmental ethics or neuro-ethics, which often begins by describing the various issues and conflicts inherent within the particular field and hence applies a number of principles to the case at hand – often determining which action is permissible or not. Instead, they argue, "nanoethics is rather a way of casting our hopes and aspirations within the story-line of an accomplished life and a flourishing commonwealth" (Ferrari & Nordmann, 2009).

In order to capture the hopes and aspirations "within the story-line of an accomplished life", lay public in Portugal and UK are thus asked to provide researchers within the DEEPEN project with their views and visions of the emerging realities of nanotechnology. On the basis of these empirical findings 5 themes are being identified, which seems to be rehearsing and reiterating a number of classical themes such as the fear of evil conjured by the theme 'Pandora's Box' or the notion of the sacred invoked by the theme 'messing with nature'. The researchers conclude from these findings, that they show an intensification of ambivalence about technological change in the minds of the lay public, rather than pointing to altogether new spheres of ethical inquiry.

The aim of this paper is to reflect on the philosophical reasons for engaging in a kind of neo-aristotelian research into the 'story-lines of an accomplished life and a flourishing commonwealth' instead of drawing on a more traditional bioethical account of bioethics. Secondly, the paper analyzes ways in which the narratives of lay-people risk being reduced or applied in conservative ways if simply identified as 'rehearsals or reiterations of ancient themes'. The authors of the DEEPEN project report are well aware of the dangers of interpreting storylines in reductive ways. They ask: How does one go beyond the identification of storylines and beyond a merely conversational mode of open-ended sharing of ethical concerns? And in particular, what role does philosophical reflection and critique have to play in this [...]" (Ferrari & Nordmann, 2009). The reasons why it is important to create a space and a momentum for philosophical reflection and critique beyond the identification of a set of rather narrow (and well known) storylines or merely conversational mode of sharing of ethical concerns will be addressed in the final part of the paper.

## **The Piecemeal and Distributed Shaping of Nanotechnology's Public Image**

*Coenen Christopher (Karlsruhe Institute of Technology, Germany)*

Until well into the 1990s, nanotechnology was couched in futuristic terms and mainly related to technophile subcultures. With its advent, visions of such areas as artificial intelligence, human biology and space exploration converged, thus also bringing about a convergence of technoscientific imaginaries regarding the human body. In the 2000s, some policy initiatives continued to describe nanotechnology in this way, thereby contributing to the strong interest in nanotechnology's 'transhumanist' aspects (e.g. 'human enhancement'). Generally, however, the nano-discourse has sobered in recent years, the debate on 'converging technologies' being in some sense a major exception.

Other noteworthy features of the discourse are the character and extensiveness of the pertinent science communication activities. The concerted efforts of policy actors, academics and others in this field include a large deliberative and participatory element which encompasses fairly numerous public dialogue activities and systematic efforts to establish multi-stakeholder governance processes. The discourse is also an example of the 'ethicisation' of science and technology (S&T) governance, with 'nanoethics' being marked by a strong interest in highly speculative topics. Moreover, public opinion surveys have been conducted since the first half of the 2000s, a time when nanotechnology was still very much in its infancy. However, only scant attention has yet been paid to the views of early users of nano-products and those who are relatively well-informed about the field.

The political and academic nano-discourse and its outreach to a broader public still appear to be suffering from nanotechnology's broad, 'enabling' character which impinges on the development of a coherent picture of the field as a whole. With regard to dialogue activities and ethical discussions, it is now often argued that 'nanotechnology' should not be thematicised as such; instead, specific applications or application fields should be examined. While this may help to deepen public engagement and ethical analysis, some of these calls for thematic differentiation appear to be motivated by the hope that the (often messy and inconclusive) general discussion about 'nanotechnology' can be ended; this is, however, a vain hope.

Based on the results of a multi-year discourse analysis and 'vision assessment', as well as on empirical findings regarding citizens' views (focusing on non-organised online discussions in Germany), the paper analyses the piecemeal and distributed shaping of nanotechnology's public image. The analysis is informed by a view of the politics of emerging technologies which emphasises the co-construction of new S&T fields by a variety of actor groups and the role of technoscientific imaginaries. It focuses on such instances where apparently incompatible or unrelated notions of 'nano' collide. This includes conflicting notions raised in the strategic debates on the future of nanotechnology as well as less conflictive struggles for meanings which simply result from the variegated character of nano-applications in society. The paper discusses how different views of 'nano' are spreading in various segments of society and in the politico-academic discourse (including the apparent gap between them), and how nanotechnology's public image is taking shape in these diverse social settings.

**Contributions and limits of the french National Public Debate on Nanotechnology (Oct. 2009 - Feb.2010)**

*Doridot Fernand (ICAM de Lille - CETS, Lille, France)*

In France, a national public debate has been dedicated to nanotechnology between late 2009 and early 2010. Without any real precedent on this scale in Europe, it was expected to allow a collective orientation of the national decisions on nanotechnology, and to ensure France a new legitimacy in promoting a responsible policy about nanotechnology in Europe. In fact, the debate was largely prevented by the recurring demonstrations of an association opposed to the "Nano-World", which denounced a factitious debate confined to some already taken decisions. In spite of these confrontations, the debate has allowed a useful exploration of the stakes of the development of nanotechnologies at French, European and global levels, and a report on the positions of the main actors of the field (scientists, industrials, politics, citizens, etc.)

We propose to provide a precise study of this debate, according to several approaches. A first approach will focus on the evolutions of the positions of the different actors during the debate. A second approach will precise the level of "co-construction" (of the knowledges, of the decisions, of the general centring of the questioning, etc.) reached during the debate at the occasion of the different themes addressed. A third approach will concern the different argumentative strategies used by the different actors during the discussions, and their many interactions. This study will allow to clarify the limits of the public debate as a mode of governance, and, in return, to identify some "ethical" and "philosophical" particularities of the issue of nanotechnology.

## **The role of public debate in development of new governance structures for nanotechnology**

*Enzing Christien (Technopolis Group)*

*Nooijen Anke (Technopolis Group)*

*Van Til Jon (Technopolis Group)*

*Vermeulen Sara (Technopolis Group)*

Nanotechnology is an emerging field of innovation that has the potential to radically transform public domains and sectors of industry. The development of nanotechnology (like other pervasive emerging technologies) can be characterised by uncertainties related to its technological aspects, its applications and its impact for science, economy and society. Moreover, the social construction of nanotechnology in terms of actors involved in scientific development, uptake by industry and potential users is also in the process of emerging and differs considerably from that of established technologies. Rather specific for nanotechnology, especially for nanoparticles, are the potential health risks. This makes that this technology is an increasingly discussed emerging field, although the technology itself remains very hard to understand. Several public consultations on nanotechnology (such as EC, Netherlands) showed that only very small amounts of people know what nanotechnology is.

Nowadays, in many countries public debates on nanotechnology are being performed, such as in Austria (Nanotrust), Belgium (Nanosoc), Germany (Nanotruck, Nanoreisen), France (Vivagora, NanoCitoyen), the Netherlands (Nanopodium, Nanodialogo) and the United Kingdom (NanoJury, Nanodialogues). The scope of these public debates varies considerably and ranges from only one-way informing the public about what is nanotechnology to debating with other stakeholders about the risks and benefits of nanotechnology, for instance in order to construct a public agenda. The institutional structures in which these debates are being initiated differ largely, depending on the position of the actors that initiated/ordered the debate (government, parliament, scientists, TA-office, etc). Moreover, the development process of appropriate governance modes that are tuned to the characteristics of emerging nanotechnology is still evolving.

This paper investigates the different governance structures (and their development) in which public debates on nanotechnology take place, in countries across Europe. More specifically, the paper focuses on the question in which way the institutional framing of the public nanotechnology debate relates to and influences the content of the debate. In addition, it addresses the impact of the public debate in its specific institutional setting on public policy.

Several models have been developed for analysing the position of “public-focused information and debate activities concerning new emerging technologies” and their impact on public policies. In our study we combine a model that distinguishes between scientific organisations, (Parliamentary) Technology Assessment bodies, consultancy agencies and dialogue platforms that organise public debates (Hennen et al., 2004) and a model that defines types of institutionalisation depending on the degree of inclusiveness of different actors in the debate (Cruz-Castro and Sanz-Menendez, 2005). Both models have a similar analytical tool for analysing the impact of the public debate on nanotechnology. The model distinguishes between three different goals of a debate: raising knowledge, forming attitudes and debate/initialising action. Conclusions are drawn as to what are best practices in public debates on nanotechnology in Europe.

## **Nanotechnology Politics: Rhetorical Shifts in Science Policy Practices**

*Heidrun Åm (Life Science Governance Research Platform and Vienna School of Governance, University of Vienna, Austria)*

This paper shows how different aspects of meaning of nanotechnology are articulated in settings of policy making like stakeholder fora (UK stakeholder forum, German Nanokommission), regulatory agencies, advisory councils or in the daily practices of civil servants and laboratory directors. The paper is based on the assumption that conditions under which governance takes place are characterised by disagreement about means, ends and what the policy problem actually is. The uncertainty of the term “nanotechnology” allows for keeping nanotechnology elusive and thus, for instance, difficultly to grasp in regulation. At the same time, the blurry definitions enable an inscribing of nanotechnology into different fields.

The theoretical approach of the paper is informed by poststructuralist approaches to policy making, as well as by Science and Technology Studies. For example, the paper tracks rhetorical shifts by diverse actors in nanotechnology politics that redefined terms like nanotechnology or nanoparticle, similar to Sheila Jasanoff's (2004) work which examined how different actors see and use concepts like 'genes', and how they are articulated in different practices as well as who challenged these definitions and applications. I assume that boundaries – that are understood as political frontiers - are constructed, stabilized, strengthened, as well as weakened in a dynamic process through logics of equivalence and difference. (Glynos & Howarth 2007, p.215)

For nanotechnology this is most true, in particular, when it comes to the question of whether nanotechnology is something "new" or "not new." This issue got politicised in regulatory debates. I will illustrate how definitions of nanotechnology are contextually dependent and related to the political agenda and aims of the actors involved. Rhetorical shifts allow, for instance, to blur the boundaries between "engineered free nanomaterials," which are manufactured by the application of nanotechnology on the one hand, and nanoparticles in the sense of “particles at the nanoscale occurring naturally” on the other. The blurring of naturally occurring and engineered nanoparticles, then again, serves as the rhetorical basis for subsequent analogies drawn. Articulations of nanotechnology as equivalent to "environmental pollution", "ancient objects", “nature (e.g. viruses)” or "well-known products" contest demands for nanospecific regulations. This can be exemplified by the often established analogy to fine dust by which opponents to nanospecific regulations suggest that it is not possible to distinguish between "naturally occurring nanoparticles" and "engineered nanoparticles" in risk assessment.

I argue that instead of reducing the complexity of nanotechnology, the term nanotechnology is kept open and uncertain. Nanotechnology lives from its paradoxical articulation as "new" and "not new" at the same time and thus cannot be easily disentangled. The constant employment of analogies and metaphors make it difficult to tackle with the particularity of engineered nanoparticles. Besides, references to "the future" prevent a closure of the regulatory debate and allow for a potential integration of upcoming issues. This – what can be called – "governance through uncertainty" attempts at keeping the political process ongoing and thus at avoiding a contestation of nanotechnologies. From this perspective, nanotechnology governance can be interpreted as a political experiment which tries to keep the governance process open, to allow for plurality and motion.



## **Nano S&T in the Global South: Assessing risk discourses**

*Kanerva Minna (UNU-MERIT)*

Despite its potential for good, nano science and technology (nano S&T) causes a significant amount of concern in terms of related health, environmental, ethical and societal risks, and it is increasingly recognized that addressing these concerns requires appropriate governance of nano S&T, involving a number of different stakeholders. Particular positive and negative implications are predicted for the Global South, and it appears that discourses around such issues in the South have not yet been systemically researched. Most nano S&T (media) studies (1) have been done in the Global North, and (2) have looked at the risk-opportunity dichotomy, with rather quantitative means. This paper, however, concentrates on nano S&T discourses in South Africa, India, Hong Kong and Kenya, analysing newspaper media in these countries, and further, addresses and tests concepts such as risk actions and complexity in the context of media discourse analysis, in place of merely concentrating on the risk-opportunity dichotomy. Theoretically, the discussion is linked to literature on risk governance, paying special attention to the International Risk Governance Council framework. A typology of risk actions is presented and used in the analysis. Employing both qualitative and quantitative methods, a range of risk actions contained in the newspaper stories is examined, and the complexities included in the discourse, as well as the general framing of nano S&T, are analysed. Trends over the last decade are also investigated. Finally, the results from the included countries are compared with each other, as well as with similar studies done in the North.

It is argued that - although they share some features, such as overall positivity towards nano S&T - media discourses around nano S&T, and the meanings attached to it, vary considerably, between individual countries and between different parts of the globe. For example, nano S&T can be seen as a vehicle for scientific and economic progress, a solution to a number of serious social problems, a means to economic restructuring, or even a way for a country to rise to the group of economically and socially developed nations. This observed variability highlights the significance of performing a number of country studies.

At the level of risk action and complexity analysis, in all the four countries included in the data for this paper, the most common media risk action regarding nano S&T is ignoring risk, and the discourses are relatively simple, although again with considerable variability between countries. A fledgling media discourse on risk does exist, but the general tendency to ignore risk does not help in generating public discussion on nano S&T, or in building consensus about the relevance of risk governance. In conclusion, a more methodological argument is made. Looking at risk actions and complexities included in various discourses can be an interesting analytical method, which could contribute to analysing risk discourses and to successful and inclusive risk governance of not only nano S&T, but also other global issues involving complex risks.

## **How to trust a molecule? The case of $\beta$ -cyclodextrin entering the nanorealm**

*Loeve Sacha (University of Paris Ouest, France)*

This contribution emerged from an open and continuing discussion between a chemist and philosopher which resulted in a common awareness of the importance of trusting objects. M. Normand's PhD aims at the synthesis of a prototype to obtain a biomedical drug release device by using  $\beta$ -cyclodextrin ( $\beta$ -CD), a cyclic oligomer of glucose able to form "inclusion complexes" (i.e. "molecular encapsulation"). The process consists in graft polymerization of a biodegradable and biocompatible monomer to improve its human-body tolerance.

The purpose of this paper is to understand and make explicit how the act of trust has been established in the context of invasive applications. We first contextualize this research in a historical perspective: during the second half of the 20th century, the image of CDs shifted from toxic yet interesting molecules to trustworthy molecules used in a still increasing number of applications. What happened? We argue that it was not a confidence relying on a set of well-established scientific data explicitly warranting safeness. Instead, it was a trust constructed on: reputation (by referring to a few and specific former robust and safe systems); semantics (a reassuring connotation of stability due to the fact that CD was a perfect example of host-guest system during the vogue of supramolecular chemistry in the 1980s); availability (the price of  $\beta$ -CD decreasing). Then, we try to understand how today's infatuation with  $\beta$ -CD in the quest for targeted drugs (nanomedicine) affects the conditions of trust in this molecule. We conclude that the notions of trust and confidence need clarification and nuances.

## **The potential impact of Nanotoxicology on biopolitics**

*Malcotte Ermeline (University Paris Ouest La Défense, France)*

Nanotechnology is said to encourage personalized medicine thanks to devices such as labs on chips, targeted drug delivery etc. Thus it seems obvious that nanotechnology fosters the individualization of biopolitics described by N. Rose, among others. In favoring an individualistic style of therapy, a personal and expensive medicine nanomedicine threatens the social security systems and thus calls for urgent reforms.

However the increasing importance of nanotoxicology, linked with the mass diffusion of nanoparticles, may work in a quite different direction. Nanotoxicology opens an alternative avenue where social and health issues are closely intertwined. This emerging discipline confronts a peculiar kind of uncertainty, which is not the result of knowledge gaps. Rather the uncertainty stems from a striking discrepancy in risk assessment: toxicological risks are a major concern at the collective level of population although they may seem extremely weak at the individual scale. This kind of uncertainty is not temporary or conjectural, it is intrinsic. It thus raises new ethical problems and calls for new forms of responsibility.

### **Translating at the boundaries: Probing collaborations between nanobio and STS**

*Milani Paolo (CIMAINA, University of Milan and Filarete Foundation Milan, Italy)*

*Ebling Mary (Drexel University, Philadelphia, USA)*

As “lab-on-chip” and similar, diagnostic medical micro- and nanodevice technologies are promoted as some of the early success stories of the so-called nanotechnology revolution; this paper explores the collaborative and translational efforts that shape the development and deployment of these technologies into biomedical settings, as well as the collaborative relationship between science and STS. These devices embody more than the scientific and engineering knowledge that went into their realization; they are, as well, the embodied collaborations between the biological, the technical and the social. These devices enroll bacteria “living robots” to construct the nano-components, use bacterial flagella to create nanofluidic pumps, push DNA strands through porous polymers, and entice living cells to cling to inorganic surfaces and are embodied artefacts of collaborative and translational work (Star and Griesemer 1989). Using an ethnographic approach, we have explored the translational work done by scientists, engineers, doctors, technicians, and investors in order for these devices to be commercialized and embedded into laboratory practices or deployed into the human body. The central focus of this paper, however, is an exploration of our own collaborative process through our research on biomedical devices.

Based on a yearlong collaboration between a nanoscientist working in biomedicine and a sociologist of science and technology, in this paper we explore the challenges, dilemmas and productive areas that have emerged in our collaborative research project. One of the most productive as well as problematic issues that can arise in collaborations between biomedicine science and STS is centered on the translational work that occurs, not only between actors within the biomedical fields that we studied, but also between the collaborators themselves. How do material scientists interpret the behavior of cells in vitro in order to translate the success of the device? How do physicists translating these devices understand the labor practices of technicians working in hospital labs within which these devices will be integrated? How does a mechanical engineer direct living, bacterial robots to perform micromanufacturing labor? What is the translation work that is performed between laboratories and industrial manufacturers? Where does the “biological” end and the socio-technical begin within these devices? How do we reflexively understand these practices and boundaries ourselves? To interrogate the practice of science sociologically, we have asked these questions through how scientists make choices in regards to the use of polymers for prototyping medical devices. While our project stands at the intersections of technological transfer, laboratory decision-making processes and considerations of scalability and reproducibility, for this paper, we are keenly interested in exploring the interfaces between the sciences and the social, as embodied in our project and in our collaboration. This research contributes to the larger work being done in science and technology studies that addresses the reflexivity in collaborative research (Haraway 2008; Latour and Woolgar 1986; Latour 1987), the problems of replication and scalability in science, with particular focus on nanoscience and nanotechnologies (Collins 1985) and translational, epistemic cultures (Hogle 2009; Kleinmann 2003; Knorr-Cetina 1999; Gilbert and Mulkay 1984).

## Public perception and risk in nanotechnologies

*Mitzi Hass (Universidade Federal do ABC, Brasil)*

*Penteado Claudio (Universidade Federal do ABC, Brasil)*

*Salomão Rafael (Universidade Federal do ABC, Brasil)*

The terms Nanoscience & Nanotechnology (NC & NT) refer to areas of knowledge related to phenomena observed in different classes of materials that occur when their geometries have nanometric dimensions (using the value 100 nm or  $10^{-9}$  m as practical limit). These phenomena are characterized by significant changes in their properties and characteristics for the same materials on a macroscopic scale, caused by the so-called "surface effects". The surface effects occur when a certain material is reduced (or manufactured) at submicrometric dimensions and important variations in their physic-chemical properties are to be observed. Among these variations, changes of properties can be observed and may include a reduction of the energy of activation for most physical and chemical processes (like lower melting temperatures) and significant variations in electromagnetical properties (electrical insulators become to behave as semiconductors, and insulators as superconductors). As result of these new properties, different applications have been produced based on the concepts of NC & NT, many of them with a much higher performance than current technologies.

Compared to other scientific and technological revolutions that occurred in human history, the technological progress, the potential for damage and ethical dilemmas generated by the development of the NC& NT are happening very fast. The production of knowledge and high-tech products based on NC & NT, besides the large amount of knowledge accumulated over previous generations, become viable due the prospect of manipulating matter at atomic and molecular level. Therefore, an unprecedented opportunity to design and produce materials and objects with desired properties, without the limitations normally imposed by standard techniques, has been created. However, the same factors that contribute to technological development also suggest that, along with the great benefits brought by this new knowledge, equally damaging risks and dilemmas arise. Note that in the case of NC & NT, the development of new nanotech-based products and processes originates mainly from the assimilation of prior knowledge and through scientific publications, being not necessarily developed from the beginning, with little (if any, in some cases) need for sophisticated equipment or materials controlled by authorities (e.g. enriched uranium as fuel in nuclear reactors). Thus, it is possible that new products are designed, patented, sold, used and discarded without that the potential harmful consequences to the environment and human health have been fully investigated.

The historical observation of other examples of misuse of scientific knowledge (such as nuclear bombs) suggests that, in the case of NC & NT, there is still time for an assessment of potential risks involved in this field. In this work, the dichotomy risk/benefit was discussed in relation to nanotechnologies and their products, involving perception of nanotechnologies at universities, communication and other indirect forms of risk.

## **Centre and periphery in Norwegian nanotechnology research**

*Nielsen Kåre (GenØk, Centre for Biosafety, Norway)*

*Åm Trond (Department of Philosophy, Norwegian University of Science and Technology, Norway)*

*Nydal Rune (Department of Philosophy, Norwegian University of Science and Technology, Norway)*

It is interesting to clarify what nano is because it constitutes a paradigmatic case of the shift from Mode-1 to Mode-2 that is often assumed to take place in science. Without committing to a specific articulation of this shift, we note that it may help explain why earlier attempts to articulate epistemic characteristics of science do not perform well; they are articulations of Mode-1 science. We suggest this is an important reason why it is difficult to understand what nano is as a scientific field – the scientific integrity of nano is often put in question. This work describes nanotechnology research as emerging in the tension between Mode-1 and Mode-2.

We compare two case-studies of nanoprojects that we respectively take to represent a centre and a periphery in a Norwegian nanotechnology context. At the centre we have the NTNU NanoLab in Trondheim, a leading research and education centre in Norway. The NTNU NanoLab appeared as a priority area at the Norwegian university of science and technology (NTNU), designed to instigate nanotechnology in a comprehensive manner. At the periphery we have a research project at the University of Tromsø where there is no equivalent nano initiative. This project is funded by the Norwegian Research Council's nano-material program and aims at using nanoparticles in the development of vaccines for farmed salmon that are more effective against intracellular pathogens, notably viruses.

On the one hand, the NTNU NanoLab appears as an organisation body facilitating the realisation of the field, committed to formal NT definitions, to the convergence of the involved disciplines, and to circulate nano-visions in ways that is recognisable in Mode-2 terms. On the other hand, the nanoparticle mediated vaccine project is a traditional research project, which is more easily recognised as a Mode-1 project. Rather than being committed to realise some nano-vision it is dedicated to, and evolves around, the practical aim of developing effective vaccines. The nano field emerges in a tension between attempts to stage a novel field called nano at the centre and the many traditional scientific projects located at the periphery. While the paradigmatic features, the prestige and the grandiose visions of nano tend to reside with the centre, this should not make us overlook the role of the periphery in the practical realisation and further development of the field.

## **Deliberation, Performativity and Research Design in the Public debate of Nanotechnologies**

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*Carvalho António (Centre for Social Studies, University of Coimbra, Portugal)*

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Deliberation has become a central topic of ongoing research in Science and Technology Studies (STS), due to the emergence of public participation procedures addressing controversies and debates on S&T.

The proliferation of these initiatives gave rise to a still expanding literature, providing a very rich body of empirical studies. Deliberative procedures have been drawn upon as a possible resource for generating more robust forms of knowledge and policy-making. However that might be also a resource for legitimating policy decisions while promoting participatory forms of governance.

As part of the tasks of the EU-funded project DEEPEN, questions surrounding the design and implementation of experimental approaches for deliberative fora, focusing on ethical issues associated with nanosciences and nanotechnologies, were explored.

One of the main features of experimental forms of public participation is the possibility of articulating a heterogeneous range of actors as well as their modes of knowledge production. Furthermore it allows the alignment of a diversity of publics, scientists and social scientists for the debate of ethical and social implications of the new technologies.

The deliberative forum brought by this presentation reflects the research made in the Portuguese context in 2009 with several participants with diverse backgrounds, gathered for a whole day. The group included participants in previous focus groups organized under the DEEPEN project and scientists developing research in nanotechnologies, and members of organizations that could have different personal and professional experiences in relation to diverse stakes, including the scientific, the activist, the medical, and the educational.

Drawing on work carried out within the project, some matters of concern related to nanotechnologies and, more broadly, to emerging technologies were identified as central. Within those matters were specifically selected as entry points into the debate: control, regulation and public policies, and the political economy of nanotechnologies.

Our analysis aims at bringing that deliberative forum as a case study to explore aspects of deliberation, performativity and research design. Here, we will focus on five main dimensions: 1) selection and composition of participants; 2) performativity of participatory assemblage; 3) experimenting with new forms of deliberation; 4) the role of social scientists and/as facilitators; and, finally 5) the specificities of deliberative fora and deliberation in Portugal.

Resorting to STS literature, direct and second-hand observation, visual media and outputs, e.g. recommendations, produced by the participants, we will explore the intertwinement between the struggle for meaning and the design of socio-technical assemblages throughout the public debate of nanotechnology.

## **Nanoethics: a struggle for meaning**

*Nurock Vanessa (Université Montpellier III, France)*

It is commonly considered that the emergence of nanotechnologies has given birth to a new discipline of moral philosophy, which has been coined “nanoethics”. However, the very existence as well as the meaning of nanoethics is now so much disputed that it seems pretty difficult to dissociate nanoethics’ struggle for existence from its struggle for meaning.

This paper aims at proposing some elements to show both the legitimate existence of nanoethics as a realm of (applied) moral philosophy as well as its specific meaning.

First, I synthesize why, contrarily to a widespread thesis, nanoethics is to be confused with neither risk assessment nor social acceptance. Second, I show why the bioethical model is not entirely relevant for nanoethics. Lastly, I argue that it is more fruitful for reflection to frame nanoethics as a crossroad for applied ethics and I propose a map of the different branches of this crossroad.



## **Regulatory policies and the production of nanotechnology. A comparison of stakeholders' opinions**

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Regulatory policies about nanotechnology are an increasingly important issue of public debate in the light of growing safety concerns (European Commission 2008, 2009). When the public discourse about nanotechnology and regulation is considered, one can observe the critical role that uncertainty, ambiguity, and even ignorance have in shaping the debate on technoscience in general and on this emerging technological field in particular (Pellizzoni 2005).

However, the relevance of these notions is seemingly twofold and even contradictory. On the one hand, uncertainty is appealed to for asking more regulation: pleas for precautionary interventions are exemplary of this attitude. On the other hand, the same uncertainty is resorted to for supporting less regulation: softer, voluntary measures or calls for postponing regulatory measures after collecting further, conclusive scientific evidence are promoted. Despite their contradictions, both perspectives seemingly share the same view of the relations between science, technology and law, i.e. that resorting to “good science” can solve regulatory problems.

These contradictions can have important policy implications, especially in the possible wake of public controversies about nanotechnology similar to those characterising green biotech in the 1990s.

To address these potentially disruptive contradictions, the paper suggests two steps in the direction of a more sophisticated understanding of the public debate on regulation and nanotechnology. Firstly, a more comprehensive understanding of how uncertainty regarding nanotechnology is socially constructed also in the regulatory arena is needed (Jasanoff 1995, Tallacchini 2000). Secondly, more extensive empirical evidence on the developments of the regulatory debate is required.

As a contribution to this heuristic effort, the paper presents the preliminary results of a comparative research about stakeholders' opinions on nanotechnology regulation in Italy and France. A qualitative research design, which is based on interviews of key informants from academia, civil society, public administration, oversight bodies, and industry, examines the perception that stakeholders have of major themes and issues related to regulation, like the perceived necessity to regulate, the suggested timeframe and modalities, as well as different views about commercialization and consumer risks.

## Images and the Struggle for Meanings in the Nanotechnology World

*Ruivenkamp Martin (University of Twente The Netherlands)*

*Rip Arie (University of Twente, The Netherlands)*

Images of nanotechnology abound, from the IBM logo and Nanogear images, to the 'Nanolouse' repairing blood cells and images of risks of proliferation of Nanobots, or just carbon nanotubes that have to be inspected. Such images are created and used by actors for their own purposes. This is not straightforward instrumental use. Actors delegate part of their message to an image that is supposed to work for them, but images have also their own dynamics, once they start to circulate. They are taken up by other actors for their purposes, and, presented in different contexts they can convey messages different than originally intended – although within the constraints of the 'story' that the various images tell.

In the struggle for meanings, images are one of the 'weapons'. Part of the struggle is delegated to how they are instrumentally used to convey a message. But then, when they get a life of their own, they will carry on the struggle on their own terms, somewhat independently of the strategies of the actors that put them up originally. This is visible in the uptake and use of the Nanogear-type images created by the Foresight Institute, but also in the way the Nanolouse image has been used. This struggle for meanings is about perceptions and images that may become dominant.

The next question is what this implies for the development of nanosciences and nanotechnologies. One issue concerns credibility and requirements on further developments. By now, the 'Grey Goo' images are too far away from ongoing developments to have much impact. The Nanolouse image, however, although originally an artist's impression, feeds into ideas about 'magic bullets' redressing our sorrows, thus reinforcing directions to go in nanomedicine (cf. European Technology Platform on Nanomedicine). Clearly, images do not have effects by themselves; they function as part of a constellation of visions, metaphors and narratives. Within such a constellation, they may have a service role, e.g. as illustration, but also a leading role, when they convey a "portable" message, as is the case with the Nanolouse image.

While there is no simple linear mechanism from images to choices to actual nanotechnology developments, there are co-construction dynamics that can be traced empirically and in which images are an integral element. In this paper, we will conclude by discussing two examples of such co-construction processes: The Nanolouse image and nanomedicine strategies, and nanogear images and the promise of molecular manufacturing. There is a difference with concrete and thus more context-specific nanotech co-construction processes, where broad promises as carried by images are less relevant.. There will still be pressures inspired by such images, however, from audiences (policy makers, patient organizations etc) on nanotechnology developers.

**The public debate on nanotechnology in society: « endogeneization » from the point of view of a nanoscience research laboratory in Grenoble.**

*Skaiky Hassan (University of Grenoble, France)*

Nanoscience and nanotechnology represent today a challenge for actors of research in terms of innovation at the international level. Many public debate takes place recently on this subject. Recently, the CNDP (National commission of the public debate) in France organized a public debate during three months in 17 french cities.

In the aim to see how actors of research takes into account the issues of society about nanotechnology, we were interested to understand how the public debate come into the laboratoty and what is the impact of this public debate in the laboratory life (practices, representations). Our research is based on 30 interviews that we realized between the period of march 2008-february 2010, and some observations realized in a french nanoscience laboratory in Grenoble.

The aim of our communication is to point out the dynamics that the public debate create in the laboratory, in a societal context of struggle for meanings in the field of nanotechnology.

## **Techno-moral imagination in relation to nanotechnology**

*Tsjalling Swierstra (Twente University, The Netherlands)*

It is necessary to explore ethical and social aspects of nanotechnology in advance, so as to enable 'responsible development and innovation'. But what typically hampers science-society dialogues is the focus on hard impacts rather than on soft impacts. Hard impacts can be defined as [a] dependent on non-controversial moral values like health, safety, sustainability and – to a lesser extent – privacy, [b] as quantifiable, and therefore compatible with the discourse of scientists and policy makers, and as [c] relatively independent from user-creativity. Soft impacts, then, [a] rest on more controversial values, are [b] often not quantifiable and [c] to a large degree depend on users for their occurrence. A particularly interesting type of soft impact is when established morals change due to the impact of the new technology, thus leading to techno-moral change. I'll argue that in liberal-pluralist societies concerns about soft impacts tend to be marginalized, with the result that those who have these concerns feel not represented. In order to redress this problem, I argue for providing a larger role for techno-moral imagination of nanotechnology's soft impacts. As an example, I'll present the set-up and outcomes of a vignette & scenario project, that was conducted as part of the National Nanodialogue in the Netherlands. I'll relate how we proceeded to develop these vignettes and scenarios; what are their main features; and how a 'method' for developing techno-moral vignettes and scenarios could look like. Finally, I'll describe some other, current, projects that build on our collection of vignettes and scenarios to engage the public in deliberating nanotechnology's soft impacts.

## **¡Viva la Nano Revolucion!: nanotechnology in the Spanish National Press**

*Veltri Giuseppe Alessandro (JRC European Commission Institute for Prospective Technological Studies)*

*Crescentini Alberto (Universita' della Svizzera Italiana, Switzerland)*

The present study is based on an analysis of Spanish National press coverage of nanotechnology. A mixed methodological approach has been used combining classical content analysis, qualitative analysis and text mining techniques. Findings suggest an overall positive coverage and a predominant framing in terms of economic development and growth with a great attention to the revolutionary nature of nanotechnology as main strategy of 'objectifying' this new technology. However, differences were found across the three newspapers taken into account (El Pais, El Mundo and ABC), with El Mundo articulating more on the risk discourse that focused on potential toxicity of nano-particles. Interestingly, we found a substantial influence of transnational events such as Prince Charles' statement on nanotechnology newspapers coverage.

### **Fate a research technicians in the field of nanotechnology**

*Vinck Dominique (University of Lucerne, Switzerland)*

Based on ethnographic investigations conducted over several years (2004 - 2009) in three laboratories within nanoscience and nanotechnology, the paper explores the fate and the involvement of technicians and engineers in research. Those involved in research are facing changes in their work organizations, new objects (roughly a thousand times smaller than that on which they worked before) and new instruments against which they are all less than neutral it affects their professional identity, their relationships at work and to the work. The Communication aims to bring a first insight into what is at stake for these actors that sociology of science often gives scant attention. It tries to characterize what is at stake for this group of research actors, without losing sight of the big differences in circumstances in which they are inserted. We show how to articulate matters of biographical reconstruction, the construction of work organizations and the relationship to the specific ontology of nanotechnology.



## **TRACK 19**

# **STS Approaches to Neuroscience Objects and Practices**

### **Convenors:**

**Andrew Balmer (University of Nottingham, UK)**

**Des Fitzgerald (London School of Economics, UK)**

**Martyn Pickersgill (University of Edinburgh, UK)**

## **The Space Inside Your Skull**

*Balmer Andrew (University of Sheffield, UK)*

Practices of lie detection have changed significantly over the past five hundred years, and over the past half-century in particular. The substitution of the trial by ordeal for the more scientific methods of technological lie detection were thought to herald an era of restored faith in public officials and police work in the USA. However, the polygraph, the preeminent lie detector of the 20th century, is often criticised and maligned for its inaccuracy and apparent failure to influence the courts. In the past decade the emergence of brain scanning techniques for lie detection has brought renewed hope that the lie will finally be conquered and justice done. The neuroethical literature on the subject concerns itself with whether the technique has sufficiently demonstrated its reliability. Rather than rehearsing the arguments on reliability, I will endeavour to understand how exactly fMRI seeks to demarcate truth from fiction, and thus provide a more detailed understanding of fMRI that may contribute to a more sophisticated discussion of future lie detection practices.

This presentation will investigate how the fMRI lie detection research creates the relationship between social behaviours and neurological objects. In doing so it will contend that the lie under investigation is a very particular kind of lie, one that is created by the practices of brain scanning and the lie detection methodology. For instance, the lie produced is one that must be conceivable in binary opposites (truth and lie), can be communicated by the pressing of a button, and can be ideally repeated by subjects over time and by different subjects. In order to understand how the lie detection apparatus is able to produce images of lying brains, it will investigate how a limited temporality of the mind is used in coordination with a reductive space of brain activity. The fMRI lie detection research regularly invokes the philosophy of lying developed by St. Augustine, a philosophy that depended on a particular relationship between reality, the mind and the divine. That philosophy, and the methodology practiced in fMRI research, requires a specific timing and organising of lying: that the lie be more distant than the truth; that the truth be pre-potent. In order to disentangle the activities of the mind and make visible the essence of lies in the brain, the subtractive method must be used, but this, the paper will argue, has important implications for how we conceive of the truth and of the lie.



## **Brain, Mind and Image: Objects and Artefacts**

*Bruder Johannes (University of Sheffield, UK)*

Functional brain imaging has become one of the key research fields in contemporary neuroscience and psychology. Many different disciplines are engaged in creating better methods, more accurate gauges, and advanced models of brain function to register brain activity and convey data into (applicable) theories. For social studies of science, brain imaging is extraordinarily interesting as part of a more comprehensive development: the recoding of the social through neuroscientific research (Rose).

Visualizations created by functional brain imaging – whether brain scans originating from fMRI or graphs resulting from EEG-sessions – are superior to bare numeric data thanks to their vividness. Especially brain scans have an imaginary quality that leads to mere regarding of images instead of reading. To understand the efficacy of brain images in general, it is indispensable to consult the history of visualization and mapping in medicine. Whereas in the early nineteenth century imaging techniques like x-ray suggested a diaphanascopy of body and mind, the still widely used technique of EEG ties in with the theories of cybernetics and records electrical activity in an environment that is supposed to be a complex system. Another motive present in imaging of the body is the intrusion of and the voyage through the body as seen in Hollywood movies like *Phantastic Voyage* and implemented in diagnostic methods like virtual endoscopy.

Brain images in general are haunted by these multiple analogies. They are artefacts of special cultures of knowledge, but as generators of meaning independent of their original context. Moreover, functional brain imaging creates images of phenomena which are not visible in the actual object. Visualization means to generate activations in experimental systems, but also to define a resting state. Representing composites of experimentally produced and recorded data and the reliance on models of organization and visualization, every image is based on fact and fetish (Latour), on acquired data and belief in their validity. As images of cerebral function and/or malfunction, they transgress their pictorial status and disperse the fine line between object and image.

It is therefore indispensable to observe the process of imaging and the efficacy of brain images in the course of research on mind and brain. What is the special quality of functional imaging compared to structural imaging? What, in the eyes of researchers, do functional brain images actually depict: blood flow, electrical activity, regions of the mind, or the mind itself?

## **The Brain in Autism Research**

*Fitzgerald Des (London School of Economics, UK)*

The paper will discuss the emergence of the brain as a site of particular concern in autism research. Within most of the sciences for whom it is a topic of interest, autism is taken to be a developmental disorder that manifests in early childhood, and that is characterised by pervasive, and usually quite debilitating, difficulties in social behaviour, communication and language. And because the major features of the disorder are thought to have a neurological basis, there is now particular concern with seeking 'distinct neuroanatomical and neurochemical anomalies associated with autism' (Schreibman, 2005: 94)

Few endeavours in neuroscience are straightforward – but this last practice (i.e. the neuroscience of autism) does seem to have even bigger issues to confront than most. Taking up some early-stage research findings, this paper will contend that many of the major debates about the relationships between subjectivity, sociality and the brain, are being played out, in perfect scale, within this same series of intellectual and practical confrontations. The paper will discuss one such issue – which is (what strikes the author as) a lack of obvious, or natural, fit between (1) a diagnosable disorder which is chiefly manifested in particular kinds of social interaction (for example, a young child's unwillingness to meet their parent's gaze) and (2) the neurobiology of a given individual.

Drawing on historical material and on interviews with key researchers, the paper will therefore ask: how has neural correlation come to be a topic of particular interest within autism research? What work has been involved in creating and maintaining the research practice that associates autism with the brain, particularly? And what does this association have to tell us about the larger networks within which the objects of neuroscience are mingling in ever more distinctive ways?

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## **Moods in control – the diagnostic equipment of bipolar disorder**

*Hautamäki Lotta (University of Helsinki, Finland)*

The vast array of phenomena associated with the prefix neuro epitomise the ontological dilemma even modern neuroscience, and psychiatry as one, is facing –that of the interrelations of mind, brain and body. Innovations in neuroscience research designs (brain imaging technologies, animal models in genetics and R&D of pharmaceuticals) have advanced the knowledge of mental disorders as brain diseases. However, thus far the standardised classification of diagnoses listing the core symptoms of mental disorders is the basis of the diagnosis reached in the conversations between the clinician and the patient. To standardise the diagnostics based on speech, a variety of tools like questionnaires, structured clinical interviews and symptom charts, have been developed.

In this paper, I will present an empirical analysis of these kinds of diagnostic devices or equipment. The analysis is a part of my ongoing dissertation project which aim is to seize the ever changing global assemblage of psychiatry (as a scientific discipline and a clinical practice) by analysing one disorder and one national setting as a case example. The case studied is bipolar disorder, a mood disorder formerly known as manic depressive insanity, in the psychiatry of the Finnish welfare state.

In the paper, I will first briefly introduce the study and the assemblage of actors, practices and artefacts around bipolar disorder in Finland. Then, I will concentrate on the ones around the 'sub-assemblage' diagnostic equipment used to screen, diagnose and treat this disorder. The equipment designed for bipolar disorder includes screening questionnaires, life charts to map the mood swings retrospectively and mood diaries for patients. I will analyse these questionnaires and charts themselves, education for GPs to use them, ethnographical observations and interviews with psychiatrists as well as patient accounts in Internet discussion threads and interviews.

I am interested in the knowledge and reasoning embedded in the practices the equipment is enacted in. The diagnostic equipment is not only mediating to the clinical practice and process of diagnosis, but also quite directly to the conduct of living of the patients. The reasoning engendered by the equipment is not instrumental but ethical because it connects knowledge, resources and techniques with the questions concerning good life – the ways to control and experience one's moods and feelings. I am interested in how does the brain figure in the practices? And what kinds of spaces of possibilities does this provide us to understand ourselves as human beings with more or less altering moods, feelings and behaviour?

**Neuroscience between laboratory research and popular science: Popularisation of scientific knowledge and its consequences for scientific field**

*Heinemann Torsten (Goethe University, Germany)*

Neuroscience has seen very extensive coverage in the mass media in recent years and there is a widespread interest in neuroscience by a broad audience. Scientific knowledge about the brain both as an organ and as a metaphor for human creativity has an ever-increasing impact on other scientific fields as well as on everyday life. The increasing interest in the brain and Neuroscience in general led to the emergence of several new research areas at the crossroads of traditional disciplines such as Neuroeconomics, Neurophilosophy or Social Neuroscience. There has been much debate about the 'neuro-boom' especially within the social science and science and technology studies. Social science studies in Neuroscience mostly have been focussing either on the research in the laboratory or the appearance in the mass media. The relation between these two areas and its relevance for the raise of Neuroscience have long been neglected, though.

I will argue that the reason for the growing prominence of the brain and the dominance of Neuroscience within the academy and beyond is based on the neuroscience practice to consequently popularise scientific knowledge and make it available to other scientific disciplines as well as to the public. Hence, I aim to analyse this practice and to reveal its immanent dialectic structure. On the one hand this practice is a major factor for success. It allows other disciplines to access the latest findings in Neuroscience fairly easy and adapt them for their own theories. Additionally it enables Neuroscience to enter in a productive dialogue with other disciplines and profit from their knowledge. On the other hand, the strong focus on the popularisation of scientific knowledge has a deep impact on the process of knowledge creation within the laboratory itself. There is a tendency to engage in research projects that are promising with not with regards to the possible scientific findings but with regards to their later popularisation. This trend is not limited to the selection of certain topics but also influences the way research is conducted in the laboratory.

The argumentation is based on a documentary analysis as well as extensive field work and interviews I have conducted in three neuroscience laboratories in New York, NY and Frankfurt, Germany.

## **Neuroscientists' Understanding and Experience of Public Engagement**

*Key Chekar Choon (Centre for Economic and Social Aspects of Genomics)*

There has been an increasing drive for more scientists to engage with the lay public. Public engagement of neuroscience has been particularly encouraged both inside and outside of the science community because of its high public relevance with rapidly advancing technologies. Through observation of various sites, modes, and methods of public engagement activities and in-depth interviews with participated neuroscientists, this project will focus on the experts' view on public engagement, whose experience and understanding of these activities are rarely examined.

Principal research questions include:

- What is the reason/motivation of undertaking public engagement activities?
- How are neuroscientists expected to present their work?
- What kind of support have they received and how do they prepare public engagement activities?
- What do neuroscientists think are the key messages they want to get out?
- How do they think their research/the field is being understood by the wider public?
- Are there any personal and professional benefits of undertaking public engagement (such as rewards and recognition)?
- How do they deal with difficulties such as issues around moral dilemma, complexity and uncertainty of the science or questions they were simply unable to answer?
- What they have learnt from the experience?

Two main research methods are 1) observation of various sites, modes, and methods of public engagement of the new emerging field of neuroscience focusing on the interaction between the public and experts 2) in-depth one-to-one interviews with neuroscientists before and after engagement events.

By exploring scientists' experience in dealing with challenges in engaging with the public, this paper will contribute to develop strategies of public engagement.

## **Genesis and development of a scientific (sub-) discipline: the case of neuroeconomics**

*Klaasen Pim (University of Amsterdam, The Netherlands)*

Today the range of capacities, experiences and behaviors open to neuroscientific scrutiny is almost limitless. Vast technological advancements and an associated enormous growth of the field of neurosciences in terms of practitioners and available funds have permitted the neurosciences to investigate such complex phenomena as experience, consciousness, (weakness of) will and decision-making. Many of the objects today studied by the neurosciences previously occupied places only in non-experimental disciplines or non-biological disciplines like philosophy, sociology and psychology.

Following Ludwik Fleck's pioneering work in the philosophy and sociology of science, we can surmise that the transportation of such objects from one discipline to another is associated with and can to some extent be explained on the basis of a change in what he called "styles of thought". In this paper it will be investigated if the genesis of the field of neuroeconomics—sometimes also called the new science of decision-making—can be explained in these terms.

At the core of this examination will be the publication and subsequent reception of Shizgal & Conover (1996)—a paper that is often attributed the honor of being the first publication in neuroeconomics. In this paper Shizgal and Conover for the first time use a normative choice theory borrowed from economics to describe the neuronal substrate of a behavioral choice. Understanding thought style to be, as Fleck suggests, a readiness for directed perception, it is examined how at some point in the 1990s it became possible to see in neuronal activation something analyzable with normative choice theory.

Of course, Shizgal & Conover's paper's status as a founding moment of neuroeconomics depends for that status on its subsequent uptake. The sedimentation process that turned Shizgal and Conover's findings into scientific facts of the newborn discipline of neuroeconomics will be analyzed. It will furthermore be investigated how neuroeconomically directed perception impacts on the framing of neuroeconomics research objects such as decision-making and the role in social interaction of emotions, trust, empathy and the like.

Moreover, using the concept of style of thought also the obstacles for forming alliances between economical and more traditional humanistic explanations of human action will be discussed. Here both conceptual issues pertaining to features of the styles of thought of the parent disciplines play a part, as do sociological considerations concerning the more or less interdisciplinary constitution of the respective thought collectives of the humanoria on one side and the neurosciences on the other.

## **The Harder They Come... Screening, Resilience, and the Search for Neural Correlates of Mental Armor in the Context of the War in Iraq**

*Kotnis Sita (Aarhus University, Denmark)*

Clearly, there has always been a strong military interest in the workings of the human mind, for defensive as well as pre-emptive purposes. However, just as the implicit scientific, philosophical and societal conceptions of 'mind' have been subject to considerable change across time, so have the ramifications of this military interest. In this paper, I will outline what I consider a significant recent tendency to integrate pre-conscious neural, sensory, emotional and basic motor processes as key reference points in the strategic planning of combat training, military preparedness, defense capability and crowd control. A tendency that gains particular momentum in the context of the war in Iraq and its human aftermath. Based on ethnographic material from my fieldwork in the US Army, I will elucidate how neuroscientific screening technologies are now increasingly used to monitor baseline neurophysiological data pre and post deployment in order to analyze the impact of various stressors on e.g. resilience, soldier fitness and 'mental armor'— and how the meaning of crucial military entities has come to hinge on neuroscientifically generated material. In today's military quest for the key to optimal performance, certain basic assumptions about human nature (e.g. that it is unified and universal) seem to be relatively unaltered compared to earlier assumptions as found in historical records of former wars – but with the noteworthy difference that whereas earlier 'the magic bullet' was almost exclusively sought in the realm of psychology, today a good deal of inquiry seeks to find neural correlates of various kinds of combat relevant faculties (i.e. emotion regulation, attention and situational awareness). Hence, one might ask how this incipient orientation towards what has been referred to as 'the molecular gaze' may influence the implicit view of human nature and the conception of the soldier-as-subject, how traditional military understandings of generic definitions of practice and performance possibly influence the interpretation of baseline neuroscientific data, and if perhaps neuroscience will replace or supplement psychology as the preferred knowledge paradigm for the military search for optimal performance.

The purpose of this paper is to analyze the simultaneity of framing and evidence in the formulation of mission requirements and in the articulation of desirable moldings of human 'raw material'. Furthermore, this paper will discuss whether the introduction of neuroscientific measurements in the military constitutes an upgraded version of business as usual or a revised paradigm for the soldier as warrior, as person, as GI and as biological being.

**The feeling brain: the impact of cognitive and affective neuroscience on measures of clinical and legal responsibility and judgements of decision making competence and capacity**

*Mackenzie Robin (University of Kent, UK)*

Although the separation of the cognitive from the affective has been established as artificial by neuroscientists like Damasio, this distinction survives in medico-legal conceptions of responsibility and measures of decision making competence and capacity. Yet the taxonomic artefacts of the psychopath, the child diagnosed with callous/unemotional conduct disorder or autism spectrum and many of the demented potentially destabilise conceptions of the social as divided into rational and irrational citizens. This has fundamental implications for medico-legal ethics and practice.

Neuroscience provides evidence suggesting that without the neural mechanisms associated with feeling, decision making becomes problematic insofar as there is no ability to evaluate different options. Without neural mechanisms associated with empathy, the ability to understand the perspective of others, or to feel that it matters, is absent. This means that there is often a theoretical understanding that some forms of conduct may be seen as right or wrong by others, but no emotional apprehension of why this should be so, leading to 'rational' instrumental decisions often condemned by others.

How those with neural conformations associated with lack of affect are categorised has implications for them and for conceptions of the social which underpin medico-legal assessments of criminal responsibility and the capacity to make decisions over medical treatment. Categorising psychopaths and children with callous/unemotional disorder as bad, those diagnosed as on the autism spectrum as disabled and those with symptoms of dementia as ill obscures commonalities which could lead to more refined medico-legal taxonomies. Moreover, it props up conceptions of normality which exclude differences, with prejudicial consequences for conceptions of the social. Despite evidence of neuronal plasticity throughout life and concerns over the inconsistency of neuroimages taken at different times, these categorisations act as biomarkers indicating fixed identifications. This forecloses treatment possibilities, as well as preserving inappropriate medico-legal structures. This paper suggests some ways forward.



## **A bridge over troubled waters? Neuroscience, hybrid fields and the remaking of human self-knowledge**

*Martin Paul (University of Nottingham, UK)*  
*Williams Simon*

Work in contemporary neuroscience is increasingly making claims about the nature of human society, social interaction and individual behaviour. These areas have historically been seen as belonging to the territory of the social sciences and there have been major tensions between biological and social scientists over previous incursions under the banner of sociobiology and evolutionary psychology. The latter resulting in the so called Darwin Wars. However, this situation appears to be changing with much greater engagement between disciplines. In response to the challenge of new neuroscientific knowledge, a series of hybrid fields are being created, including neurolaw, neuroeconomics, neuroethics, neuroaesthetics, neuroanthropology, neurofeminism and neurosociology. Some of these areas are now becoming well established sub-fields, with their own journals, meetings and research programmes and there are growing expectations that new neuroscientific knowledge will have a major impact in areas such as law. These developments raise a number of important questions for the social sciences in general and STS in particular. How might we best understand the changing response from the social sciences to the rise of neuroscience? What is the nature of these new hybrid fields? Does their formation represent genuine multidisciplinary, the 'socialisation' of the neurosciences or, as Fuller argues, the re-biologisation of the social world in an era of bioliberalism? This paper is part of an ongoing project examining the relationship between the neuro and social sciences, and will explore these issues by looking at the emerging hybrid field of neuroeconomics which focuses on how people make decisions. The paper will draw on the concepts of epistemic and promissory communities to analyse the contours of this field and how it is being constructed in emerging socio-technical networks, the nature of the new knowledge and the types of human subject that are co-produced, and the expectations and futures they are being made. In conclusion, we will explore the extent to which the emergence of these new hybrid fields represents a fundamental shift in the production of human self-knowledge, the role of social scientists in the construction of neurofutures, and how we might respond to these developments.

## **Nothing in social behaviour makes sense except in the light of evolution – social neuroscience and human nature**

*Matusall Svenja (ETH Zürich, Switzerland)*

In the recent years, human sciences experienced a shift from looking for character traits connected with egotism and a selfish self to looking for character traits like altruism and a cooperative self – a shift highly relevant for reconceptualising the notion of ‘social’ as an internalised capacity of (“normal” and “healthy”) subjects. One of the disciplines pushing forward this shift, is social neuroscience. This newly emerging research field at the borderlands between neuroscience and psychology tackles questions about neural foundations of social behaviour. The field is a kaleidoscope of diverse approaches and disciplines, united in the aim to find neural substrates of social interaction. It is involved in research on a wide range of issues like autism, emotions, face perception, love, meditation, neuroenhancement, moral reasoning, purchasing behaviour, and a lot more. On all these topics, scientists hope to achieve deeper knowledge through the application of neuroscience. This new research field brought a concept of human nature into the discussion that stresses the sociality of human nature. This sociality is rooted in each individual, has evolved during the course of evolution, is located in the brain, its genes, functions, hormones and neurotransmitters and is embedded in an environment. The core of this new notion of human nature is the ‘social brain’ that is able not only to communicate with the environment but rather to directly interact with other brains via neuronal mind reading capacities such as empathy. The social brain is a conglomerate of discourses about the evolutionary history of the brain, a history of ideas that led to conceptualising the brain in its current form, the lens through which the actual material brain is investigated and the materiality that is found. Its key characteristics are its plasticity, its biological setup and its evolutionary history.

This new way of thinking about human nature as the individual’s capacity of pro-social behaviour fits into the social and cultural discourses of the 21st century with their strong emphasis on the individual and her responsibility for her own wellbeing. With social neuroscience, sociality shifts from the external organisation of society to the internal constitution of homo sapiens sapiens. Sociality becomes a (neuro)biological entity (which requires a certain social order as its natural habitat). This paper will explore the emergence of this new type of human nature, which is based in evolutionary theory. This new human nature is brain-centred and its key elements are the capacity of direct interactions between brains, the importance of sociality and the role of emotions. The paper will focus on the (neuro)biological explanation of the social and locate it in the context of contemporary discourses about the organisation of the social world and in a history of attempts to bring the social and the biological together.

## **Plastic Fantastic? New Discourses of Brain Plasticity and the Enduring Import of Everyday Life**

*Pickersgill Martyn (University of Edinburgh, UK)*

*Martin Paul (University of Nottingham, UK)*

*Cunningham-Burley Sarah (University of Edinburgh, UK)*

Over the last decade, discourses of 'brain plasticity' have become increasingly resonant in the neurosciences. The plastic brain is understood to be a dynamic network, the very nature of which is moulded through cerebral function (i.e. subjective experience). Popularised by key researchers such as Norman Doidge, the evidencing of brain plasticity is, apparently, "one of the most extraordinary discoveries of the twentieth century." (Doidge, 2007). Investigators like Doidge have been quick to capitalise on the almost inevitable public appeal of research in this area, and a plethora of books, media articles and other cultural products draw explicitly or indirectly on the new discourses of brain plasticity in their exhortations to 'use it or lose it' and 'keep your brain fit'. Some social scientists have cast their gaze upon these emerging socio-technical forms, diagnosing them as symptomatic of broader neoliberal agendas that seek to create and order evermore diligent subjects, who can today self-govern at the level of the neurological itself. Yet, it is unclear to what extent these discourses are finding traction and salience within the everyday worlds of those likely to be most affected by them. In this paper, we cast fresh light on these issues by drawing on focus group research conducted with a variety of publics (patient groups, scientists, and other professionals) regarding the place, role and impact of neuroscience in and on society. Whilst new neuroscience - and the discourses of brain plasticity in particular - were attractive to our participants, the novelty and salience of these were systematically unpacked within the focus group context and nested within taken-for-granted ideas about mind, self and society. Ideas about brain plasticity were only salient – indeed, only made sense – to our participants in the contexts of their direct life experience and broader understandings of the ontology of their selves. Thus, whilst to researchers like Doidge, concrete findings that the brain is plastic may indeed be "extraordinary", to many non-specialists such claims are simply mundane and mostly lacking salience for the way individuals think about themselves or one another. Scientific knowledge on its own, therefore, is insufficient to transform conceptualisations of selfhood and is thus unlikely to propel behaviours of self-surveillance for health improvement. For social scientists, discourses of brain plasticity might more usefully be framed less as a tool of governance, but more as a window through which to better appreciate the ways in which individuals ascribe ontological relevance to 'new' (scientific) knowledge.

## **Neuroscience of Emotional Bonding: Reflections on the Changing Scientific Conceptions of Mother-Infant Interactions**

*Polat Bican (The Johns Hopkins University, USA)*

With the increasing explanatory power of neurosciences in the public domain, sociologists and anthropologists have begun to track how neuroscientific understandings of human behavior have made their way into disparate domains such as medicine, law, and economics and in the forging of social identity and subjectivity. While these works have amplified our understanding of how biological explanations started to monopolize conceptions of human sociality and selfhood, they have primarily looked at how neuroscientific findings are taken up and accepted as explanatory models of human behavior or identity-making outside domains where scientific knowledge is produced. My research takes a different trajectory by focusing on how the long-standing psychological construct of “attachment”, originally used to understand the early life experiences of mother-infant relationships in humans, has been rediscovered and given a new lease of life within developmental neurobiology. Rather than examine how neuroscientific findings are translated into diverse social domains (i.e. the making of the pharmaceutical self, the construction of a new paradigm of choice in economics, or the re-tooling of accountability in law), I look at how a psychological construct absorbs and gets absorbed into research protocols of neurobiology. Illustrating the ways in which “attachment” comes to be constituted as an experimental object through the use of neuroscientific techniques, I examine how disciplinary boundaries get blurred and reconstituted in generating a new scientific object.

Within the field of child development, John Bowlby’s Attachment Theory has been the major paradigm that promoted the centrality of emotional bonding between the infant and primary caregiver during the early years of infancy. According to Bowlby, parental responses to infant’s proximity-seeking behavior shape patterns of emotional control that guide the infant’s cognitive, affective, and behavioral development. Building on this, subsequent studies have explained attachment in terms of cognitive-behavioral models based on laboratory observations of mother-child interactions as well as reflective accounts generated by the mother’s verbalization of her infant’s emotional needs. However, following recent advances in affective neuroscience, there has been a fundamental shift in the study of emotion away from reflective accounts of “feeling” to conceiving of emotion first and foremost as a set of experimentally verifiable, biological mechanisms. Contemporary research on animal models has lent credence to the idea of a non-conscious and pre-cognitive domain of emotions accessible through physiological and computational techniques but recalcitrant to the reflective and observational protocols of the cognitive-behavioral paradigm. Allowing researchers to interrogate bodily-based interactions of non-human animals in the laboratory environment, “attachment” is now defined as a complex developmental phenomenon driven by non-conscious transactions that characterize emotional bonding in mother-infant interactions during critical periods of infancy.

Through a socio-historical analysis of the attachment construct and relevant practices, I trace the emergence of a new field, the neurobiology of attachment, which explains emotional bonding with reference to non-conscious and pre-verbal biological systems at work during mother-infant interactions. Providing textual analysis of published papers, conference proceedings, protocols, interviews, and correspondences with prominent researchers within the field of psychology and neurobiology, my paper documents how a formerly psychological construct gets absorbed into developmental neurobiology, based on findings from affective neuroscience. It further explores how a scientific construct not only mutates in relation to diverse disciplinary contexts, but also, by articulating these contexts, provokes profound debates about the nature of scientific knowledge, cross-disciplinary transfer of ideas, and the translatability of scientific findings across human-animal divide.

## **Neuroscientific Research: Practical Ethics within the Patient Care Complex**

*Sahinol Melike (University of Tuebingen, Germany)*

Neuroscientific research and neurotechnical innovations are raising fundamental questions about what it means to be human. In doing so, they are also changing the ways in which patients suffering from debilitating illness are understood, cared for, and able to live in the world: they are producing new forms of human action, new methods of communication, and new conceptualisations of patient autonomy. The neurotechnical innovations affect patients directly while they are dependent of medical technologies to the extent that they could not survive without them. There is a need to describe both empirically and analytically the conditions through which these technologies emerge, and the role of various actors and understandings, both social and scientific, in the innovation process. Of special importance is the role of ethics, both formal and personal, in the development of such technologies as they are adapted to model and address human disease. This paper examines the place of ethics in the neurotechnical innovation process. It does so through an analysis of the patient care complex in the neurotechnological innovation process, with a focus afforded to patients that are treated with neuroscientific medical technologies, i.e. Brain Machine Interfaces (a direct communication pathway between a brain and an external device) or Deep Brain Stimulation (surgical treatment involving the implantation of a medical device, which sends electrical impulses to specific parts of the brain). Based on interviews with several neuro scientists/ surgeons, patient care takers, and ALS (Amyotrophic lateral sclerosis is a form of neuron disease, which causes gradually muscle weakness) patients who worked already with BMI, I argue that the patient care complex is distinguished by distributed ethics: If we understand ethics as technology itself, we can see that it produces new action, insights, motivations, and dilemmas during the innovation process. With "distributed ethics", I would like to draw on the notion on knowledge as an element completely entangled in networks (Latour 1987) or in other words "distributed knowledge", where the important idea is that different complementary bits are distributed in an interactive network (ANT) and that there is no centre, no periphery but distributions, interactions, etc. Thus causes a problem (or at least a problematic situation) for professionals of ethics but also for the innovation process itself. There is a new type of agency or performativity which comes with ethics: ethics produces a new kind of normativity and there is a contradiction with the distributed character of ethics. We also have to consider that norms of research are more flexible, because there is a promise of innovations that may improve patient's problems. This exaggerates the problem of ethics in the innovation process and the neuro scientific/ technical innovation process itself.

## **The bio-technological cerebral subject between determination and optimization**

*Schmitz Sigrid (University of Vienna, Austria)*

Neuro-cultures comprise a wide range of new intersections between the brain sciences and various disciplines including neuro-technologies, neuro-pedagogy, neuro-economy, neuro-marketing, and neuro-aesthetics. In this amalgamation of the biological and the social, the human is defined primarily by his/her brain. The so called cerebral subject emerges as the central category defining of the self, socio-cultural processes, and future visions of the idea of the human. Modern paradigms of the determined brain combine nature and nurture concept with the biological matter. The brain determines behaviour and at the same time the plastic brain is to be used and modularised for optimization in modern meritocracy. In line with these developments neuro-governementality emerges, i.e. the implementation of technologies of power and the market economy into technologies of the self in the field of brain optimization; with the individual (or even more his/her brain) in focus of mending and manipulation, and mostly neglecting its societal, political and economic situatedness.

Even more as a bio-social phenomenon the modern cerebral subject is an intra-actor in bio-techno-social networks. I will deepen this issue with some examples. Concerning Brain-Computer-Interfaces, the point is superficially a matter of facilitation of communication between the brain and the environment via machines. BCI are aimed to detect the output of the brain, to transform it into electrical signals, the latter then should navigate the connected technical devices in order to replace human activities. However, BCI-community itself breaks up this apparently focused direction from inside to outside. The aim and the prerequisite for an 'effective' human-computer-communication is a so called 'closed loop' enabling the feedback of the machine-communication to be processed by the brain. On the other hand, brain stimulations with help of technological devices (e. g. TMS) or pharmacological neuro-enhancement are definitively not short-termed and not without consequences; instead they perform long-lasting effects in the brain and change the cerebral subject.

In the area of neuro-technologies gendered norms are legitimized and manifested; (re)produced in theories and applications about the cerebral subject. I examine the gendered ideologies these concepts of the cerebral subject are based upon such as the separation of a male connoted rationality versus a female connoted emotionality/intuition. In this view, emotions are a necessary counterpart to prevent rationality from loosing control; with reference to neuroimaging studies both are separated, and rationality is considered superior to emotions. Analyzing the findings, the methodical influences, and the interpretations of neuroimaging, I scrutinize this division between 'thinking' and 'feeling' as well as their allocation to distinct brain areas.

Consequently, I will question the breaking up of gender boundaries through technobodies, that has been postulated in feminist STS research (amongst others Haraway, Barad, Tuana); whether they are fostered or thwarted by these developments. In her Cyborg Manifesto, Donna Haraway already stressed the danger of power in the modern information society with its particular codes. Which relations of power are manifested in the modern bio-technological cerebral subject and which interventions are thinkable against such manifestations?

## **You are what you choose? News media configurations of the neuroconsumer**

*Schneider Tanja (University of Oxford, UK)*

*Woolgar Steve (University of Oxford, UK)*

Neuroscience is increasingly being considered as the basis for a wide range of social activities and practices: decision making, political preferences, sexuality, new business practices. Neuromarketing - the management of customer preferences by the use of brain imaging technologies - is a prominent example of this trend. In this paper we examine news stories reporting on neuromarketing research and product development. The aim of this study is to identify how these stories portray the consumer. We are particularly interested in exploring through textual analysis (Smith 1978; 1987) how these stories explain to a wider public how neuromarketing is contributing to a 'new' and 'better' understanding of consumers.

We base our analysis on major titles of the international printed press that we source by means of a key word search from the database Lexis Nexis that offers full-text access to news, commentary, pictures and media transcripts from international news media. We concentrate on the English-speaking media and start sourcing neuromarketing news stories from 2000 onwards.

To date social science analyses of media reportage in the field of neuroscience have primarily concentrated on press coverage of brain imaging such as functional magnetic resonance imaging (fMRI) a technology that has gained significant public visibility over the past ten years (e.g., Racine et al. 2006). These studies tend to comprise relatively straightforward content analysis, combined with a call for innovative ways to communicate science and a plea to address the ethical issues of new technologies (e.g., Illes et al. 2010).

Our analysis of neuromarketing news stories differs from existing approaches. We view these news stories on neuromarketing as 'products of neuroculture' (Frazzetto and Anker 2009), i.e., products that a) symbolise the transfer of neuroscience's idioms from the laboratory to society and culture and b) create and inspire narratives about current neuroscience research and the role of brains in our lives (2009: 815). We look in particular at how 'literary devices' are mobilised in order to outline the new understandings of the consumer which are said to result from current neuromarketing research. We ask to what extent can these texts be considered performative? How do they contribute to the dissemination of brain-based narratives about consumer decision-making? And to what extent do they shape and reconfigure conceptualisations of the consumer and consumer behaviour?



Practicing science and technology,  
performing the social  
September 2<sup>nd</sup>-4<sup>th</sup> 2010

## **TRACK 20**

# **Engineering Practice: Performing a Profession, Constructing Society**

### **Convenors:**

**Sarah Bell (University College London, UK)**

**Darryl Farber (Penn State University, USA)**



## **Social Machines: on Some Consequences of STS for Theory and Methodology of Social Sciences and Social Engineering Practice**

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The notion of social engineering is usually mistakenly understood as: 1) specific application of social theory; 2) formulation of practical recommendations, or 3) influence social behaviors on a large scale. This contrasts strongly with the way we perceive engineering practices associated with natural sciences. Natural sciences engineering is conceptualized as design and construction of machines and closed technological systems. Many researchers emphasize that it is impossible to reduce engineering practice only to application of theoretical knowledge.

We maintain here that notion of social engineering should not be identified with narrowly understood techniques of social influence. It is possible to construct 'social machines' similar to technological products of natural sciences. The belief that it is impossible to construct such structures in social sciences, was mainly based on ideology tacitly presupposed by both sides of naturalism/antinaturalism debate. As STS have showed natural sciences are able to generate innovations (knowledge, technologies and procedures of effective actions) neither thanks to the fact that their domain is far less complex than area of interest in social sciences (ontological explanations of natural sciences success), nor thank to their special methods (methodological explanation). According to STS the sources of natural sciences success are: 1) laboratory reproduction of natural processes and creation of phenomena, which do have their equivalent in natural setting; 2) pragmatic tinkering; 3) expansion of laboratory environment, procedures and standards outside the laboratories, creation of technological infrastructure and production of isolated, closed systems. This factors and practices were omitted in traditional accounts of science, especially in post-positivist philosophy of science as well as in official self-presentation of scientific work. At the same time many social scientists deceived by this ideology and unaware of actual practice of natural sciences were and still are trying to emulate patterns of natural sciences methodology. They were trying to obtain adequate representation of social world as a prerequisite of effective technology forgetting about the real function of laboratories and experimentation.

In our presentation we would like to show that transmission of patterns of natural sciences identified by STS to practice of social sciences is in many cases possible. Also it is possible to create reproducible, synthetic social arrangements on micro- and meso- levels of social structure. Of course this kind of practice generates many social costs. Also this social technologies have many limitation. But nature of this problems is not in any specific way different from limitations and costs associated with technological products of natural sciences. Technological innovations of social and natural sciences require comparable level of interventions in socio-material collectives. What is most important, building and maintaining of social machines can bring new impulses and inspirations for development of social theory – this kind of development can be observed in research fields which are based on so called synthetic methodology.

## **Multi-sited ethnographies and studies of engineering practice**

*Buch Anders (DTU Management)*

*Jørgensen Ulrik (DTU Management)*

The reproduction, development and transformation of engineering work and culture have been the focus of a number of theoretical and empirical studies over the last 60 years or so (Barley 2005). In the 1950'ties and 1960'ties the predominant perspective was that of the engineering profession studied by sociological (Weberian) methods including studies of engineers serving authoritarian regimes. In the 1970'ies the perspective shifted to Marxist inspired discussions of the engineering profession in relation to class structure in parallel to studies of engineering education and skills from a perspective coming from Industrial Sociology. Over the last 30 years the studies have – to a large extend – used ethnographic and grounded methods in order to investigate the specifics of engineering practices in situated perspectives. Thus the overall trend has been from a macro to a micro perspective. We argue that this trend has – in many respects – led to a richer and empirically sensitive perspective on engineering work and culture. Thus, detailed studies of engineering work practices or engineering education provide new material for a richer understanding of engineering culture. On the other hand, however, the specific and strictly situated focus of these studies threatens to limit discussions of engineering practices to departmental and discrete institutional settings. We propose a research agenda that – inspired by George Marcus' multi-sited ethnographic methodology (Marcus 1998) – sees (and contrasts) engineering practices in diverse settings (e.g. engineering education and engineering work) in order to uncover the material-discursive transformations in these practices.

In our discussion we will outline the research perspective we intend to use in our study of engineering practices in the research program PROCEED. Our study will rely on the fundamental presumption that engineering practices are produced and reproduced in two – different, but mutually constitutive – institutional contexts: one located in institutional settings that are concerned with the reproduction of engineering knowledge and skills, i.e. engineering education and research, and the second based in engineering work, institutionally situated in organizations and companies.

Thus our study will address these two institutional contexts by investigating their fields of material-discursive practices. Engineering work and education are not viewed as distinct spheres performing independent versions of engineering theory and practice but as one of interplay and mutual constituency.

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**“Bespoke problems” with “multi-variant solutions”: The problem of knowledge and action in a profession performed in local contexts**

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*Bell Sarah (University College London, UK)*

This paper explores the resources of experience that engineers build up in practice and draw from to ‘frame’ their contributions to two key processes of social leadership and professional method: 1) proposing new configurations of socio-material relations; and 2) formalising these through detailed design and delivery. The basis for this account is a set of ten semi-structured interviews with individuals involved in the planning, design and construction of a high-speed rail link connecting London and South-East England to continental Europe.

Between 1989 and 1991, the engineering and design consultancy Arup prepared and, through a process of public consultation, political lobbying and leadership, eventually secured an alternative alignment into London for the Channel Tunnel Rail Link (CTRL) contrary to the one proposed and under formalisation by the publically owned rail operator of the time. Subsequently Arup were also part of the successful consortium of contractors that bid for the detailed design and delivery of the railway between 1995 and 2007.

Interviews were conducted with a sample of individuals from Arup that were involved in the various stages of this process. These included civil, structural and geotechnical engineers, an environmental scientist, a planner and an economist from Arup. The interviews deliberately covered both key individuals from the high profile initial stages of debate and negotiation regarding the railway alignment and those involved in the more ‘mundane’ engineering processes of detailed design formalisation.

Emergent from the accounts of both of these key processes are two potentially problematic themes. On the one hand it is clear that individuals, through the course of their professional work, develop a background of experience that either validates for falsifies the application of certain approaches to consideration of certain socio-technical parameters in the proposal and formalisation of possible worlds. On the other hand interviewees and the wider literature emphasise the specificity and localised nature of each instance contributing to this corpus of experience from which individuals and collectives draw their professional validation. Interviewees did this with reference to the “bespoke” nature of engineering problems which were either implicitly or explicitly identified as socio-technical in nature. Some interviewees chose to explicitly stress the “multi-variant” nature of possible solutions to these.

The unavoidable variance and boundaries to the individual corpuses of experience raise interesting epistemological questions around how to know the correct approach in practice. To the extent to which they are identified by interviewees, we show that answers to this have developed and been institutionalised both professionally (e.g. formal design codes and reviews) and more locally (e.g. stakeholder consultation, close client relations, co-habitation of design teams etc). Local formulation of the correct approach to a new project or problem is particularly important in the context of an engineering consultancy with its commercial emphasis on meeting the needs of clients.

## **Reflection of UCL Civil and Environmental Engineering experience in integrating ethics in engineering education**

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Discussions on ethical aspects of engineering and the development of ethical codes of practices are now common practice in many countries. These discussions stem from the 20th century experience that engineering decisions can have profound implications for the wellbeing of the public and the environment, although different societies have followed specific paths in their development of codes of engineering ethics (Downey et al. 2007). Engineers need to act within their professional code of conduct and be able to make ethically sound decisions and therefore engineering ethics cannot be separated from technical competence.

Yet, despite these developments, the integration of ethical aspects into the education of future engineers remains patchy. At UCL, the Department of Civil, Environmental and Geomatic Engineering (CEGE) have adapted the ethics curriculum map written by the Royal Academy of Engineering working group on teaching engineering ethics, which was released in 2008. The process included the development of an internal discussion document that proposed ethics learning outcomes and identified opportunities for integrating them in the curriculum, including suggestions for teaching activities and assessment. In addition, an outline for an ethics teaching toolkit and a proposal for evaluating and reviewing ethics teaching in the department was developed.

While the integration of ethics into the departmental curriculum started in earnest only in the current academic year, we have decided to evaluate the reception of the programme by the lecturers in the department. This was carried out through questionnaire and interviews. The response of those that were interviewed is generally positive.

Time, logistics and teaching formats seem to be main concerns. Few are keen on the idea of lectures that specifically focus on ethics. Most stress ideas of interactive, reflective and group-based learning which are widely used in the department. Case-studies seem especially popular as they can be used in tutorial groups and during scenario based learning. While a toolkit with information about ethics was provided to all lecturers, only few dedicated the time to explore this material. The few who have seem to find it mostly useful, some few have gone on to integrate parts of it into their own teaching.

The interview also included questions about personal ethics. Most staff reported that they had faced any significant ethical dilemmas in their own work to date. It is possible to identify academics who have clear opinions and people who have more tacit or less articulated views on engineering ethics and related issues. Staff showed either a more flexible, situational approach to ethics, or principled stances. Sustainability is often an important driver for those with more normative ethical positions often important for the latter.

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## **Social learning in engineering practice: Towards democratic construction of sustainable communities?**

*Egmose Jonas (Roskilde University, Denmark)*

In an era of climate change engineering practices has become pivotal to the construction of sustainable societies. Whilst engineering might enable new ways of living it remains true that sustainable solutions are always embedded in social practices of particular times and places. Accordingly it remains a continuous challenge towards sustainable change to take into account the interplay between technical and social dynamics.

The current landscape contains various opportunities and challenges for doing so. In recent years we have seen an increasing number of public engagement initiatives, one the one hand aiming to further dialogue on science and engineering, while on the other being criticised for not adding much new except science communication to the public. Equally, the flowering of user-driven innovation focusing on specific aspects of incremental technology development has been criticised for not being able to adequately grasp the broader societal aspects in which engineering science operates. Thus, the pressing need to understanding the interrelated dynamics of technical, social and societal aspects enabling sustainable change still remains.

The Citizen Science for Sustainability (SuScit) project sought to develop novel ways for engineering researchers, practitioners and citizens to address this challenge through an action research and public engagement programme aiming broadly to explore community understandings of urban sustainability in order to provide a basis for reflexively identify future research needs and opportunities.

In doing so the SuScit project took a rather distinct approach: First, it sought broadly to address the challenges of sustainability by enabling citizens to explore and articulate local lived experience, rather than building the deliberation on discourses predefined by scientific communities. Secondly, the process aimed to enable exchange of different kinds of human experience; create room for shared reflection; and foster social learning, which could lead to joint action and future projects by linking the knowledge, experience and perspectives of researchers, practitioners and local communities.

Hereby the SuScit project aimed to address issues which were not merely engineering problems but indeed part of democratic and societal challenges. The project in particular sought to address the environmental and social challenges faced by marginalised and deprived urban communities. Understanding the challenges of marginalised communities often represents a particular challenge to academic communities usually having rather different experiences in their personal and professional life. However, these marginalised issues can prove crucial for broader transitions towards urban sustainability.

Aiming to enable social learning on these issues the project was fundamentally based on researchers' capability to learn from engaging with the public as a prerequisite for adding new perspectives to future research and practice. This paper addresses the experiences of doing so by examining the dynamics of social learning processes between engineering researchers, practitioners and local citizens taking part in the deliberations on urban sustainability.

## **Engineering as Performance: An “Experiential Gestalt” for Understanding Engineering**

*Evans Rick (Cornell University, USA)*

Engineering practice has long been a topic of interest and much that is positive has resulted. Constructions of engineering practice have allowed educators to make substantial progress in providing students with good, useful and powerful learning experiences (Sheppard et al., 2009, Crawley et al., 2007). And, certainly one of the most positive results of the qualitative research of engineering practice has been the rejection of long-standing false dichotomies – theoretical versus practical knowledge, hard versus soft skills – in addition to warning of new (or re-emerging) false dichotomies – academy versus workplace (Trevelyan, 2007, 2009). However, while the concept of practice allows us to explore engineering as an ever varied and variable collection of actions relevant to purpose, this same heterogeneous nature resists both a simple and elegant theoretical formulation in ways that allow for coherence. Consequently, given the diversity of practices that are possible in engineering, there is a growing discussion, perhaps even confusion about what engineering really is. Performance does offer such a formulation along with an opportunity for coherence.

Performance is an “essentially contested concept” that has emerged, very eclectically, from a broad range of disciplines/fields – sociology, anthropology, linguistics, literary and rhetorical studies, theater and/or performance studies, even philosophy (Carlson, 1996). Still, in referencing these various disciplines/fields, there is an agreement that performance is doing; it is redoing; and it is showing doing (Schechner, 2002). To say that performance is doing emphasizes the importance of acting. To say that performance is redoing suggests that performers who act never do so apart from tradition and/or conventions. And, to say that performance is showing doing highlights performers’ awareness, most importantly, of themselves as distinctive agents. I begin my paper with a brief overview of performance.

Then, since my particular interest is language use in engineering, I discuss the ways that performance helps us to better understand communicative practice(s). Communication, like other types of engineering practice, is an ever varied and variable collection of situated and recurring actions relevant to purpose. We term these actions genres (Bazerman, 1999). And, like other types of engineering practice, communication in engineering is informed by tradition and/or conventions. That tradition and those conventions not only provide scaffolding for students’ participation, but also, through performing those genres, they develop genre knowledge or an understanding how to act communicatively (Berkenkotter and Huckin, 1995). And again, like other kinds of engineering practice, performing those genres and displaying genre knowledge, at least in part constructs and represents their awareness of themselves as agents, their emerging identities as engineers (Butler, 1990).

Finally, and again briefly, I suggest that the concept performance represents an “experiential gestalt,” or “a structured whole within our experience” that allows us to explore engineering practice in terms of doing, re-doing, and showing doing (Lakoff and Johnson, 1980). Discovering that experiential gestalt not only enables us to see coherence across the varied and variable practices that are engineering but also to develop a simpler, more elegant – less disjointed – understanding of what engineering really is.

## **Cultivating Strategic Imagination in the Next Generation Transportation Professional**

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*Pietrucha Martin (Penn State University, USA)*

Potentially the biggest failure in transportation planning is a failure of imagination. How many times have we heard, “we did not see it coming,” “it wasn’t on our radar,” “nobody could have planned for THAT?” The increasing complexity and interconnectedness of transportation systems worldwide and the connectedness with other critical infra-structure, such as telecommunications, and electricity, as well as land-use planning demands that the next generation transportation professional have an intellectual toolkit that is broader and more strategically oriented than today’s tactical and operational perspective. The ability to understand the complicated dynamics of transportation systems as complex, large-scale socio-technical systems requires the cultivation of an ability to imagine the possible and understand the consequences of what sometimes are called low probability, high impact events. Although one can not plan for every remote possibility, one does need to develop a framework for interpreting the potentially far-reaching implications of seemingly minor events and to craft strategies that can effectively respond to these possibilities. One may think of this capacity as strategic imagination. In this paper we explore scenario planning for cultivating strategic imagination and in particular explore scenario planning as a way that can enable not only the individual transportation professionals to think more creatively but that through its incorporation into the transportation planning process create a common medium to think through and reflect upon the deeper connections among socio-technical systems as a system of systems. We use an example of a scenario planning exercise for the Centre Region, Centre County, Pennsylvania, USA to illustrate how scenario planning may be used to think imaginatively, but practically of the connections between land-use and transportation. Enhancing the learning of the multiple stakeholders increasingly involved in transportation planning in understanding the transportation system as a system of systems and an element of a larger system is needed for more holistic planning. Cultivating this type of skill in future transportation professionals is at the heart of the problem of creating livable communities.

## On Open Science and Public Engagement with Engineering Research

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Open Science is an emerging approach to the conduct of science, technology and engineering projects, in which the whole of an ongoing investigation, its 'data, scientific opinions, questions, ideas, folk knowledge, workflows and everything else'[1] are made available on and through the Internet. This approach has largely been developed by scientists and engineers for use within their internal networks, as a way to allow large, often multi-national, research groups to collaborate effectively on a joint project. However, using the Internet as the medium of communication means there are no boundaries to preclude members of the public from following, analysing, engaging – and potentially contributing to – the project involved.[2] Thus, Open Science has wide implications covering diverse areas such as fundamental research, the practice of science and engineering, publishing and the public's engagement with science and engineering. For the UK government, encouraging researchers and members of the public 'to discuss the issues that science raises for society'[3] is a core element of policy, raising an associated need to 'look for innovative ways to provide people [...] with access to scientific resources and information'.[4]

This paper reviews the history of the Open Science movement and how its methodologies, aims and reach are evolving, including reflection on the related areas of Open Access, peer-review and public engagement with science and engineering. Open Science challenges present models of interaction between the actors in the research process in that it is capable of facilitating direct public engagement with the science, technology and engineering itself as it is happening, rather than through the mediation of its practitioners. Research is dynamic and tentative; it is uncertain both to what extent researchers are willing to embrace such uncertainty beyond their own community and to what extent members of the public are willing to recognise the value and importance of that dynamism. This paper will discuss recent analysis of data gathered from interviews with researchers and members of the public to probe some of these issues more fully.

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## Supporting Change through Expansive Learning in Engineering Practice

*Hackel Monika (FernUniversität in Hagen/Hagen University, Germany)*

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Mechatronics engineering unites mechanical engineering, electronic engineering, and information systems engineering in an interdisciplinary design process. In this process, engineers from different disciplines collaborate in order to provide for higher functionality in technical systems, to reduce failure rates, and to save expenses based on an early design matching. This talk presents a study in social scientific research on interdisciplinary collaboration among engineers at the workplace.

In order to foster the implementation of an interdisciplinary design process, the project AQUIMO has devised a process model for mechatronics engineering, which is supported by the development of a computer-based modelling tool and an associated qualification program. Three medium-sized companies, leading providers for their specific market in mechanical and plant engineering, a software company and two university-level institutions have been participating in the project. The combination of process model, engineering tool and qualification program enables to replace subsequent processes in engineering which are concentrating on discipline specific aspects in engineering, through interdisciplinary or parallel processes.

The task of social scientific research in AQUIMO has been to support the engineers to create new tools, methods and attitudes for their interdisciplinary work. The formative evaluation, which was expected to facilitate change, has been based on the approach of “developmental work research” as set forth by Engeström (1987, 2005). This specific form of “action research” concentrates on activity systems. Contradictions and double binds force an activity system, the related community of practice and the practitioners themselves to change. They find and develop new ways to organize the division of labour and create new instruments to support this. Engeström calls this expansive learning.

This talk gives an overview on facilitating change towards interdisciplinarity in engineering based on developmental work research. The ethnographic description of the actual conditions and contradictions in mechatronics engineering leads to a deeper understanding for this field of action. Although there is a great cooperativeness between the disciplines, interdisciplinarity raises certain difficulties. The talk presents some central findings:

Discipline specific tools, design languages and visualisations lead to different perceptions of the shared product and thus obstruct a systemic view. Even shared terms, definitions, data and experimental knowledge do not necessarily provide a common ground for collaboration. Perspective taking and deeper understanding for the needs of the other disciplines are essential for an efficient design process. Workspace awareness is a central challenge for interdisciplinary engineering. Interdisciplinarity in engineering is affected by self-perception of the involved disciplines. In the project AQUIMO, expansive learning was facilitated in two respects. On the one hand, the engineers who participated in the study learned about their contradictions in everyday work, and thus discussed and implemented new ways to organize their local community of practice. On the other hand, the confrontation with the findings from the studies supported the project partners to create an innovative mechatronical modelling tool and to identify competency needs, which are addressed by qualification (AQUIMO 2010).

## **The Craft of Modeling, the Modeling of Craft**

*Kouw Matthijs (Maastricht University/Virtual Knowledge Studio, The Netherlands)*

Simulations and models are becoming more and more intertwined with the design of technological systems. In terms of understanding, monitoring, countering, and communicating risks, simulations and models thus fulfill an instrumental role. In this paper, I discuss the history of modeling in hydrological research on flooding in the Netherlands from the 1950s to the present. Drawing on ethnographic research carried out at a renowned institute for water management in the Netherlands, I will present a history of hydrological models. In addition, I discuss how both engineers and policymakers relate to hydrological models, and outline the possible ways in which their attitudes towards hydrological models influence engineering practice.

This discussion of the epistemological dimensions of simulations and models reveals their underlying technological, institutional, and political values. Attitudes towards hydrological simulations and models appear to be increasingly shaped by a desire for resilience and control in the form of quantified knowledge, which is expected to facilitate foresight and make risks more tangible. To substantiate this claim, I discuss shifts in hydrological research from physical to computational models, which are often described as a linear move towards increasingly robust explanations enabled by technological and computational prowess. However, studying the history and use of computational models reveals they were instrumental in effecting commitments to the codification of model-enabled knowledge. This value attributed to computational models implies a desire to manage and control uncertainties related to the modeling of hydrological phenomena. The move towards standardized, quantified, and computational model-enabled knowledge reveals tensions between the craft typically involved with hydrological research on the one hand, and technological, institutional, and political investments that flow through such practices on the other.

In a profession where computational modeling is becoming more pervasive, engineering practice straddles discovery and manipulation. What is the relationship between the rationalities at work in engineering practice and the ability of those implicated in these practices to think through the knowledge provided by models? How is engineering practice located between standardization and customization? Does the encoding of risks culminate in a homogenization of solutions for risks? Is it still possible for engineers to question the momentum computational models have acquired?

Commitments to codification appear to entangle engineers in technological practices that envelope the acquisition of knowledge about hydrological phenomena. Immersion in computational practices yields varying degrees of opacity of hydrological models, and thus influences the ability of engineers to fathom assumptions and design principles underlying a particular model. In everyday engineering practice, craftsmanship is not replaced by standardized operations in digital environments, but remains a necessary dimension of work in digital environments. However, craftsmanship is subjected to formalization and codification. Thus, issues related to immersion also extend all the way to the supposedly empowering processes that are expected to equip actors in technological cultures against risks. Along these lines, my analysis of social reliance on simulations and models reveals engineering as a practice where aspects of the vulnerability of technological cultures to risks can be analyzed.

## **Identity building for design professionals: some issues from two ethnographic fieldworks**

*Minguet Guy (Ecole des Mines de Nantes, France)*

*Osty Florence (Ecole des Mines de Nantes, France)*

Guy Minguet and Florence Osty examine why and how software engineers identify themselves so deeply with their activities, their trades and their companies. At its most, the accelerated process of innovation tests individuals' abilities to face new uncertainties regarding products, services, methods of working as well as professional sociability and the modes of self-construction at work. The milieus of intensive innovation form a tormented landscape in which the unfolding of the technological imaginary and the updating of high competences represent a challenge the face of the spreading of the sources of prescription and the destabilization of the space-time frameworks of the productive activities. How can professionals manage to save what makes them as subjects in the face of the relentlessness and the restructuring that affect them? The authors' analysis is directed toward the anchorage that makes it possible to resist the identity giddiness, the risk of dilution of sociability and the emergence of tactical and contingent behaviors. Indeed, the motives and processes of recognition in a context in which the identity benefits depend on work situation and are uncertain in terms of careers. That perspective is the guideline in two R & D locations in order to highlight how much the identity aspect of design work is an especially valuable factor of regulation of the perpetual movement in advanced technology organizations. When it is associated with a strong work sociability, it promotes a flowing cooperation, the critical point of matrice structures and the source of a lasting integration.

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## **Walking down the Democratization Boulevard in STS: A Critical Reflection on Studying Biomedical Engineering Practice and Policy**

*Morlacchi Pierangela (SPRU/University of Sussex, UK)*

Inspired by Bijker(2003)'s plea for a new generation of public intellectuals coming from STS this essay reflects upon my personal experience of what he called the 'democratization boulevard' route of doing STS. He describes this route as combining long-term academic agendas with clear political and societal engagement. In a nutshell I will articulate my contribution to our understanding of engineering knowledge and practice, and the relationship between engineering and policy from the point of view of a STS engineer studying engineering practice.

Since studying engineering I thought that there is more to technology than just machines. To learn how to study the people-side of technology I have retrained myself as an organizational sociologist and in the last few years I have been involved in teaching and academic policy research. My work is mainly on the co-evolution of technological and organizational change in health and medicine with a focus on implantable medical devices or spare parts of the body, but also on the evolution of academic and technological communities (e.g. Morlacchi and Martin, 2009).

The field of engineering that I know better is the one of biomedical engineering, which I have studied in relation to its co-evolution with the medical device industry. My research combines historical work and ethnographic work or fieldwork 'sur le terrain' (Nersessian, 2009). I study practices and processes 'in the wild' at multiple levels of analysis to understand new ways of thinking, interacting and working in biomedical engineering, starting from the individual level – what biomedical engineers do and how they do it, how they think – to the field level – the process of professionalization of biomedical engineering and the role of biomedical engineering in society.

Biomedical engineering is an excellent site to explore the relationship between technological culture, democracy, STS and policy. I think that my reflexive discussion of the evolution of biomedical engineering practice presented in this paper can contribute to the discussion in this track for two sets of reasons. On the one hand is the inherent significance of biomedical engineering, in terms of work and knowledge practices, as interdisciplinary field at the cross-roads of engineering and medicine. Biomedical engineering knowledge and 'what [biomedical] engineers know and how they know it' are different when compared to the ones in other areas of engineering (Vincenti, 1990; Nersessian, 2009). Bioengineers are key actors in development and evaluation of new medical technologies, which can present significant ethical and policy problems (Morlacchi and Nelson, 2010).

On the other hand is the significance of the study of biomedical engineering for the understanding of the democratization of technological culture in general. Bijker (2003) proposed that as academic scholars working with politicians, engineers, scientists and the public in general our intervention via a case study 'could be the 'STS mirror': STS studies present mirrors in which actors see their cultures and actions in new ways. And again seeing themselves in new ways may lead to self-conscious change of behaviour' (Bijker, 2003: 4).

## **Crossing Disciplines to Address Urban Sustainability**

*Paskins James (University College London, UK)*

*Bell Sarah (University College London, UK)*

*Croxford Ben (University College London, UK)*

*Haklay Muki (University College London, UK)*

*Julier Simon (University College London, UK)*

We will present results based on our experience of running a programme of activities designed to stimulate interdisciplinary research. The work was carried out at UCL (University College London, UK) as part of 'Bridging the Gaps: Sustainable Urban Spaces', which is an EPSRC (Engineering and Physical Sciences Research Council) funded programme. All of the EPSRC's Bridging the Gaps programmes aim to initiate and support interdisciplinary collaboration within a university. The programme at UCL was designed to create research collaborations that addressed problems in the area of sustainable urban spaces, an area that features complex problems that are often at the interface of different academic disciplines.

The programme initially focussed on building relationships in the three faculties which make up the UCL School of the Built Environment, Engineering Sciences and Mathematical & Physical Sciences, but subsequently brought in participants from other faculties, as the programme grew to include the social, as well as technical, aspects of urban sustainability.

As can be seen in Figure 1, the programme has had particular success in linking departments within the Engineering faculty, both with other engineering departments, and with departments in other faculties. Figure 1 also gives an idea of the range of activities we have used to support collaborations.

Bridging the Gaps has brought together researchers working on different elements of a problem, allowing each of them to contribute approaches from their own discipline. For example, a model for street level pollution was developed by an engineer and a statistical scientist, who combined techniques from their own disciplines to address the problem.

Throughout this programme, there has been a focus on early career researchers. A condition for the majority of funding, was that a collaboration should be led by an early career researcher, allowing them to head collaborations that included more senior staff.

The paper will present findings from interviews carried out with key participants in the programme. We are interested in the value of interdisciplinary working, for instance, whether the benefits that come from interdisciplinary working are outweighed by the complexities and problems associated with it. We will address the challenge of creating the correct conditions for interdisciplinary working and ways in which we can use our experience to minimise the barriers in the future.

In many cases, the collaborations have focused on an engineering topic, or featured collaborators from departments in the Faculty of Engineering, or departments with strong elements of engineering research. Because of this, much of our experience relates to the value of interdisciplinary collaboration in engineering research.

We will also speculate on the future culture of interdisciplinary working at UCL. Will the focus on early career researchers embolden a new generation of researchers to reach across departmental boundaries?

## **“Intending Engineering Practice” - A Conceptualisation of Engineers’ Understanding of Innovation through their Encounter with their Own Practice**

*Schaefer Stephan (Department of Business Administration, School of Economics and Management, Lund University, Sweden)*

Innovation is arguably one of the buzzword of today pervading economic, social as well as cultural life. Innovation however is an elusive and ambiguous concept. Notwithstanding this most innovation research builds on pre-conceived notions of innovation and thereby circumventing its highly elusive nature. What is lacking are studies which embrace the ambiguity surrounding understandings of innovation by delivering “thick descriptions” (Geertz, 1973). The following paper attempts to deliver such a “thick description” by drawing on empirical findings from a longitudinal close-up study of a high-technology company. Based on a first tentative analysis the purpose of my paper is to conceptualise how engineers understand innovation and how their detachment from their actual engineering work affects understandings of innovation and what implications that entails for the organisation.

or my framework I draw inspiration from phenomenology. My framework comprises three different levels which are separated for analytical purpose but overlap empirically. The first level is the intentionality level. The phenomenological concept of intentionality proposes that we are always consciousness of something. A distinction is made between filled intentions or intuitions which refer to the direct apprehension of a bodily presence and empty intentions directed towards an absent object (Sokolowski, 2000). I claim that engineers close to the technology process intuit technology processes, artefacts and related objects rather than intend them in their absence. Intuition is then closely related to their “lived experience” of innovation whereas empty intending would point to a much more discursively influenced basis for understanding innovation. This intuition/ intentionality dynamic frames the second level of the concept namely the understanding of innovation. Here the engineer “objectivates” his/ her intentions by using language (Berger & Luckmann, 1966). The articulation of these understandings impact the third level of the framework: the implications. Understandings either impact on an individual level, i.e. affecting the self-identity constructions of engineers or on an organisational level leading to institutionalisation of understandings within the organisation. My framework, I argue, contributes an empirically derived concept which relates the directness of experiencing engineering practice to understandings of innovation and thereby enables to point out possible ramifications of these understandings.

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## **Environmental Standards as Ethical/Epistemic Mediators in Consulting Engineering Companies?**

*Solli, Jøran (Norwegian University of Science and Technology, Norway)*

In the standard view, the main instruments of environmental policy are financial and judicial. The provision of information and the support of relevant R&D are also considered important. Nevertheless, experts tend to be viewed as passively responding to the demand of their services, by rationally supplying the services that are demanded through public regulation or the market. Further, companies that provide environmentally relevant advice may be seen as intermediaries or boundary organisations (Guston 2001) between R&D and decision-making, mediating new knowledge to relevant constituencies. In theory, environmental policy instruments should shape the advice of the consultants but above all make potential clients demand information and guidance about environmental issues. In practice, the situation is more complicated. A substantial body of research shows that the processes of transfer of knowledge in the environmental area are far less effective than expected (see, e.g., Cash et al. 2003, Kerkhoff & Lebel 2006, McNie 2007).

Following the knowledge practices of four consulting engineering companies we will be able to analyse how new standards are met, handled or appropriated in their daily work. How may the experts' appropriation of new environmental standards be described? Are these standards ethical/epistemic mediators in consulting engineering practices? And what consequences does the appropriation of standards have for how their services to the clients are shaped?

## **The meaning of strategic areas in enterprises applying principles of Toyota**

*Stasiak-Betlejewska Renata (Czestochowa University of Technology, Poland)*

Harmonizing aims of the organization with workers needs, at taking into consideration determined outside and internal conditionings, is one of essential objectives of the personnel and production management in model applying principles of Toyota.

Findings of the examination carried out in one of production plants of several different branches were presented in the article. An assessment of production workers made in the scope of superiors attitudes and chosen strategic areas of the enterprise is an object of analysis. The Pareto-Lorenz diagram and innovative BOST method was applied for research needs. BOST method is a questionnaire method using interpretation of Toyota principles in the context of contemporary conditions of crisis.

The research findings are basis of improvement actions project for some production enterprises.



## **TRACK 21**

# **Organization of Science Practices**

### **Converners:**

**Inge van der Weijden (Rathenau Institute, The Netherlands)**

**Peter van den Besselaar (University of Amsterdam, The Netherlands)**

**Sven Hemlin (University of Gothenburg, Sweden)**

**Maria Nedeva (University of Manchester, UK)**

**Life cycles and leadership of research groups: the case of the Hubrecht Institute for Developmental Biology and stem cell research (1916-2008)**

*Braam Robert (Science System Assessment, Rathenau Instituut, VU University Amsterdam, The Netherlands)*

*van den Besselaar Peter (Science System Assessment, Rathenau Instituut, VU University Amsterdam, The Netherlands)*

If research groups (organisational units or institutes) follow a life cycle development, the performance of groups will depend on the stage of the group. Cycle deviations, then, occur only if conditions change, e.g. new leadership (internal) or changed field dynamics (external). Research groups and institutes are organisational entities with a certain strategic capacity (Laredo & Mustar, 2000). Such research groups can be seen also as units of change, steered by an internal mechanism in conjunction with other external events and processes (Scot Poole et al., 2000). If conditions are stable, the long-term development of groups can be modelled by a life cycle, of birth, growth, maturity and decay. However, if conditions change, internally or externally, groups have to accommodate to these 'disturbances' and as a result groups deviate from the life cycle path. Empirical development trajectories, thus, are a combination of life cycle stages and adaptation to changed conditions. The trajectory will be reflected in a group's output history (Laredo and Mustar, 2000; Braam and van den Besselaar, 2010).

Little empirical evidence is known on long-term development patterns of research groups. We explore this gap in a case study approach, studying a group or institute's entire output history. We construct bibliometric indicators of the production level and composition of output, and analyse these to find patterns in the output indicators over time. We then compare results with the expected life cycle pattern development, and look for deviations from this. Further, we compare results with field development data and with reported events in the groups' history.

The paper reports evidence of stepwise consecutive life cycles of a research institute, for the case of the Hubrecht Institute for Developmental Biology and Stem Cell Research, a public research institute in the life sciences in the Netherlands. The found pattern can be explained by the combined influences of international field dynamics and succession of local leadership.

Overall publication growth was found to follow literature growth in the field of research (as indicated by keyword searches in the Web of Science). But, in more detail we find a series of escalating steps (99% statistical confidence), each with initial growth followed by a stable period. These steps endure several decades and coincide with a succession of directorships. Our findings are in line with earlier hypotheses of Omta (1995) on appointment of new professors in research institutes. Further research, to be presented at the conference, focuses on aspects related to content of the research. Do the changes of leadership (successive directors) also involve a widening of research topics studies at the institute, and how does this relate to the field? The point we explore here is if appointment of new leaders boosts output - after an incubation period - only quantitatively or also qualitatively (new

topics). Inspection and analysis of titles and references will be used to analyse dynamics of content, around steps.

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## **Determinants of successful PhD projects**

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Research groups and graduate schools invest a lot in PhD students, expecting that these investments will lead to a dissertation of sufficient quality and hoping that the PhD projects will lead to high quality publications. However, the outcomes of PhD projects vary widely and a number of PhD's never finish their project. We decided it would be worthwhile to study the variables that may help to explain the success and failure of PhD projects. As there is no encompassing theory that can explain the success of PhD projects, we took a broad approach to study the PhD process. In a longitudinal survey study, we included institutional, interpersonal and intrapersonal variables as determinants of successful PhD projects.

Institutional aspects include the field of study, or discipline (e.g. law, social sciences, etc.) and their associated characteristics (e.g., individualistic or cooperative projects), support by the faculty (e.g. quality of research facilities) and the graduate school (e.g. quality of courses) and the characteristics of the faculty and/or graduate school (e.g., size of staff). The interpersonal variables focused on the relationship between PhD's and their supervisor (e.g., supervision style, quality and intensity of supervision). Finally, some intrapersonal variables were measured, such as motivational factors (e.g., persistence, time management, perceived interestingness of the project).

We conducted a longitudinal survey study (two measurements, one year apart) yielding data from 417 researchers working on their PhD, and 230 of their supervisors. The results show that each of the variable categories is relevant for the understanding of the PhD process. PhD's indicate that several institutional, interpersonal and intrapersonal variables we included in the study contributed to perceived delays in the project (e.g., complexity of the project, type of chosen methodology, personal time management, quality of supervision). However, the PhD's perceptions of the characteristics of their own project also changed between the Time 1 and Time 2 measurements (e.g., interestingness of project, value attached to timeliness). These results will be discussed in more detail during the presentation, in the light of institutional and motivational theories.

## **The generation of the social impact. Three case studies in ICT Research**

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### **BACKGROUND**

Social relevance of scientific research is considered more and more to be important. Research councils, governments and related agencies, and charity foundations are therefore interested in stimulating and assessing social impact (e.g. Arts and Humanities Research Council, 2005; Cowan & Patel, 2002; Melis, 2007). In recent years, numerous methods have been introduced to assess social impact (e.g. Bensing, Caris-Verhallen, Dekker, Delnoij, & Groenewegen, 2004; Hanney, Grant, Wooding, & Buxton, 2004). Actual social impacts of among other units research groups, universities and entire research fields have been presented as well (e.g. Wooding, Hanney, Buxton, & Grant, 2004).

However, the majority of these methods and impact reports just describe impacts on society. For instance, the use of research in policy making or the economic benefits of a new procedure in health care. How such impacts are generated and what kinds of interactions with the relevant societal context are required to be successful in terms of generating impact is mostly reported in the margin. If reported at all. Without understanding *how research practices should be organized* in order to generate societal impact, success remains subject to trial and error.

Need for more knowledge on this subject has been recently articulated both in scientific literature and in grey literature (Health Economics Research Group, Office of Health Economics, & RAND Europe, 2008; Jensen, Rouquier, Kreimer, & Croissant, 2008; Krücken, Meier, & Müller, 2009). A better understanding of the mechanisms underlying the generation of social impact and the factors that support or hamper the process, could improve both policy making and research assessment related to social impact.

### **PRODUCTIVE INTERACTIONS AND ENVIRONMENTAL SELECTION MECHANISMS**

We presume interactions between science and society are required to generate social impact. Interactions that result in a change of opinion, attitudes or behaviour of societal stakeholders are considered to be productive. Potentially productive interactions include personal interactions, such as research collaboration; indirect interactions via for instance papers and tools; and formal interactions like contracts. As becomes clear from practice, not all interactions are productive.

The notion of environmental selection mechanisms is borrowed from evolution theory to explain why some interactions are productive and others are not. In evolution the selection mechanisms determine which organisms and species succeed to survive. In the case of social impact the mechanisms determine which research outcomes are adopted to generate social impact. These selection mechanisms differ between the various societal contexts, and therefore have to be studied in a variety of local and sectoral innovation systems.

Concerning social impact, we expect to find selection mechanisms on three levels; the research environment (research organization and researchers), the research process (where science and society might cooperate and interact) and the social environment (stakeholders within the relevant societal subsystems). Selection mechanisms may be of social nature (such as involvement of key persons), economic nature (such as market processes) or political nature (such as regulation).

## THE CASE STUDIES

In this paper, we will present the results of three case studies in ICT research in which productive interactions between science and society are studied. The aim of the case studies is to improve our understanding of the way impact is produced through these interactions in their specific disciplinary and local environments. Therefore, not only the interactions are studied, but also the environmental selection mechanisms that determine success. The case studies will be conducted in spring 2010 and include an interorganisational research institute, a research field and a case of collaboration between researchers and social movements.

This study is conducted in the context of the EU funded SIAMPI project (Social Impact Assessment Methods for research funding instruments through the study of Productive Interactions between science and society). The approach is based on earlier methods for societal impact measurement (Spaapen, Dijstelbloem, & Wamelink, 2007) and results from the Dutch ERiC Project (Van der Meulen et al., 2010).

## EXPECTED RESULTS

First, the study will result in a conceptualization of the notion of 'productive interactions' by presenting a typology of these interactions. Second, the study will result in the identification of selection mechanisms that enable or disable the generation of social impact. Thirdly, the selection mechanisms will be related to contextual factors. The identification will be accompanied by indicators to assess social impact of research. Together, this will help to better understand the generation of social impact.

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## **Leadership and innovation in Swedish R&D organizations**

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In this research project, managing is analysed in terms of relations, exchanges, individual motivation and initiative in relation to innovativity. Our focus is on the relations between managers - coworkers and the social exchange, for example services, appreciation, respect, trust and responsibility. This view has a strong support in international research about leadership and is particularly well suited in a Scandinavian context where shared responsibility and fairly democratic leadership are common. The theoretical contribution consists of: a) a development of the LMX theory to include a co-workship perspective, b) to insert a stronger emphasis on motivation and initiative in LMX theory, c) to adapt LMX theory to the Scandinavian model of management/leadership. The preliminary results of the first study will be presented.

## **Systems of Assessment of large research collaborations, and the impact for the scientific culture in universities**

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The increasing pressure on universities to invest in large applications in collaborations for the European Commission or different strategic research councils creates a special regime for assessment of these collaborations as they seem to be based both on peer reviews and on other criteria and political negotiations.

The paper will discuss the problem viewed from different kind of collaborations, where we draw on empirical experience. One case is based on examples from a study of collaborations in the energy sector for the European Institute of Innovation and Technology, where we did a pilot study on collaborations and models for collaborations which will be included in the analysis. We also include 2 other types of calls for large strategic networks, one from an EU assessment process in the EC, and one from a Danish programme on strategic research for innovation. The special challenges created by the politically decided need for large projects and collaboration between universities and industry across national cultures are important for an analysis of the foundations for new research agendas.

The idea is to analyse the assessment procedure in relation to more traditional peer review procedures, and to the different political, scientific agendas developed for these processes, and then discuss this in relation to general conditions for university research in. Peer reviews are integrated in the decision making processes in all cases, but the peer reviews are used in very different ways. The peer review act as the general quality guaranty system and the relationship between this guaranty and the policy decision making is an important discussion as it has important implications for both the scientific applicants and the reviewers. The peer review is based on the transparency of the assessment, and most of the time this is kept as a transparent process. But the role of the reviews afterwards in the decision making process, in the short listing ect. is very different, and often we meet the use of other and often non-transparent criteria. In some cases the decision process challenge the legitimacy among the researchers involved.

In terms of theory, we want to relate to theory of research and technology evaluation and assessment, social studies of science and organizational decision making theory.

In terms of methods, we will describe the process of the 3 cases, and then analyse the new agenda for scientists and the use of peer reviews in relation to other more political agendas. We will analyse the impact of this process on the scientific communities, and how it influences the creation of identity of the researcher and in relation to understanding of quality of research.



## **Disciplinary Identity Crisis: Different Modes of (Inter-)disciplinarity**

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The notion of interdisciplinarity has received a lot of attention from researchers and policy makers in discussions around the social and intellectual organisation of the sciences. To date, however, no consensus has been reached on the definition of interdisciplinarity and on suitable indicators. In this paper we propose a conceptualization of different forms of (inter-) disciplinarity by introducing different levels of analysis; research, science and society. Science can be considered a complex adaptive system with interacting researchers giving rise to an emergent scientific body of knowledge. This system is functioning within a wider societal environment that provides resources and disturbances. This conceptualization allows us to elaborate the changes taking place in the sciences with respect to disciplinary identity formation and to discuss how different modes of interdisciplinary research are emerging.

In this conceptualisation, researchers are the nodes that carry the science system. Research can be considered as geographically situated practices with site-specific skills, equipments, tools and practices. At this level, interdisciplinarity relates to the variety of skills and infrastructures that are required for formulating research designs, applying methodologies, using tools and data gathering in knowledge production. On this level of analysis, disciplinary identity is reproduced through local research traditions and the institutional organisation of teaching and research.

The science level refers to formal communication activities; the scientific end-products published in journals and books, and announced in conferences. Publications are not evenly distributed but form emerging clusters of related publications in an otherwise empty landscape. At this level, disciplinarity relates to the position of a publication in this changing landscape of distributed scientific contributions. Here, disciplinarity is reproduced through journals and their citation patterns.

The contextual dynamics refer to the ways in which knowledge production provides resources for social and economic development and the ways in which society provides resources and disturbances to sciences. At this level, interdisciplinarity relates to the intensity of knowledge use in society and the importance and variety of stakeholder involvement.

Based on in-depth interviews and bibliometric analyses, we will provide empirical examples of these different modes of disciplinarity. Our examples show that it is important to distinguish between these levels of analysis because different modes of interdisciplinarity refer to different processes and are not necessarily occurring simultaneously. Catalysis, for instance, has a strong and stable disciplinary identity in terms of skills (research level) and publications (science level), but interacts very intensively with diverse stakeholders. We also observe that the different levels of disciplinarity are subject to change. Our conceptualization and empirical examples make clear that interdisciplinarity is not an intrinsic property of knowledge (e.g. how, why), but a relative property in relation to activities in research (collaboration between researchers with different skills), to the position in a body of literature in science (publication patterns), and the type and intensity of societal interactions (user interaction and stakeholder involvement).

## **Institutional changes and science-stakeholder interactions in nine fields of natural science**

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Over the past three to four decades academic research in many western countries has witnessed at least two considerable institutional changes: shifts in the available funding and the rise of performance evaluations. In this paper we analyze the consequences of these (potentially conflicting) institutional changes for academic research practices, based on an analysis of the 'Credibility Cycle' in nine fields of chemistry, biology and agricultural science. Are academic research agendas increasingly oriented at practical applications? Do interactions between university researchers and societal stakeholders increase? The fieldwork includes qualitative document analysis and in-depth interviews with over 60 Dutch academic researchers.

The changing institutional environment of academic research causes two profound changes in the Credibility Cycle. First, the acquisition of funding is increasingly connected to potential practical applications. A substantial share of all available funding sources demands research to contribute to a desired innovation trajectory, e.g. by the involvement of 'user committees' or 'dissemination activities'. Second, the attribution of recognition becomes formalized by the existence of performance evaluations. As a result, scientific recognition nowadays strongly depends on bibliometric criteria, such as the number of publications and citations.

Our analysis indicates that the consequences of these institutional changes vary strongly across fields. In some fields researchers simply sustain the existing fruitful and tight relationships with industry, which help them to acquire sufficient funding, without compromising the fundamental nature of the research agenda. In fields of a second category, the shifting funding situation did lead to an increasing interaction with 'contexts of application'. The fact that these societal stakeholders had developed a growing interest in fundamental knowledge enabled the researchers to acquire funding for relatively large research projects on basic issues that will lead to publications in high-impact journals. The third class of fields, however, is shifting in the opposite direction as the increasing pressure for publications has made it necessary to develop a more fundamental research agenda, which is less likely to yield direct practical applications. Finally, a fourth category can be identified consisting of fields that traditionally work on very fundamental questions. These fields have not increased their interactions with users, because this would inhibit them to continue their basic research agendas.

The differences between the fields can only partly be explained by existing typologies of their cognitive content (Bonaccorsi, 2008) and social-organization (Whitley, 2000). A strikingly influential factor turns out to concern the characteristics of societal stakeholders of the different scientific fields.

## Evaluating Research Productivity within National R&D Programmes

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Public support to R&D and technology transfer activities are totally incorporated into Spanish science and technology (S&T) policies. However, the evaluation of these activities is not fully internalized into the policy cycle yet. Furthermore, the evaluation processes carried out so far deal with the elaboration of static indicators which barely provide an accurate picture regarding the way the results of these activities are evolving over the time. In addition, many scholars claim that the structuralist-evolutionary context under which these sorts of policies are being built (Lipsey, et al. 2005) need an alternative evaluation context different to the efficiency of outcomes in a *return on investment* sense (Potts 2007).

Another important claim that policy makers and scholars raise with respect to these activities' outcomes and impacts is the need for a long term perspective to be able to actually appreciate them into the territory. This totally fair claim implies on the other hand that the evaluation process of these activities might render its results too late to be useful for policy reorientations. Therefore an evaluation methodology that provides a dynamic overview on the results evolution of R&D and technology transfer activities will be able to capture, on the one hand, the agents' behavioral evolution participating in the policy (i.e. the micro-level perspective) and, on the other, the complexity of the economic order that S&T policies pose on any given innovation system (i.e. the macro-level perspective).

This paper proposes a dynamic evaluation framework for a Spanish public policy supporting R&D and technology transfer activities within the Food Technology field. In order to offer a dynamic view on the impacts and outcomes that such policy has shown and still is showing we perform a Malmquist Productivity Index (MPI) analysis that help us understand how the policy is affecting and is being affected by research units participating into this policy through three different tools aimed at producing three types of research outputs. Our goal is to determine the policy impact on the research groups' outputs to gauge to what extent the policy is contributing to consolidate the research units position on the Food Technology field (micro-level perspective) and how this relative position is helping the policy to construct a complex and articulated innovation system on the referred field (macro-level perspective).

## **Transforming the organisation of science practices: reflections on physics culture in Estonia**

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In the paper I shall rely upon the empirical interview material gathered in 2005-2008 within the EC 6. framework programme project UPGEM (Understanding Puzzles on Gendered European Map: Brain Drain in Physics through the Cultural Looking Glass). UPGEM's aim was reaching better understanding of the cultural mechanisms causing brain drain from science. Specifically it was physics culture studied both in the wider cultural settings and as an exemplar of science culture, among other cultural factors gender perspective was applied. The project was led by Prof. Cathrine Hasse (Danish School of Education, Aarhus University), in addition to the Danish group, also research groups from Estonia, Finland, Italy, and Poland participated. As result various types of workplace culture were identified, their constellations in particular countries were analysed, and respectively recommendations for the changes of the workplace culture and organisation were formulated (See Hasse & Trentemøller 2008, Hasse, Rolin *et al* 2008).

In the current follow-up study, I focus only on the Estonian physicists' reflections on the organisation of the science practices. In this case, in the addition to the cultural contrasts which appeared in the wider European study, a number of locally conflicting views on the transformation of the research organisation appeared. Respectively also perspectives on research evaluation vary. First of all, historical and social contrast needs to be paid attention to, as most of the elder physicists see their everyday work as contrasted to that of the pre-independence times (before 1991 when Estonia re-gained its independence). Hence, there is elder-younger contrast. But also a number of other contrasts emerge. For instance, one can easily notice a tension between the interests in developing basic research and those of contributing to commodity design. There is a contrast of new democratic leadership models including distributed responsibilities vs. traditional autocratic models. Strangely enough, both models are seen to be efficient and creativity stimulating. The local views on the role of particular scientific disciplines vary remarkably, and so do the views of the role of science in the society in general. Perspectives on funding and science policy are diverse. Therefore, it seems fruitful to expand the method of cultural contrast developed by Hasse and Trentemøller (2009) to further study of the local contrasts in the science practices in Estonian physics. Better understanding of the local tensions and contrasts would certainly facilitate better organisation of the future research.

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## **The QUEST for knowledge: organising interdisciplinary practices in earth**

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There is increasing emphasis, nationally and internationally, on interdisciplinary research in order to tackle some of the world's most pressing environmental and social problems. In the UK, we are witnessing a significant increase in public funding for strategic interdisciplinary programmes but the tacit lessons arising from such initiatives can be hard to capture and codify.

QUEST (Quantifying and Understanding the Earth SysTem) is one of the UK's flagship programmes for Earth system science. This paper examines how institutional practices within QUEST have influenced the interdisciplinary performance of individual researchers and research teams/groups within this large scientific research programme. It assesses what organisational opportunities were provided to stimulate interdisciplinary collaborations among natural scientists and between natural and social scientists funded by the programme.

By taking an in-depth look at QUEST, in conjunction with comparable interdisciplinary initiatives, in the UK and abroad, this research adopts a multiple methods approach, exploring and evaluating ways to support and expand the UK's diverse and active community of Earth system scientists. It will provide insights more generally about the kinds of enabling organisational infrastructure that supports collaboration, information-sharing and leveraging of resources within such large-scale, multi-site, multi-discipline research programmes.

The empirical research is structured around three case studies and the outcomes from this research will: suggest practical enhancements to QUEST's modes of working during the remainder of its programme; facilitate opportunities for the QUEST community to continue its collaborative working in future; and contribute to future public investments by providing valuable organisational learning and transferable lessons to both the funders who frame, assess and manage interdisciplinary initiatives and the researchers who lead, conduct and generate impacts from them.

The programme's communication structures, reward and promotions systems, leadership, coordination of scientists, and research evaluation practices underpinning research-funding decisions, may be considered from the perspective of interdisciplinary science. This will allow an analysis of the extent to which organisational conditions conducive to meeting the programme's interdisciplinary goals were successfully promoted.

The paper's broader contribution will therefore be to reflect on the extent to which the institutional practices of science are context dependent, in particular the ways in which science practices differ between the social and natural sciences. It will consider how knowledge produced in the context of complex environmental problems requires boundary crossing between the sciences: in so doing the paper will contribute to our general understanding of the nature of interdisciplinarity and how this might operate differently in different organisational contexts.

## Organization of scientific research for climate proofing the Netherlands

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Global climate change poses a worldwide threat to the way we live our daily lives. Even if we are able to achieve a substantial reduction of the emission of climate house gasses, scientists predict that climate change will persist for quite some time in the future. Therefore climate policy in the Netherlands includes anticipative policy that aims at accommodation to climate change. Main issues concern safety against flooding, agricultural production, economic activities, water quality, water supply and health.

We have researched two large scale climate research programmes in the Netherlands that both aim at developing knowledge for climate proofing the Netherlands: 'Climate changes spatial planning' and 'Knowledge for Climate'. Both programmes are an example of what (Baumann et al., 2004) called multi-actor, multi-measure programmes (MAPs), policy instruments that aim to bring about systemic change of innovation systems, particularly in collaborations between scientists and industrial and societal actors.

Both climate research programmes are directed by a consortium of knowledge institutes which have received governmental funding to run a 5-year programme. As a main requirement to obtain governmental funding a programme needs to be evaluated both as scientifically excellent *and* there needs to be a good prospect on the economic or societal return of investments. Furthermore funding rules require that governmental funding is matched by an equal amount of co-funding by participating knowledge institutes, public organizations or private companies. Apart from these boundary conditions the consortia have a high level of autonomy on how to organize the research programme.

Main research question is how the two research programmes address the combined objective of scientific excellence and societal relevance. Are these conflicting and incompatible objectives as is often suggested or is there a way in which the two can be productively brought together under one programme? What works and what does not work in that sense? Using semi-structured interviews and a survey among involved researchers and societal stakeholders, we will analyze and evaluate the measures and activities for improving societal impact of the research. We will answer the following questions: what measures were taken, in what way did these measures contribute to societal impact and which internal and external conditions enabled or constrained the success of these measures? Preliminary results suggest that reaching societal impact asks for a custom-made combination of different types of measures.

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**Resources acquisition by research units. Modelling the interactions among different allocation methods, analysing their impact on the organization of science**

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The present study aims at modelling the process of resources acquisition by research units, thus by describing the impact of three elements and of their interactions:

1. the balancing of two allocation methods: *institutional funding* and *third-party funding*;
2. the balancing of two variables: *institutional power* and *academic reputation*;
3. the strategic choices made by the research unit to acquire resources.

Accordingly, the research question is: *Which factors influence resources acquisition by a research unit?* And some more specific questions are as follows:

- To what extent different environmental configurations – as a combination of national, institutional and subject-specific factors – drive to specific patterns of distribution of research funding across units, e.g. which configurations lead to cumulative effects and which ones allow a broader distribution of funding?

- Which kind of resources-acquisition strategies are available to individual units, depending on their position and reputation, but also on environmental configurations? E.g., under which conditions can lower-reputation units focus on institutional funding to improve their status? To what extent a unit's strategies has a chance to modify existing hierarchies and to allow new entrants in the research funding systems?

- Which is the cumulative impact of environmental conditions and unit's strategies on the distribution of research funding across units, as well as on their patterns of activities and on the organization of scientific fields?

The unit of inquiry is represented by research units belonging to Higher Education Institutions (HEIs), while the dependent variable is represented by the amount, as well as by the composition of acquired resources.

Following a longstanding tradition in Science Studies, we consider that resources acquisition represents a central task of research units and that it is closely related to their activity patterns, as well as to their reputation (Latour and Woolgar 1979; Weisenburger and Mangematin 1995); further, different configurations of funding systems, as well as objectives and conditions of public funding, are likely to have a deep impact on the organization of scientific activities.

Research funding systems in developed countries are basically characterized by two main allocation methods: *institutional funding* – attributed to whole research organisations, like universities, and allocated internally to departments and research units - and a varying shares of *third-party funding*, attributed directly to research units ("project funding"; Lepori et al. 2007). However, most studies in the field separately analyzed the impact of changes in either streams of funding: there a number of works focused on competition for third-party funding, as well as on the strategies developed by researchers to cope with increasing competitive pressure and the push towards useful science (Laudel 2006; Barrier 2008). Other works analyzed the impact of the change in institutional allocation from a rather flat

baseline allocation towards performance-based schemes (see Jongbloed 2007 for HEIs and Sanz Menéndez and Cruz-Castro 2003 for public research organizations), as of the introduction of evaluation schemes and performance-based allocation like the RAE in the UK (Barker 2001; Whitley and Glaser 2007).

A first objective of this work is to analyse the balancing of the two funding streams, their interactions and their (cumulative) impact on the organization of science. We consider that most research units get (different types of) resources from institutional and third-party funding and, in developing their strategies for resources acquisition, they focus on either source depending also on their position within their institution, on their reputation within the academic community. Further, we consider that this interaction is dependent on configurations of the environment and, more specifically, on the amount and composition of third-party resources in the unit's subject domain, on the amount of institutional funding for research available and on the determinants of the allocation of institutional resources.

In terms of research policy studies, the main outcome of this work will be a better – theoretical and empirical - understanding of the linkage between research policies and configurations of funding systems from one side, distribution of resources and organization of scientific activities at the research unit's level on the other side. This by taking into account the multilevel structure of research policy (Lepori 2010), the interaction between national-level, institutional-level and subject-specific factors and the own strategic decision-making of research units concerning their research programs, activities and funding acquisition.

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## **Collaborating in Life Science Research Groups: The Question of Authorship**

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This paper engages with the internal social structure of academic life science research groups and addresses the question of how work is allocated within these groups. Drawing on interviews with group member scientists at the PostDoc level<sup>1</sup>, this paper will more specifically explore how PostDoc scientists narrate the way work is distributed within the group and how they debate the pros and cons of more collaborative or more individualized modes of working within research groups. I will show that questions of authorship play a significant role in these considerations.

When talking about how their work relates to the work of other group member scientists, most PostDocs explain that there are few connections and that research work would be mainly organized into relatively individualized projects: Each scientist would be assigned a specific question, a clearly delimited project in which no other group member is crucially involved. This form of organization has a shared positive connotation, mainly because highly individualized projects are believed to ensure clear ownership over a body of work expressed as first-authorship. More collaborative modes of working, it is argued, could obscure who is primarily responsible for a corpus of work and could cause severe conflicts between group members about who should be attributed first authorship. The weight of this question is explained by the crucial importance of first authored papers for realizing a career in science.

Hence, in PostDocs' narratives first authorship appears as an important mode of ordering scientific work as well as social relations within research groups, resulting in rather individualized modes of working. However, as this paper will show, this way of organizing work is both complemented and contested by a matrix of support and exchange relationships among group member scientists: Each individual scientist in the group is framed as holding particular methodological, technological or content-related expertises that will be shared mutually when needed. Yet, while there is an understanding that this sharing of expertise is essential to the functioning of the research group, all these forms of support and collaboration are also subject to constant processes of monitoring the amount of labour contributed and the amount of credit received. Again, questions of authorship figure prominently in these considerations: There is a tendency to keep the involvement of others as limited as possible in order to keep the number of co-authors on a paper to a minimum because multiple co-authors are perceived to decrease the career-value of a paper.

Hence, narratives about collaborating or not-collaborating in research groups are always also narratives about careers and career requirements: About the necessity to accumulate first authored papers, about the perceived value differential between two author papers, three author papers and multiple author papers. Thus, in my presentation I will try to draw attention to the multiple ways in which the need to present scientific work in formats that count as valuable career assets are prominently shaping ways of thinking about and engaging in collaborative as well as non-collaborative modes of working in research groups.

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<sup>1</sup> Conducted in context of the research project "Living Changes in the Life Sciences" (Project leader: U. Felt; Collaborators: J. Allgaier, M. Fochler, R. Mueller; Dep. of Social Studies of Science; Univ Vienna, Austria)

## **Daily organizational and technical issues arising in a multidisciplinary research organization. A case study**

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In the past decades academic research has undergone some severe changes, with the rise of various forms of collaboration (Houghton et al., 2004) and interdisciplinarity (Hagstrom, 1965) being the most important ones. In addition we see a closer collaboration between academia and industry, with both of them influencing each other's working practices. Information and communication technology (ICT) plays an important role in all these forms of collaboration and their developments.

The focus of this paper will be a case that fits within the growing importance of both trends in collaboration, namely the Interdisciplinary Institute for BroadBand Technology (IBBT). Started in 2004, IBBT groups 16 research groups from 5 Flemish (region of Belgium) universities that study various aspects of ICT (both technical and non-technical), and brings them together in projects with private companies and non-profit organizations. Although IBBT projects provide highly valuable and innovative research results in various ICT application domains, partners from both academic research groups and private companies have indicated that cooperation within the IBBT framework is not yet optimal. Communication between partners is often distorted and the practical collaboration on research between project partners, especially technical and non-technical, remains a strong threshold.

In this paper, we will present some results of the Coconut project, which was designed to map and to address the organizational and technical issues arising from daily operations within IBBT. To get a grounded understanding of the issues that are raised during the daily working activities within the IBBT community, we chose to perform an ethnographic field study. In this study, forming one of the central components of the Coconut project, we visited each of the 16 affiliated IBBT research groups for one week. During this week, we got a desk in their office space and observed the daily activities of the groups. We looked at their working practices, their use of ICT, their organization, and how all these aspects were influenced by the arrival of IBBT. All observations were documented with notes and photos. Also, we interviewed 5 employees with different profiles on the history of organization of the group, their daily activities and the collaboration with colleagues and project partners. In the interviews, we also asked the participants to perform several projective tasks such as drawing an organizational chart of their group and discussing photos previously taken by them that depict their daily activities.

These insights resulted in a comprehensive picture of the research groups' working and organizational culture and in an understanding how these characteristics shape their collaboration with other research groups and parties within IBBT. The importance of aspects such as hierarchical structures forms of social control, language, meeting praxes and use of various communication tools will be discussed. Based on these findings, we formulated a number of recommendations to improve collaboration within such a multidisciplinary organization. These involve the complex relationship between the IBBT, the research groups and their universities, where all parties might have to re-examine their position and views.

## **Babel - A communication study within a large interdisciplinary research group**

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Since collaborative research has become the dominant and most promising way to produce high - quality output, collaboration structures have become the target of research and management design. Crossovers between different disciplines and organizational units are observable. However, the collaborative process leading to such observed interdisciplinary or inter-organizational work is still hidden in a black-box.

Various scholars have shown that teams increasingly dominate solo authors in almost all fields. The team approach is very often mixed with the desire or expectation that teams be interdisciplinary. Various actors desire and bring about an increasing level of interdisciplinary research. For example, a great deal of national and international funded research projects require certain level of interdisciplinarity for a successful application. This is certainly also one of the reasons for interdisciplinary research projects.

However, little seems to be known what is happening within interdisciplinary research projects. We have undertaken a study of communication within an interdisciplinary research group in order to open this black box and expose its contents. Our results reveal the communication patterns within an interdisciplinary research project.

We collected our data with a web survey over a period of six months, running surveys every week. The several hundred reported communication events in our data allow us to construct a dynamic communication network of this interdisciplinary research group.

Each reported communication includes rich information, such as the medium of communication (e.g., face-to face or email), the topic of the communication (e.g., technical problems, project process, or output related, administration, funding). We further take into account the status of each researcher (PhD, post-doctoral researcher, or principal investigator) to see who is communicating with whom and on what topics.

We use various methods from social network analysis to measure the relative density of communication within and between disciplines, different universities, and the different status groups.

Additionally, we try to tie this communication to output. Although scientific output like published papers have some delay, there are already some outputs visible, allowing us to compare the output network with the communication network.

**Seeking knowledge, providing services: How institutional changes affect organizational strategy and research agenda in the cases of CSIC and ISCIII**

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The Mode 2 thesis has been extensively used to describe recent transformations in the organization of knowledge production (Gibbons et al, 1994; Nowotny et al, 2003). Although useful to identify broad tendencies in the way research is getting organized, Mode 2 has been criticized not only for its normative nature (Weingart 1997, Jansen 2002) but also for its lack of empirical substantiation (Godin 1998, Shinn 1999), which has so far discouraged the analysis of the impact of these transformations in specific national or organizational contexts (Wilts 2000). In fact, as important differences among public science systems still persist, it is reasonable to expect that institutional and policy changes inspired by the Mode 2 thesis may have produced different outcomes across different countries and periods.

This paper aims at casting some light on how institutional changes inspired by the Mode 2 thesis may affect public research organizations (PROs). More specifically, we analyse how the *Consejo Superior de Investigaciones Científicas* (CSIC) and the *Instituto de Salud Carlos III* (ISCIII) have adapted to the progressive introduction of important institutional changes associated with recent Mode 2 inspired transformations in Spanish science and technology policy and what have been the outcomes in terms of PROs integration strategies and research agendas.

This paper combines Actor Centered Institutionalism (Wilts 2000) with elements from political theories of decision-making in organizations (March, 1962; Cyert and March, 1963), from resource dependence theory (Pfeffer and Salancik, 1978) and from the social studies of science (Whitley, 2000; Whitley and Gläser, 2007). Our hypothesis is that the strategies of adaptation of PROs are conditioned not only by shifts in political and economic dependence from their tutelary ministries but also by the amount of PROs strategic control over the allocation of internal resources. Depending on how these factors change, organizational responses may range from encouraging the researchers' autonomy to pursue their personal research interests to a strong integration of researchers' activities around collective goals and problems.

The study is designed as a qualitative comparative case study (Yin, 2003) and is based on 27 semi-structured interviews, conducted during 2009, with the directors of CSIC and ISCIII research institutes. The interviews covered different scientific fields and dealt with the institutional autonomy of PROs; the research funding and government models; the strategic autonomy of managers in the allocation of research positions, funding, equipment and infrastructures; and the elaboration and change of the research agendas.

The findings show that both organizations are progressively changing their research agendas settings but in a different way. The CSIC, whose recent strategic plans have recently increased its capacity to influence the scientific objectives of researchers and groups through a higher control over its internal human and economic resources, is moving towards a closer integration of researchers' activities around collective goals. In contrast, with the change of tutelary Ministry, ISCIII is increasingly stressing research goals over health services and, as

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a response, individual researches have gained greater dependence from external funding sources and greater autonomy to pursue their personal research strategies within their institutes and centres.

These results show not only that institutional factors largely shape the way research organizations adapt to the policy changes associated with Mode 2 transformations in knowledge production regimes, but also that these transformations cannot be fully appreciated without taking into account the changing institutional and economic contexts and the strategic capacities of research organizations.

## **A survey-based method for mapping knowledge domains in interdisciplinary research organisations**

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Many research institutions have undergone or are undergoing major reforms in their organisation and in their activities in order to respond to changing intellectual environments and societal demands. As a result, the traditional structures and practices of science, built around disciplines, are being by-passed in various ways in order to pursue new types of differentiation that react to diverse pressures such as support to industry, engagement with social needs, translation to policy goals and openness to public scrutiny (Gibbons et al., 1994). However, no clear alternative socio-cognitive structure has yet replaced the “old” disciplinary classification. Two apparently opposing developments are in place: on the one hand a perception of escalating fragmentation in science, on the other hand a flurry of interdisciplinary initiatives aiming to bridge divides (Galison and Stump, 1996; Weingart, 2000). In this fluid context, in which social structure often no longer matches with the dominant cognitive classification in terms of disciplines, it has become increasingly necessary for organisations to understand and make strategic choices about their positions and directions in moving socio-cognitive spaces.

Bibliometric analysis, in particular using science maps, is the most widely used analytical method to explore the position and direction of organisations (Noyons, 2001; Rafols et al., 2010). However, bibliometrics offers just one narrow perspective of research activities and it may miss many relevant developments. This is because researchers have to publish and reference in accordance to conventions of *established* journals, and because large science maps inevitably reflect dominant structures (generally disciplines) and the expense of weaker or more diffused linkages fields. Here we present here a survey-base method for mapping the areas of expertise or research capabilities by means of a survey to the researchers of an organisation. The survey collects information regarding expertise of researchers according to a rooster of categories. These are carefully peer-reviewed for their balance and level of disaggregation in relation to the profile of the organisation. The respondents are allowed to add additional categories. The survey also collects information on the backgrounds of the researchers, their journal preferences, collaborations with other organisations and perceptions of trends in the organisation's profile.

I have used this survey to investigate the areas of expertise of my own organisation, SPRU – Science and Technology Policy Research, a university department that is atypical in that is defined by its policy-driven study of science, technology and innovation, rather than by a single disciplinary identity. SPRU is characterised by the diversity of epistemic backgrounds and approaches of its researches and the engagement with innovation managers, policy-makers and civil society. SPRU's diversity and bottom-up dynamics makes it difficult to fully apprehend the scope of its activities and how they are related. The SPRU survey was designed along four dimensions of 'empirical focus', 'disciplinary approaches', 'research themes' and 'analytic tools'. After consultations, each of these dimensions was divided into a total of 93 capability categories. The survey was answered by 50 researchers and analysed

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using conventional multivariate techniques based on distance metrics and factor analysis. The analysis has allowed to cluster categories into research topics, explore how they relate to each other and locate the relative position of individual researchers among these topics. The implications for research strategy of this type of exercises will be discussed in the presentation.

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## **Social dynamics in research groups: new risks or opportunities?**

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Many analyses of the recent changes of research systems seem to converge on one point: research processes carry a large mass and a wide variety of elements of a social nature that in the past seemed to be less important or less visible.

The relationship between science, technology and society is more and more complex and unpredictable. On one hand, a deep and general complexification and fragmentation of social processes is characterizing contemporary societies, in the current phase of transition from modernity to "knowledge society". On the other hand, research system's transformations are producing effects on research groups: politicians, bureaucrats, company managers, servicemen, lobby groups and nongovernmental organisations and society itself come into research. As a consequence, research becomes a collective enterprise, aimed at problem solving and "context-driven". Places of knowledge production increase as types of knowledge produced: university is no longer the only institution involved in knowledge production as well as research is trans-disciplinary.

The presence of a strategy and governance can lead research groups to come throughout the present complexity of scientific and technological research, improving its quality and underpinning its potential social use (this process has been referred as "research socialization"). On the contrary, the lack of awareness of the threat represented by these critical factors (symptoms of hyposocialisation), as well as the absence of forms of reaction to this threat inevitably undermine the formation, development and subsistence in the time of research groups and research results.

Within the European research project "Social Sciences and European Research Capabilities", the authors explored the social dynamics involved in S&T research, identified the impeding and enabling factors and the role of the institutional environment, for its quality and stability, and outlined the current and potential contribution of social sciences in this process. To equally manage this broad set of phenomena, the authors studied two Italian research groups, in the field of immunology and mechanical engineering, gave greater emphasis to researchers' interactions and social, cultural and organizational barriers, that slow down innovation and technology transfer processes, by a first diagnostic analysis and a pilot initiative.

During the experimentations carried out the authors have tried to define dynamics, organization, strategy, strength and weakness points of two research groups and also worked on specific issues helping groups to find a possible solution. Furthermore, the experimentation showed the potentialities of social sciences in scientific and technological research's analysis and the preconditions for the success of this merger.



## **Creative leadership practices and gender in science and technology organisations**

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The topic of institutional practices of science and engineering can provoke the question, if there are differences between women and men in leadership positions, especially in promoting creativity and innovation, and how that affects the organisational culture. An institutional environment with low prejudices and biases is a prerequisite to develop creativity and innovation. Cross-border thinking requires a state of mind free of gender dichotomous thinking. Traditionally, women are expected to prefer a different leadership style – e.g. more caring, more team-oriented and less authoritative. This practice can be circumscribed as a more communicative one and is likely to influence the organisational culture towards more creativity. Yet, these properties ascribed to women on top reflect an essential perspective as long as they are not proven empirically. They could also reflect a shift from traditional to modernised leadership styles. How that shift is linked to gender is an open empirical issue. The question if leading women in science and technology will have an impact on creativity and innovation is one subject of a current German study which will be presented in the paper.

The cooperation project between the University of Wuppertal and the Wuppertal Institute for Climate, Environment and Energy, funded by The German Ministry for Education and Research together with European Social Funds, focuses on potentials of innovation, which women in leadership positions can realise, and on barriers they experience. Power and organisational culture are the two perspectives, together with sustainability. Theoretical perspectives are taken from organisational, science and technology as well as gender studies. For empirical investigation eight case studies are done in universities, governmental research organisations, political institutions and companies. Methodological instruments are website analysis, focus discussion groups and guided expert interviews with women and men in leadership positions. Further expert interviews are done with key personal from human resources and equal opportunity office. Gender separated focus discussion groups with women and men in leadership positions complete the cases. For analysis based on hypotheses and research questions, case studies, typological, contextual and trans-disciplinary methods are used. Thus, different contexts of innovation and creativity are taken into account. Science organisations compared to enterprises and non-profit organisations are expected to provide different conditions of performance. Furthermore, how different disciplinary cultures within research organisations will have a different impact on creativity will be analysed too.

The paper analyses the impact of gender on science and technology policies within institutional contexts and cultures. First results will show how innovative and creative leadership organisational cultures are gendered and which differences exist between and within organisations and disciplinary cultures.

## **Research Management at the Boundary of Science and Society**

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Professional management is increasingly important for successful research at universities as well as other organizations. This exploratory review draws on different bodies of literature in order to reformulate the complex challenges of research management by applying newer organizational theory. Research management can be described as boundary work that produces couplings between science and the wider society. Because of the complexity of organized science, management is increasingly indispensable to ensure the social, cognitive, and material preconditions of research. This paper discusses different means of research management on the research group level and within university departments. Research organizations are characterized by their relative diffuse distribution of management functions over organizational levels as well as by little direct determination between organizational elements. Charismatic scientific leaders can enhance the efficiency of research organizations and projects. More recently, universities have started to create new management positions within projects and centers. Scientifically trained people are hired as specialists in research management, constituting a new professional role. In contrast to pure administration, the new research managers make decisions with reference to scientific knowledge and the societal environment of research.

## **Collaborative engineering research and recipes for mode-2 knowledge production**

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As public funding bodies and their government paymasters weave research impact ever more tightly into the processes and discourse for allocating research funding, the pressure is increasing for researchers to turn their backs on allegedly traditional and outmoded ways of doing research in favour of a more dialogic approach. Research, they are being told, ought to involve users or practitioners working closely and continually with them right from project conception. It should cast off its disciplinary chains and combine the research perspectives of multidisciplinary, interdisciplinary or, best of all, transdisciplinary research teams. It ought ideally to enfranchise other impact constituencies too, for example, consumers, NGOs or the general public.

Nowhere in academe have these admonitions echoed more loudly than in organization and management studies (OMS). For nearly 20 years, a corps of OMS academics have been urging their colleagues to see the error of their ways and convert to research that is relevant to the needs of management practitioners. Remarkably, a good number agree on how to achieve this – by remodelling the research process in the image of Mode 2 knowledge production as set out by Michael Gibbons and co-authors in their book *The New Production of Knowledge*. Several OMS authors have gone as far as translating the generic characterization of Mode 2 knowledge production advanced by Gibbons et al. into recipes for co-productive OMS research.

Among engineering academics, by contrast, there has been little sign of a similar concern with relevance to extra-academic constituencies. But there appears to be no cause for concern. Engineering academics and their research collaborators apparently cross the boundaries between the practices of academe and extra-academic settings, especially industry, with some facility, even if their research collaborations do not always satisfy collaborators' respective expectations.

Why such a stark difference between two academic disciplines with origins closely tied to bodies of extra-academic practice? Motivated by this question, we explore in this paper how publicly-funded collaborative research projects initiated by engineering academics are organized in practice and what part their organization plays in facilitating the crossing of boundaries – especially between differing working practices and organizational cultures – that might otherwise be expected to impede collaboration and research impact. We consider too how closely they approximate (or not) to Mode-2 models of collaborative research

Our research has been carried out through semi-structured interviews – supported by documentary analysis – with researchers and their mainly industrial partners who have collaborated on research projects funded by the Innovative Manufacturing and Construction Research Centre (IMCRC) at Loughborough University, UK since 2001. The IMCRC's research scope covers technological manufacturing and construction research and management research. The Centre was among the first cohort of IMRCs established by the Engineering and Physical Sciences Research Council (EPSRC) in a move intended to put IMRC researchers in a better position from which to respond to the dynamic needs of industry, build lasting relationships with industrial collaborators, retain research staff and develop coherent research strategies.

## **Taming the “Publication Machine”: Interactions Dynamics on Boundary-Objects as New Means of Research-in-the-Making?**

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Lights on, buttons pushed: researchers hold their breath until a slight hum sound announces that *the Machine* is awake. The entire world of the laboratory is now ruled by the centrality of scientific instruments, yet “professional life requires that one lives with the tension of using technology and remembering distrusting it” (Sherry Turkle: 2009, p.10).

In this paper, we focus on the role of a particular scientific instrument in the reconfiguration of research practices and their ethics, through the process of setting it up. The event that triggered this study paper was the acquisition of a high-tech microscope by the CARIM Research Centre at Maastricht Hospital. Here we based our ethnographic study, examining the way researchers interact with this sophisticated multi-devices apparatus. This brings into light a negotiation process that occurs at the intersection of different multiple social worlds, each of them bringing its own scope, value-laden motivations or strategic goals in configuring this instrument. We do pay attention to the very role of researchers in this process, especially junior researchers and their challenged ethical principals.

First, we ground our work in former laboratory ethnographies that focus on the role of scientific instruments as “inscription device”. In that respect, such instruments “represents” reality and play an acting role in the establishment of scientific facts (Latour & Woolgar, 1979). Then, we combine these perspectives within the model of “enculturational” model theorized by Collins (Collins, 1985). We start by presenting it in its context, framing this instrument as a “boundary object”, which is defined by the “social worlds” that gravitate around and interact with it (STAR & GRIESEMER, 1989), but which in turn defines them as well. In a second part, we focus on one particular “community of practice” involved in that process, showing how they engage in a very negotiation process with this new microscope, challenging their tacit knowledge and confronting resistances. Third, we address their discourses and motivations, which at some point legitimate engaging such a negotiation process. Ultimately, this will allow us to establish shifts in research practices and re-configuration of the ethos of researchers, pointing out to the increasing porousness of research practices to external “social worlds”, through the mediation of the scientific instrument. To put it otherwise, we will provide clues of the mutual shaping processes happening through the instrument.

The conclusion focuses on the microscope as it increasingly becomes a black box to the scientists. The researchers cannot fully master it, but *they have to trust* it in order to move on with their projects. This behavior relies on a certain lack of “distrust”, lack of critical stance, as junior researchers end up questioning less and less the machines they are using. Accommodating such machines also implies, at some level, the “unlearning” of former skills – for instance the handling of older machines. In this way, complex scientific instruments are “disturbing “<<sacred spaces>>” (TURKLE, 2009, p.5), disrupting the core values of the traditional Research Ethics and demanding unjustified authority.

As they re-appropriate the *ethos* of their professional culture, junior researchers need to shape a new paradigm for the *Scientific Etiquette*, given the emergence of such complex instruments.

This empirical study is the result of a fieldwork conducted by the authors at the CARIM (Cardiovascular Research Institute Maastricht, The Netherlands) Unit of the Biochemistry Department of the Maastricht Hospital. It relies on semi-structured interviews and an ethnographic approach of the laboratory.

## **De Facto Governance of International Research Collaborations in Nano S&T**

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Increasingly research, in particular in fast developing scientific fields like nanosciences and technologies, is done in collaborations cutting across national borders. International research collaborations are motivated by the need to bring together highly specialized knowledge, to work towards applications and to mobilize resources to launch new and expand existing research topics. In collaborations among research institutes with diverse institutional and national backgrounds a particular issue is the compatibility of their inherited governance structures.

The main research question studied is how the governance of public research institutes influences the common governance of international collaboration. The study also analyses motives to collaborate internationally and factors facilitating and hampering collaboration.

Empirically, collaborations of German public research institutes (Max Planck, Fraunhofer, Leibniz and Helmholtz) in nanosciences and technologies with their counterparts in France, Belgium, and the Netherlands are studied. Qualitative, exploratory research based on case studies and reconstructive process tracing of collaborations is undertaken combining multiple data sources: semi-structured interviews (more than 30) and organizational, project, publication and CV data. On the basis of literature review and empirical results concepts of international inter-organisational research collaboration and its governance are developed and emerging forms and potential types of common governance are identified.

This research is based on a number of background assumptions about governance of international collaborations among research institutes. Firstly, the institute governance matters for collaborations (not only scientists' ideas and public policy initiatives). Secondly, the motives to collaborate internationally at institute level are driven by dynamic interplay between thematic, organisational and resource rationales. Thirdly, the concept of *de facto* governance is useful for analysis of research governance, covering not only formal rules but also informal norms, routines and practices. Finally, an important characteristic of the governance of collaborations is the tension between path-dependencies of historically established research institutes on the one hand and isomorphic processes on the other.

Preliminary results suggest that the development of international collaborations is characterised by interplay between self-organisation of scientists, governance of institutes and support from diverse national and transnational policy initiatives. International collaborations act as a 'change agent': as a mechanism to develop new research topics and groups; as a facilitator of isomorphic governance changes. Still, some historically developed national and organisational differences remain, sometimes as hampering factors, e.g. differences in PhD systems, project funding and transparency in decision-making.

## **Social interaction in grant review committees. Group decision-making in evaluation and grant allocation**

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Growing competition between scientists for research resources has put more emphasis on excellence. Funding agencies claim to fund only the best researchers and select only excellent research proposals. But on what are these funding decisions based? Research shows that the allocation of grants seems to be determined by two equally important determinants: characteristics of the applicant and the grant proposal, and elements 'behind the curtain' (Cole, Cole & Simon, 1981; Hartmann & Neidhardt, 1990; Van den Besselaar & Leydesdorff, 2009). This can also indicate that the discretionary power of the decision-making committee is large. The allocation of research funding is the product of group interaction. Decisions about which applications to grant and which to reject are made by committees of renowned researchers. Committee members with different backgrounds, preferences, motivation and status come together to discuss the applications and to eventually reach a joint decision. However, we still know little about this process of decision-making. In this paper I will contribute to a better understanding of group decision-making in relation to evaluation processes and grant allocation.

I will study the process of evaluation and decision-making as a social process, in which social identity and group norms play an important role. This is in accordance with the growing importance of studying science from a psychological perspective (see e.g. the founding of the new field International Society for the Psychology of Science and Technology). Committee deliberations provide the context to present one's ideal self and to have one's identity as a valued expert confirmed (Lamont, 2009). The way people identify themselves in comparison to other group members affects their behavior in the group, e.g. in terms of competitiveness (Van Kleef et al. 2007). I will investigate the effects of expertise diversity and social identity on interaction behavior and decision-making in *experiments*.

So far, most research on group decision-making processes is actually based on the study of individual decision-making or on reconstructions of these processes. I propose that the dynamics of group interaction can never fully be grasped by looking only at individuals or reconstructions. In order to really look into the actual process of decision-making, I will make *real-life observations* of grant review committee meetings. The social interaction of the meetings will be coded act-by-act with the SYMLOG-scoring method (Bales, 1950). This will make it possible to discern different roles that are fulfilled by the committee members. The interaction patterns can also be analyzed to learn more about coalition forming, negotiation strategies and the construction of group norms.

I am currently conducting the experimental studies and the observation studies. The first behavioral results will be presented at the EASST conference in September, as well as a discussion of potential implications for organizing project selection.

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## **Organization of the Science Practices: performance of research groups**

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What institutional practices of science can enable and stimulate the creativity, the intellectual innovation and the high level of performance of researchers, research teams/groups and research organizations? There is agreement in the literature that both the individuals' abilities and competencies and the opportunities that organizations provide are necessary. The importance of organizational opportunities is further emphasized by various scholars, who state that research and development leaders should not assume they can simply hire good people and let the system run by itself. The challenge is to create conditions conducive to meeting the collective and individual goals of science and technology (S&T) such as high research performance. The organisation's communication structures, reward and promotions systems, leadership, coordination of scientists (level of autonomy), and research evaluation practices underpinning research-funding decisions, among others, affect levels of creativity and productivity in science.

In this paper we review the scholarly literature on factors affecting performance of research groups. We distinguish three types of determinants that influence performance of research groups: (1) resources and organisational design of the research group, (2) research leadership and management, and (3) characteristics of researchers. The key resources for the organisational design of research groups are human capital, social networks, funds, and research time. From the literature we can conclude that groups need to be small rather than large. Secondly, groups should have a heterogeneous composition wherein members have various skills, knowledge and abilities. This human capital is a core resource of the research group. Other major resources are social networks, funds and research time. We claim that research groups are a heterogeneous set of people with different skills, knowledge and abilities but also with various preferences, interests, and priorities. Seeing this, it can be imagined that a research leader is required to reconcile these whole set of preferences, interests and priorities. What characterized such a leader and which aspects of research management will also be discussed in this paper. Characteristics of the leader include competences and leadership style. Leadership of creative people, like researchers, asks for special expertise. In the scholarly literature this is identified as an integrative style: "a style that permits the leader to orchestrate expertise, people, and relationships in such a way as to bring new ideas into being." Research management is the way in which research leaders bring their management tasks into practice. For instance, leaders motivate their researchers and create facilities, define and disseminate mission and strategy, and position the group internally and externally. The last section of the paper deals with the relation between characteristics of individual researchers and group performance. We described for example how research commitment, research experience, and gender affect management and performance of research groups.



## **National research council and the ERC**

*van der Meulen Barend (Rathenau Institute, The Netherlands)*

For a long time, national research council have occupied rather save positions within the national research systems. Only few had competitive councils at the national level, and if competition was often mitigated through task division along disciplinary lines or funding modes. As a result, most of these bodies functioned in an organizational field in which research councils shared a common identity, but with little pressures to align actual practices. With the concept of the European Research Area, the European Commission has taken up responsibilities for basis science policy. One of the new funding schemes, the European Research Council, immediately effects the position and role of national research councils. This paper analyses how the national research councils have responded to the ERC.

Organizational relationships within organizational fields are shaped by two interaction modes: coordination and competition. Coordination is visible in the participation of national bodies in preparing the ERC as well as on going interactions between ERC and European level research council organisations like the ESF and the EUROHORCS. Competition occurs when councils have an overlap in functional and geographical territory; in empirical terms when there is similarity in funding modes and selection procedures and similarity of researchers being funded (or submitting). We assume that the response of national research councils to the development of ERC depends on the level of coordination and the level of competition. More specifically the hypothesis is that research councils with little coordination and competition will just continue to function juxtaposed to the ERC, while research councils with high levels of coordination and competition will move into a process of mutual adjustment of strategies. Whether the latter process will favour national councils or the ERC, depends on the perceived success of the ERC as well on possibilities of national councils to join forces.

The interactions between the national councils and the ERC are depended on a third variable, or rather a set of 'third variables', that is the external pressures on the research councils. Research councils are intermediary bodies and depend on the government and the (national) research communities. These principal and agents may push the council toward specific responses, depending on their perception of the ERC.

The paper uses a comparative case approach and is based on interview data and organizational data from different European countries and the ERC.

## Effects of research evaluation. A literature review

*van der Most Frank (Centre for Innovation, Research and Competence in the Learning Economy, Lund University, Sweden)*

Recently, Whitley & Gläser (2008, p. v) have put the effects of research evaluation on the agenda through a volume of the *Sociology of the Sciences Yearbook*. Mostly discussing developments of the past decade, the volume lacks a literature review. This paper addresses that omission and proposes to re-introduce concepts from science and technology studies (STS).

It draws on literature from science policy studies as well as evaluation studies - meaning the studies of evaluation of social programs in general - dating back to the 1970s/1980s. In both bodies of literature, the issue is not unattended but understudied compared to for example methods of research evaluation and peer review. Three developments can be distinguished. Firstly, in general, most literature on research evaluation and on the use and effects thereof takes a top-down policy-making perspective. Although productive to an extent, when it comes to identifying effects of research evaluation this perspective has its limitations because of its focus on the usability within government policy making.

Secondly, STS offers, also since the 1970s/80s, concepts and conceptual frames, mostly focussing on the micro level of the laboratory or on individual technologies. Of particular interest here are actor-network theory, its notion of translation, the script concept and its related notion of geography of responsibilities (Akrich, 1992). Somehow, these notions have not been applied in the studies of effects of research evaluation<sup>2</sup>.

A third development is that in studies of research funding, theoretical frames and concepts have been developed that can play a role in connecting the two. Principal-agent theory and the notion of intermediary (Braun, 1993; Guston, 1996) allow analysis of the difficult position of research councils, which also characterizes the position of peers in evaluation (Van der Meulen, 1992).

This paper collects and reviews the literature on the effects of research evaluation. To illustrate how the different bodies of literature that have a bearing on this subject can be combined, the paper provides two re-interpretations of historical cases. One of the well known Research Assessment Exercises in the UK, and one of an early discipline evaluation in Norway.

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<sup>2</sup>(Gläser, 2008) provides a welcome exception when applying the concept of modalities to the construction of bibliometric evaluation.

**Leadership, motivation and performance of scientists: A case study of biomedical and health researchers in the Netherlands**

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An understanding of the determinants of research performance is a prerequisite for designing effective micro and macro research policies. This study examines the relationship between leadership style, motivation and performance of scientists. It focuses on medical and health scientists in The Netherlands. The effects of managerial initiatives of leaders, in which leadership style is an example, on individual performance are investigated. Over the years several scholars have emphasized that leadership is an important aspect of motivation and performance of scientists and academic groups, but empirical studies are still scarce.

Leaders have to deal with several tensions by managing and steering their group. First of all, they have to balance between autonomy and coordination. Secondly, leaders have to deal with the paradox of risk: choosing between research question that are risky in one way or others that are risky in another way. A third tension is the existence of role conflicts. On the one hand leaders educate the new generation of researchers and want to give them freedom to choose what to explore. On the other hand, leaders are responsible for realizing group goals and strategic goals of the organization. Fourth, leaders have to determine when to share information both within and between groups, and when more time is needed for a more thorough analysis. The fifth tension for leaders is to be active as a researcher in the lab, such as doing experiments and analysing raw data. Simultaneously, leaders need to manage their groups, build external networks for collaboration, and position their group in the environment. Finally, there is accumulation of advantage within groups. Past decisions about research technologies and research directions determine later performance and recognition of groups. Literature shows that effective leaders are still involved in ongoing research. Active participation on the work floor (in the laboratory) is important for leaders, e.g. to understand the problems in the group, to motivate group members and to organize a coherent research program. Another important finding in the literature is the room for maneuver: scientists highlight the importance of providing independent research support to outstanding individuals. In addition, leadership is also crucial for recruitment of creative and good performing scientists, in convincing them to work in a particular group or institute.

In this study, data will be gathered from unstructured interviews with early career scientists, mid-career scientist, and professors working in the biomedical and health field. Results of a first pilot study will be presented. The outcomes of this study are intended to help group leaders and the boards of research institutes in managing their creative scientists.

## **Adaptation in the internal structure of academic research groups: Using co-leaders to manage the span of control**

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Group size and research performance correlate, but there is no consensus whether groups should be large or small. Intuitively, big seems better as it provides research groups economies of scale and scope. This is reinforced by the increasing complexity and interdisciplinarity of research asking for more and different expertise combined in one team. However, there are diminishing marginal returns to size: as a group grows, a research leader's span of control declines and coordination costs increase. Smaller groups have lower coordination costs and greater agility and responsiveness to change. From a research leader's perspective both large and small are desirable: large groups are good because they produce more output, whereas smaller groups are easier to manage. The explanation for this paradox lies in the adaptation capacity of groups: groups change their internal structure to accommodate the challenges of coordination. In this paper we examine co-leadership as an adaptation strategy of academic research groups in biomedical and health care research.

We held a survey on management and organisation among 282 biomedical and health research group leaders in the Netherlands in 2002 and 2007. One of the more striking observations was that the observed increase in average group size (from 14.4 to 17.0 fte) was accompanied by a drastic rise in the percentage of groups that had a co-leader, from 47% of groups in 2002 to 75% in 2007. Where this provides empirical evidence of co-leader appointment as an adaptation strategy in the management of growing groups, it does not tell us what happens in practice.

Using the survey results, we examine how research group leaders and their co-leaders divide their time among various tasks. Group leaders gave information about the time they allocated to developing and carrying out experiments and analyses; other research activities, such as writing papers and research proposals; education; patient care; supervision of junior researchers; internal management; and external management. In addition, group leaders indicated how intensively their co-leaders were involved in the same tasks.

Preliminary results show that in most respects group leaders and co-leaders have a similar pattern of time allocation. There is, however, a marked difference in time spent on experiments and analyses: group leaders with a co-leader spend significantly less time on this task than group leaders without a co-leader. In addition, we have compared group size and co-leader presence to estimate an optimal group size. Our data show that the average number of group members per (co)leader is about 10 fte and that none of the groups without co-leader is larger than 20 fte. Apparently, groups larger than 20 fte are not manageable for one research group leader. The ideal span of control is estimated at 10 fte per (co)leader.

Several additional analyses will be presented to show the extent of task specialisation between co-leaders; and to test whether the type of task specialisation is related to performance of research groups and to disciplinary differences within biomedical and health care research.

## **Using Survey Based Social Network Analysis to Establish an Evaluation Baseline and Detect Short-Term Outcomes of Clinical and Translational Science Centers**

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Translational research has been defined recently as “the multidirectional and multidisciplinary integration of basic research, patient-oriented research, and population-based research, with the long-term aim of improving the health of the public (Rubio et al. 2010).” While the National Institutes for Health (NIH) has begun to establish well funded Centers for Clinical and Translational Science (CCTS) to better institutionalize translational research, little is known about the effect of these new institutions on the collaborative behavior, attitudes, and outcomes. Certainly, the size and complexity of these programs complicates effective and informative assessment, especially as it relates to short term outcomes. Moreover, translational research is expected to result in social outcomes, which are notoriously difficult to measure, especially in the short term (Trochim et al. 2008).

In response, this paper uses survey based social network data that captures of ego-centric collaborative network structure, tie characteristics including duration and origin of relationship, resource and knowledge exchange across ties, attitudes toward clinical and translational research, and a range of activities including grants, conferences, workshops, new manuscripts, clinical research initiatives, interaction with the public, and education and policy activity. Survey based ego-centric network analysis enables the establishment of a multidimensional baseline for analysis that captures early outcomes, enables attribution to program activities, and provides feedback to program managers. This approach contrasts with bibliometric analysis as a means of assessing program outcomes where publication and citation narrowly capture scientific productivity only after institutional mechanisms have been established, when it is often too late for formative recommendations to have an effect on program development (Luukkonen 1990; Narin et al. 1990).

Using data from an annual online survey of CCTS affiliated scientists at the University of Illinois at Chicago and a control group of comparable scientists, the paper will examine how collaborative network structure and resource exchange patterns vary between CCTS participants and non-participants and whether CCTS related institutions are associated with pattern variation. Additionally, the paper will present new measures of short-term social, institutional, and scientific outcomes and examine differences in their distribution based on CCTS participation across different disciplines. Analysis will also model the association between structure, participation in CCTS, departmental characteristics and short term outcomes. Findings will inform social science research on the collaborative effects of new institutions and further evaluation methods that seek to integrate individual behavior, social structure, and new institutions designed to enhance translational research in medical schools.

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## **Organising and managing scientific research – an empirical study of a nanotechnology institute**

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This paper discusses how to organise and manage research to get the best performance out of researchers in terms of use of their produced knowledge. To this end we extend the strategic positioning theory (Kurek et al., 2007) developed to predict the level of the production of knowledge. The premise in this theory is that the organisation of the production of scientific knowledge is determined by the strategic goals of researchers and their strategic positioning. The theory is based on two dimensions: the necessity for strategic interdependence (sharing of resources) and the necessity for organisational autonomy (governance of research).

### **RESULTS FROM THE EMPIRICAL STUDY**

The performance of researchers is measured in this paper as the impact of produced knowledge and the citations it receives. These performances of impact and citations are discussed in relation to the knowledge produced ( $P_K$  measured as the number of paper published per year).

The impact  $P_I$  is measured as the number of papers published per year by an individual researcher in international, refereed journals multiplied by the impact factor of the journal of publication. The number of citations received per year and per individual researcher  $P_C$  is measured as the number of papers published per year by this individual researcher in international, refereed journals multiplied by the citations received by these individual papers. As it turns out in a test on researchers of an institute for nanotechnology (see figure 1), the higher the interdependence and the better this interdependence is aligned with autonomy the higher the impact and citations of their produced knowledge. The theory explains largely the variance of the impact and citations of produced knowledge.

The performance increases when the necessities for interdependence and autonomy increase simultaneously. For all the three cases:  $P_K$ ,  $P_I$  and  $P_C$  researchers perform best if highly autonomous and interdependent.

### **CONCLUSIONS**

Getting the best performance out of researchers requires managerial interventions. We have seen that if a high number of papers and received citations is the management objective, autonomy should be optimised without compromising too much on interdependence. It does not only suffice to choose a prospective strategic research direction, but also research groups should be strategically formed by bringing individuals together resulting in the right combinations of interdependence and autonomy, simultaneously also being commensurate with the research direction.

It is concluded that researchers need to share resources to be performing: research management is advised to stimulate this sharing in combination with a commensurate degree of governance in directing research.

Given specific domains and organisational conditions, this management theory can be expanded to serve as a tool in setting research programmes as it gives insight on which settings could and should be created by research managers or policy makers. This will be illustrated.

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## **The 'Meaningful' Organisation: The Role of Language Practices in Scientific Organisations**

*Zeller Frauke (Ilmenau University of Technology)*

Formal as well as informal rules and policies shape the disciplinary boundaries in science and enable researchers to collaborate, as they define what is perceived as valuable and acceptable research. Moreover, it is not only the research that is being framed by disciplinary as well organisational/institutional rules, but also the output of science and research – that is knowledge. Hence, epistemic cultures (Knorr-Cetina 1999) – just like any other social community – demarcate themselves from other cultures and communities by their specific set of rules, codes of conduct, and dichotomies.

Consequently, when it comes to collaborate across disciplinary boundaries, the formally and informally approved rules can hinder collaboration, and therefore need to be overcome at least to a certain degree. In this respect Cummings and Kiesler emphasize coordination costs as an important issue: “There is a tension between the benefits to innovation of working across disciplinary and organisational boundaries versus the risks that arise from the costs of coordination and relationship development in these collaborations” (2008: 100). Coordination however requires first and foremost an understanding (i.e. sense-making) of organisations and their practices, which includes the acknowledgement of the relevant influencing factors.

A promising approach towards a better understanding of organisations is Weick's notion of the sensemaking organisation (1995), where the act of sensemaking is an ongoing and central process, as it is “the primary site where meanings materialize that inform and constrain identity in action (Mills 2003: 35, cited in Weick, Sutcliffe & Obstfeld 2005: 409). Weick, Sutcliffe and Obstfeld conclude that therefore sensemaking is an issue of language, talk, and communication. This means that language (in general) is a core means for the development of organisations, which also holds true for scientific organisations. Moreover, taking into consideration the aforementioned factors that influence multidisciplinary organisations, language gains even more relevance, given that each epistemic culture uses its specific set of communication patterns and disciplinary vocabulary. Therefore, an analysis of the communication patterns and emergent ‘materialised meanings’ in terms of for example scientific terminology understanding across different disciplines can provide significant insights into the dynamics and processes of multidisciplinary science organisations.

This presentation will present results from a longitudinal study in a multidisciplinary science project, using a mixed-methods approach to the analysis of communication patterns and language usage (including email analysis, online surveys, and network analysis). The results show that there are inherent differences across disciplines regarding the understanding of project-related shared concepts. Interestingly, pre-existing associations regarding important keywords change over time and certain joint concepts develop across different disciplines. Finally, these findings are correlated with results from the analyses of interactions between different partners (with ICT usage as independent variable), and the project's perceived and pre-defined governance structures, so that conclusive insights can be presented as to the



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ongoing sensemaking processes and practices as well as what enables and stimulates the developmental and creative processes of scientific organisations.

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## **TRACK 22**

# **Technologically Dense Environments: A Bridge Between STS and Organization Studies**

### **Convenors:**

**Manuela Perrotta (University of Trento, Italy)**

**Maurizio Teli (Museo Tridentino di Scienze Naturali, Trento,  
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**Dances with disciplines? Practice and performance in multidisciplinary electronic patient record (EPR) research**

*Axelrod Lesley (University of Sussex, UK)*

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Rather like archetypal stories (such as 'Dances with Wolves' or 'Avatar') that feature individuals who embark on adventures and are changed by their exposure to natives, social scientists and others have to negotiate new ways of working within the multidisciplinary team. Multidisciplinary research is valued for drawing on multiple knowledge bases to redefine problems and processes and to reach new understandings and solutions. Designing a project so that the practice and performance of various disciplines are truly interactive and interdependent rather than just parallel work-packages should offer maximum benefit but can be challenging to plan and implement successfully. A new research team brings a new set of challenges, potential barriers and facilitating factors to the table, all operating within a technologically dense environment (TDE). In this presentation, we will describe our Patient Record Enhancement Project (PREP) - the overall aim of which is to develop strategies for making available, for research and audit purposes, medical information that is 'concealed' in the free text parts of the primary care EPR. The research involves field work studying the creation and use of the primary care EPR to better understand the contexts within which coded data and free text forms are used. We work within a highly multidisciplinary team including social scientists, epidemiologists, doctors, statisticians, computer scientists and human-computer interaction analysts who all work on various aspects of the research in different ways. Drawing on our experiences during analysis of a particular data set- on ovarian cancer- and on insights from the field studies, we will reflect on how team practice and performance is mutually shaped and influenced. We will illustrate some of the slips and some of the successes that have emerged as we strive to function efficiently as a truly interdisciplinary team that crosses traditional boundaries of practice and performance.

## **The role of computational ontologies and failure-based systems in the social**

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*Ferrario Roberta (Laboratory for Applied Ontology - Institute for Cognitive Sciences and Technologies, National Research Council, Trento, Italy)*

If, on the one hand, there is a long tradition in the humanities and, especially, in the social sciences that focuses its analysis on the interplay of humans and artifacts, on the other hand the awareness of the importance of such an interaction is surprisingly not as clear for many of those in charge of building technological artifacts.

Take, for instance, the case of e-government, where technology is so pervasive that, more than an instrument to exercise governance, it becomes nearly a policy, a governmentality in itself. Nonetheless, most projects have been mainly focussed on increasing the technical performance of computer-based artifacts, mainly disregarding their impact on the surrounding social and institutional environment.

Surely this issue has already been raised since long in the literature (see for instance studies on socio-technical systems), but the claim here is that, in order to overcome this situation, it is not sufficient to concentrate on generic principles; computer scientists and engineers need formal, good, comprehensive *models* to be embedded in their systems.

This is the exactly the purpose of computational ontologies in the social: building formal models that will then be run by computer-based artifacts, in which both these artifacts and the surrounding social environment are represented. The modeling will then be based on logical languages, as to reach a good level of rigor and at the same time being translatable both in machine-readable and human-understandable languages.

An accurate model based on these assumptions becomes the key to *open* the system to itself, making it *transparent* and accessible to its own actors, and not just to its designers or controllers.

In particular, the novelty of the perspective we would like to propose is that it shapes the whole ontological analysis through the notion of failure. In a nutshell, the idea is to reflect on structural contradictions and limitations of the socio-technical system and to take into consideration that the world does change in unpredictable ways during its lifetime.

Such a reversed perspective on socio-technical systems is a way out from the naive idea of design as the production of perfect worlds and at the same time an opportunity to get flexible strategies to cope with systems' failures.

## **Working in Technologically Dense Environments: an Example from the Operating Theatre**

*Bruni Attila (Dept. of Sociology and Social Research, University of Trento, Italy)*

Opening the “black box” of medicine has led to find in medical practice and sanitary environments a privileged empirical reference for the observation of the reciprocal relations that bind together human actors, technological artefacts and everyday working practices. Hospitals, in fact, constitute nowadays a perfect example of technologically dense environment, where technologies and objects actively contribute in the co-construction of interactive practices, everyday work and organizational processes.

Based on a three-months ethnography in the operating theatre of a hospital (in the north of Italy), the paper frames surgical practices as the result of a process of alignment and mobilization of heterogeneous elements (data, technologies, doctors, patients, nurses, health facilities, institutional pressures and so on), whose outcome does not necessarily depend on a pre-established and coherent sequence of actions, but is instead the emergent effect of the encounter among diverse materials and performances. In particular, the analysis will pay close attention to the modes of interpretation and translation into practice of the institutional and legal norms with which healthcare organizations must comply; the communities of practice and professionals internally to them; the guidelines and protocols (clinical and organizational) that regulate the work of the health practitioners; the material and technological aspects of everyday work.

Coherently with a framework that conceives organizations as action-nets and technology as social practice, the paper underlines how the reciprocal influence between everyday organizational practices and work instruments is translated into an ordered and enduring series of actions and interventions, constantly standing in relation to other technologies, practices, actors and knowledges.

### **The Link between Strategic Orientations, Dynamic Capabilities and Firm Performance**

*Coelho Dulce (Escola Superior de Ciências Empresariais do Instituto Politécnico de Setúbal, Portugal)*

The present study aims to assess the relationship between strategic orientations, innovativeness, dynamic capabilities and firm performance. Strategic orientations are viewed as the firm's strategic directions to create proper behaviours to interact with the market and other key players, and they are considered crucial to achieve superior performance. The concept of dynamic capabilities, which links resource-based view to the concept of market dynamism, has a growing importance in today's business environment, because this context is becoming increasingly complex and dynamic. Innovativeness is at the heart of dynamic capabilities, contributing to the capacity to renew competencies and to achieve strategic fit, matching the requirements of a changing environment. So we consider relevant to investigate the relationship between these constructs. To this purpose, we used primary information, collected through a survey by questionnaire in Knowledge Intensive Business Services (KIBS) in Portugal. The methodology includes statistical methods of factor analysis and regression analysis. Given the results, we present some suggestions of further investigation.

**Transformation within knowledge practices: challenging taken for granted assumptions of what it means to inhabit indoor climate**

*Gunn Wendy (SPIRE centre, Mads Clausen Institute, University of Southern Denmark)*

*Clausen Christian (SPIRE centre, Mads Clausen Institute, University of Southern Denmark)*

The paper tells a story of how a user orientated approach to designing indoor climate systems and products challenges established engineering systems of generalized knowledge. It is often shown that innovation is an outcome of interaction between diverse perspectives and often across knowledge domains (Pavitt 2005). As an implication, it is expected, that the combination of different kinds of knowledge should be central to creating innovation potentials. In this paper we claim that while the combination of different knowledge practices is important, it does not lead immediately to innovation but it may lead to a reframing of what innovation could be. In the paper we argue during the course of our everyday lives people are active in creating indoor climate. This leads us to consider how different knowledge traditions conceive of users knowledge in the control of indoor climate systems. We go on to consider the dilemmas between two different perceptions of indoor climate. One underpinned by a techno-scientific discourse of generalized knowledge, the other by local practices. We show that framing of users knowledge in terms of having or not having innovation potential, reveals underlying assumptions concerning the use of local knowledge in developing systems of control. Finally, we consider the limitations and potentials, for movement of local knowledge to occur in a number of Danish manufacturers of indoor climate products and systems. We conclude that while the bringing together of knowledge traditions influence the conceptualization of what is conceived as having innovation potential, this does not directly lead to exploring innovation potentials.

The paper is based on research within the SPIRE centre for participatory innovation at the Southern University of Denmark. One of the main ambitions of the centre is to develop the concept of Participatory Innovation (Buur and Matthews 2008) as an approach involving user knowledge in innovative practices. We pose questions asking where and when (if at all) local knowledge is transformed into innovation potentials. Our analysis appeals to field study material from indoor climate practices in private homes, kindergartens and offices and on follow-up interviews with engineers from building sector companies and indoor climate researchers from universities taking part in a number of SPIRE participatory workshops. The analysis will be informed by theories and concepts concerned with how diverse worlds of knowledge may be framed such as the notions of object worlds (Bucciarelli 1988), actor worlds (Callon 1986), lifeworlds (Ingold 2000), social worlds (Clarke and Star 2007).



## **Does Computing Mean the Cavalry Is Finally Coming, or Will Computing Destroy Organizing Studies?**

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It is increasingly difficult to identify significant human practices that are not affected by computing; indeed, computing is so thoroughly integrated into many forms that it would be impossible to carry them out were the computers taken away. At the same time, we humans are much taken by the idea that the ways we organize ourselves, the kinds of social relations and relationships we build, are changing fundamentally. Further, much scholarly talk assumes the “hype” that computing is powerfully causative of change in organization, as in these comments from the abstract for today’s Indiana University job talk: “Social media such as blogs [etc.]...enable people of all walks of life to express their thoughts, voice their opinions, and connect to each other anytime and anywhere. The boom of social media has spawned new research to study human interactions and collective behavior on an unprecedented scale. It is (sic) reshaping business models...” and so on.

There are many ways to query this presumption, that computing is the primary cause of organizational change today. This paper begins with recognition of how much current academic studies of Organizing are in a period of transition, even crisis. Loud voices that call for “starting over,” refounding the field on pre-Taylorist, even pre-Smithian notions of how organization works. Of particular interest is the rapprochement being attempted between Organizational and Social Movement Studies in Sociology.

Was the corporation, the image of organizing put forward by Twentieth Century Organizational Studies, accurate enough to provide a comparative baseline for assessing how different the purportedly “new,” computing-induced ones really are? If this model of organization was misguided, do forms of computing, whether Management Information Systems or Social Media, provide a substantial enough model for refounding the study of organizing? Conversely, does the experience of supporting human practices with computing undermine the very idea of a stable organizational structure as even possible, let alone desirable?

If we don’t know how organizations really used to be, we can’t say much about how different they are now. The author’s approach to articulating these questions is based on his thirty years studying the relationship between computing and change in organizing, including his current project on Socially Robust and Enduring Computing.

**A new way of working':**

**Organizational culture and material space in a virtualising organization**

*Kingma Sytze F. (Dept. of Culture, Organisation and Management, Vrije Universiteit Amsterdam, The Netherlands)*

This paper deals with a case study about the Dutch subsidiary of a multinational insurance company that in 2006 radically changed its way of working. This change was induced by a major business crisis of the company as a whole, and included basic organizational structures referring to both the technological infrastructures and the physical space and architecture of the office building. With the material changes management sought to further a new organisational culture, away from a hierarchical and static culture towards a more customer oriented and flexible culture. The fundamental changes affected many of the working practices of the employees, who had to adapt to a new organisational environment and adopt new ways of working and interacting with management as well as with each other. The changeover was implemented in a period of only a few months. In this respect the case study represents a kind of 'natural experiment': how is organisational culture affected if one quite suddenly and dramatically changes its material conditions? Among the many significant material features were the introduction of the principles of the 'paperless office' and the 'flexible office', principles which contrasted with the way the traditional office space of the company was instituted. The traditional office space could be characterized by lots of filing cabinets, paperwork and highly personalized desks and office spaces of individual employees as well as the various departments. The new working principles were introduced with the aid of a consultancy agency specialized in the development and implementation of 'smart buildings' based on 'post-modern' office spaces and management principles. The philosophy, or ideology, of the consultants included the 'physical', the 'virtual' as well as the 'mental' environment. This paper theoretically assesses the philosophy of the consultancy agency, in particular the principles of the paperless and the flexible office, in view of Henri Lefebvre's theory of social space and principles regarding the social shaping of technology. In this respect the paper blends insights from organisation studies with STS. Empirically the paper analyses, based on in-depth field work, the way the material changes affected the organizations' culture, the user practices concerning the technologically dense work environment, and the way employees re-organized and experienced their work.

**An emergentist analysis of developments in health professional practice following the introduction of the electronic patient health record in the U.K.**

*Lain Crinson (St Georges, University of London, UK)*

The policy context for this paper is the rolling-out of the National Health Service (NHS) National Programme for Information Technology (NPfIT). One of the key objectives of this unprecedented undertaking is the construction of what is known as the Extended Choice Network (ECN), designed to achieve wider patient choice and greater organisational efficiency. The ECN facilitates the local commissioning of health care services from a much wider range of providers than hitherto been the case within the U.K. The electronic patient record (EPR) is the means by which individual patient information will flow from commissioner to provider and back, across a range of organisational boundaries. Central to the success of the strategy is the willingness of healthcare professionals to engage with the EPR in their patient management practice.

Drawing upon case study research, the paper traces these new forms of patient information flow as they extend across traditional healthcare organisational boundaries and between divergent groups of health and social care professionals. In assessing these developments, the paper seeks to move beyond the duality found in traditional forms of socio-technical analysis that either reify new technologies (HCI), or overdetermine the socio-cultural elements within organisational practice. This paper draws upon a realist methodological understanding in asserting that the interfacing of health professions with information technology has in this case resulted in both an 'elaboration' of the EPR as well as the emergence of new forms of professional practice.

## **Evidence-Based Medicine and Styles of Patients' Admission in the Intensive Care Unit**

*Lusardi Roberto (Dept. of Psychology, University of Parma, Italy)*

Evidence Based Medicine (EBM) currently represents the mainstream of medical epistemology and truly finds application in every setting of cure and care. According to many scholars, its success, introduced in the medical discourse at the beginning of the 90's, seems to reside in the effective improvement of the practices' standardization. Nevertheless, STS and organization studies have shown how the evidence-based artifacts (guidelines, protocols, decision-making supports) undergo a process of interpretation and adaptation in the phase of their local application.

Based on ethnographic data gathered during a field research in an Intensive Care Unit (ICU) of a hospital in the north of Italy, this paper aims at analysing the existing gap between the formal dimension of the Evidence Based Medicine and the professional practices as concerning a specific activity of the unit: the patients' admission. To admit or not to admit a patient in ICU is clearly a controversial decision, as it could imply patient's survival or death (especially in the case of elders or patients in critical conditions) and it requires considerable economical, technological and professional resources, which collide with the structural limits of public funds for healthcare services.

The ethnographic data show how in the ICU practice two factors stand out and constantly interact: the formal dimension, constituted by protocols, procedures and guidelines, which points to the universalistic tension of western medicine and health organizations; and the actual medical-nursing practice, in which formal artefacts are reinterpreted and embedded in situated practices. That is, during the application of the formalized protocol of the patients' admission, various situated practices, recalling the *macro-social*, *organizational-interactional* and *individual* dimensions, intervene.

The standardization process of the patient's admission, based on guideline and protocols, is therefore realized according to different *styles*. These styles link the three dimensions and the operative indication based on international evidence so that they switch from a rigid conformity to international criteria to compliance towards legal, organizational and relational factors.

The empirical study stresses the relevance of the *relational* knowledge in the integration process of protocols and guidelines in the medical practice. Based on this knowledge, healthcare professionals are everyday able to cope with the gap between the formal procedures and the concrete circumstances of healthcare processes. Humour among professionals, for example, appears to be a way to smooth the differences in the *styles* and lead consistently the medical *equipe* in spite of the different interpretations regarding the patients' admission protocol.

## **What does IS maintenance tell us?**

### **Shifting perspective on ICTs and organisation alignment**

*Marcolin Mario (Department of Sociology and Social Research, University of Trento, Italy)*

In this paper I want to theoretically question the mainstream management perspective of strategic alignment, by calling for a more situated and relational insight of Information systems (IS) maintenance. I will therefore reflect on the fruitful implications of assuming a practice lens in accounting for the phenomenon.

#### **A BRIEF OVERVIEW AND SOME QUESTION MARKS**

IS maintenance has a wide spectrum of significance in mainstream management IS literature. Roughly summarizing, it is analyzed at two different levels: as the ordinary activity of error correction and technical solutions, and as the extraordinary activity of enhancement (Bratteteig & Al., 1991). This second issue is accounted as the principal task of management and analysts which have to keep the system “in tune” (Riggs, 1969) with the organisational needs. This is the very point addressed by the debate on strategic alignment (SA). Briefly, SA deals with the harmonisation of both business and infrastructure strategies in order to face conjointly the respective internal and external pressures (Henderson & Venkatraman, 1993). By this extent, it is conceived as a matter of modelling and planning how to face changes, trying to manage the relation between IT and organisation (Burn & Szeto, 2000). There are at least three main points this conception does not help to explain and/or account for. They can be pointed out by posing some simple questions:

- a. How does this SA develop in practice? Indeed, there is no account of the concrete unfolding of SA (Avison & Al., 2004);
- b. Is SA a goal to be reached or better a process? The evidence that just in few cases the objective of SA can be empirically observed (Smaczny, 2001) suggests that it should be something more under the water surface that is kept waiting to be taken in consideration;
- c. Can we possibly consider technology as a passive element ready (and easy) to be handled by the management? Or should we take it into account as an intervening variable (Maes, 1999)?

#### **A PRACTICE-BASED APPROACH TO ALIGNMENT**

I would address this open questions by considering the problem of alignment as a situated process daily performed by the heterogeneous actors involved in the practice of maintenance. Indeed, the assumption of a practice lens suggests to look at “*how, in specific context, facts become so, how the order is performed, how things get to a stabilisation – in a certain way – and how changes occur*” (Gherardi e Nicolini, 2005). This point of view allows to: a) take into consideration each actor involved; b) account for the concrete unfolding of alignment as a situated ecology of interaction; c) grasp the active role of technology in shaping – by interacting with the other element of the network – courses of action; d) highlight the dynamics of inclusion and exclusion, activity and passivity, in the process. In other words, it helps to reconstruct alignment as an emergent process, a process that is

deep-rooted in the practice of mainten-*ing* the system aligned with different professional practices on a daily basis.

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## **Computer-mediated handover – change from oral to electronic nursing handover**

*Meum Torbjørg (Telemedicine Laboratory, Tromsø, Norway)*

Nurses are depending on accurate and timeless access to appropriate information in order to perform the variety of activities that involves patient care. Particularly in handover processes, oral reports have played an essential role and is strongly embedded in the hospital culture. The main function of the handover is to transform information and knowledge of patients from the off-going nurse(s) to the oncoming nurse(s). Even if transferring information is the main function of the handover, other functions as teambuilding, group cohesion, teaching and emotional support has also been indentified as important aspects of the oral handover (Lally 1999; Kerr 2002). However, communication breakdown is recognized as a common cause of errors in health care delivery and a more standardized handover process has been recommended(Nadzam 2009). Several studies in the nursing community have illustrated how use of care plans has successfully replaced oral handovers (Wallum 1995; Solvang 2005). In modern health care, where electronic patient record (EPR) has become a key actor in the information flow, many believe that information technology is the most effective measure for improving quality and efficiency in health sector (Norwegian Ministries of Social Affairs and Health 2008). In the nursing informatics community they also recognize the EPR system to reshape information management, create new communication patterns, and enable development of new practice models (Moen, Hellesø et al. 2005). This makes it particularly relevant to explore efforts aimed at replacing oral handover processes with computer-mediated handover. On the one hand there are political and professional expectation that information technology will improve continuity and seamless care through information systems like the electronic patient record (EPR). On the other hand transformation of information and knowledge in the handover process are situated, multifunctional and sosciomaterially configured (Orlikowski 2007; Suchman 2007).

The study is carried out at the psycho-geriatric ward [APP] at the University Hospital of Northern Norway (UNN). The empirical data was collected by participant observation, interviews, document analysis and informal discussions. Data collection and analysis have not been separate activities, but rather an iterative process. It has been a process back and forth between fieldwork, case description and use of related literature to gain new theoretical insights(Walsham 1995).

The case study illustrates a change of the handover process from a traditionally, oral nursing handover to a computer-mediated handover. A reconfiguration of the handover process became a possibility after implementation and use of an electronic nursing module. Translation of the electronic handover to the local practice is considered as a success and the use of the electronic nursing module has been a key actor in the process. However, the new handover is also transformed through the multifunctional aspects of the handover, professional guidance, new skills, rearranged environment and new work practices. It is difficult to draw a boundary between social and material implications because they are mutually constituted and transformed through ongoing activity in the local practice (Suchman 2007). The electronic report enhanced more flexibility into the handover process and released time to a morning meeting. Use of electronic care plans enabled greater continuity

and up-to-date information during the report and use of standardized nursing terminologies ensured shared meaning across time and space. However, the computer-mediated handover also involved new skills, roles and work practices.

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## **Decision-making practices in medicine: between protocols and information**

*Mozzana Carlotta (Graduate School in Social, Economic and Political Sciences, University of Milan, Italy)*

Since the last two decades, the medical decision-making processes have known a complete revolution due to the transformations that affected the medical world: the healthcare sector reforms, the rationalization of healthcare professions, the scientification of medicine, the links with other disciplines (especially biology and the neurosciences), the use of the internet as a working tool. As for this, decisions in the hospital wards are complex socio-material processes and the elements that participate in the decision-making (and the consequent pieces of information needed in order to decide) are various and heterogeneous.

In this paper I will account for the results of a research carried out in an Italian hospital ward. I will seek to describe the ways in which human and non-human elements participate in the decision-making process, especially for therapeutic choices. The research is focused on the clinical protocols role and the way they inform (in the double meaning of shaping and providing for the information) the process and build up the boundaries of the choice and its appropriateness, in order to understand and describe the rationalization of medical work in practice.

The research is based on an ethnographical work carried out during 9 months of participant observation in an oncology ward of an Italian university hospital. I analysed the connections, the performances and the decisional practices that clinical protocols enacted: who or what decides? On the basis of what? How the choices are taken? And which kind of justification do they bring in the process?

In the first part I will ground the paper in the theoretical and empirical framework of the contemporary analysis of the organizational processes of science and technology. The second part will examine how, in the oncology field, clinical protocols are practiced and how they participate in the construction of information for decisions and therapeutic trajectories. I will analyse two levels of the action: the practice of the decision-making processes and the discourses about them (especially the justification that artefacts bring into the discourses). By doing so, I will show that clinical protocols and the information they produce have different “natures” (the normative and cognitive, but also the organisational, scientific, technological, collective, social, economic, etc.) that on the one hand inform the process and on the other emerge, combine and contrast in various ways.

In conclusion, I will present some indications about the complex role of protocols as scientific and organizational artefacts, in particular as normative devices that inform the context and the chances of choice.

## Translation and classification practices of the “presumed medical error”: Boundary objects, categories, stories and professional visions

*Pentimalli Barbara (La Sapienza University of Rome, Italy)*

The purpose of my paper is to present the results of an ethnographic study that was conducted by observing the daily activities of the *Patients' Rights Court*<sup>3</sup>, which receives calls from citizens narrating stories about “presumed medical errors” (experienced by them or by their family members) and tells them if there is sufficient pertinent evidence to begin the legal process against hospitals, doctors...

In particular, the paper aims to describe the abilities of phone operators and consultants (lawyers, forensic doctors...) in translating and classifying the oral narratives of citizens into written summaries, categories and cases of medical errors, in order to prove the civil or criminal liability of medical teams (for late diagnosis, error in diagnosis or therapy, error during surgical procedures...).

By adopting the Workplace Studies and the ANT approaches (Luff, Hindmarsh & Heath, 2000; Callon, 1986; Latour, 1989), I will show that the activities of phone operators and consultants, working in Technologically Dense Environments, imply the performance of complex socio-material practices and chains of translation, which mobilize the joint action of heterogeneous elements, both human and non-human, involve abilities for assembling and aligning multiple technologies and artefacts<sup>4</sup> and require specific knowledge for fitting stories of error events into categories.

The phone operators perform *emotive work* (Hochschild, 1983) by demonstrating their understanding of the citizens' dramatic stories (death of family members, permanent invalidity...), and by encouraging, reassuring and calming those who are desperate, sad, disappointed or angry. Simultaneously, they guide the citizens in determining the key data they have to include on a pre-formatted computerized form, which plays the role of the Munsell Chart, used by archaeologists to classify the colours, texture and consistency of the dirt in excavation fields (Goodwin, 1994).

The consultants, who are looking for proof and causal links to demonstrate the medical errors, exhibit their dexterity at combining, comparing, looking at, “making to talk”, interpreting, translating, categorizing, filtering and highlighting the salient and pertinent elements of the information that emerge from heterogeneous *narrative artefacts*: summary of the citizens' story produced by phone operators; pro-memoria written by citizens to indicate the chronology of an error event; medical records telling the clinical history of the patients (medical exams, radiography results, reports on surgical procedures...).

My paper reconstructs the *chains of translation* to transform the narratives of medical errors into legally demonstrable cases and describes in detail the skilled use and assembling of a multiplicity of artefacts and boundary objects (Star & Griesemer, 1989) which: travel from one organizational space to another, are combined and differently interpreted by heterogeneous actors according to their purpose at hand, their professional vision (Goodwin, 1994), their knowledge, categories and language.

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<sup>3</sup> Tribunale per i diritti del malato.

<sup>4</sup> (phone, PC, pencils, sheets of paper, clinical documents).

Furthermore, during my fieldwork I observed the difficult design and implementation of a new technological “boundary object” – a new software – for improving the coordination of heterogeneous activities distributed in time and space, and for standardizing vocabularies and coding categories used by various professionals (Bowker & Star, 2000; Trompette & Vinck, 2009), with the intention of replacing the multiple “homemade” computerized forms.

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### **A network approach to sensemaking and organizing: accounting for failures in safety-critical coordination**

*Sanne Johan M. (Department of Thematic Studies, Technology and Social Change, Linköping University, Sweden)*

Sensemaking is a salient process for carrying out a large number of organizational activities, not at least safety-critical coordination. Mostly, sensemaking and coordination are smooth and non-problematic, despite opportunities for errors due to incomplete or inadequate linguistic means and information. However, at occasions mistakes have devastating consequences. Unfortunately, current approaches to sensemaking are conceptually inadequate to simultaneously account for both non-problematic and accidental outcomes. This paper suggests an alternative approach that draws upon networks of heterogeneous engineering, requisite variety and boundary objects.

Sensemaking is usually conceived in organizational research as only retrospective and only taking place when triggered by moments which challenge sense makers' existing mind-set or cognitive frame, as opposed to non-problematic, smooth situations, as well as explicit. Ethnomethodological approaches show that sensemaking is both retrospective and prospective, that it is constantly accomplished in any interaction, and usually successful despite inadequacies, for example incorrect linguistic means. However, ethnomethodology in turn provides inadequate means to account for how participants draw upon specific cultural or institutional resources such as professional rationalities, institutional agendas, regulations and technological artifacts when making sense, as well as for failed sensemaking.

An analysis of safety-critical communication between train dispatchers and railway maintenance technicians, suggests that sensemaking and organizing is advantageously conceptualized through a heterogeneous network approach. Sense makers engineer a network of objects such as phrases, actions and technological artifacts, to make sense of and to organize a response to the situation they face, that is, to enact a manageable world, through enrolling heterogeneous resources such as talk, technology, regulations, culturally specific logics, knowledge and experience. Failure or success of the engineered networks depends on their requisite variety in relation to making sense of and managing the various demands of the situation at hand such as risks, timeliness and efficiency.

I examine sensemaking and interaction in situations where railway dispatchers and railway maintenance technicians organize safety-critical coordination, informed by two major rationalities that structure their work, can-do attitudes and improvisation. The paper juxtaposes a situation where these rationalities informed an ordinary, non-problematic coordination with another one where they contributed to an accident.

Requisite variety relies upon interactions where participants construct and link a sufficient number of boundary objects in their network. Boundary objects can be used by various communities for different purposes while also maintaining coherence across these communities, so that they become meaningful for both participants, serving a common goal. Participants' heterogeneous engineering of various resources at hand is created through their interaction. If participants create and link boundary objects, consisting of certain phrases, artifacts, and actions, the networks convey sufficient meaning to both participants, enabling them to enact a manageable reality that sufficiently account for the various demands at hand. Conversely, when participants fail to construct and link boundary objects into a network, sensemaking also fails.

### **Community Wasn't Dead After All - Value orientation among Norwegian fishers**

*Sonvisen Signe Annie (Norwegian College of Fishery Science, University of Tromsø, Norway)*

Prior to the cod crisis in the 1990s, Norwegian fisheries were open access and there was a close cooperation and connection between the fisheries and local communities. Modernization, through technological development, and the introduction of property regimes in the fisheries changed these relations. Technology replaced people and reduced the demand for labour. The introduction of property regimes changed the traditional rules for participation in the fisheries. The results were fewer vessels and fewer fishers, and more importantly, fewer people for local communities directly involved in fisheries. Consequently, this development weakened the social ties between fisheries and local communities. Furthermore, technology and property regimes introduced non-human actors, such as technology, finance and banking, management and science, into the fisheries. This process, known as cyborgization, contributed to further weakening the role of the communities in the fisheries. Subsequently, the fisheries were no longer dependent upon the local communities for recruitment and employment. It is therefore increasingly difficult to see the fisher as a member of a community, in the traditional sense, and it is difficult to assume the continued existence of values associated with local community. Although fisheries management has, uncritically perhaps, adopted neoclassical economic models, can we assume that the modernization project and the introduction of property regimes have changed the value orientation of the fishers? Can we assume that the values of the fishers are increasingly influenced by neoclassical economic theory? Have Norwegian fishers become disembedded from local community in terms of their values? If so, how may this affect future employment and recruitment decisions in the fishing sector?

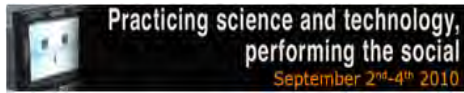
## **The Discursive Production of Uncertainty as a Source of Organizational Innovation. Ethnography of a Standardization Program in Clinical Cytogenetics**

*Turrini Mauro (Department of Sociology, Padua University, Italy)*

Science and technology studies have widely exposed sources of uncertainty and contingency that are «forgotten» or «deleted» when facts and artifacts are treated as «black boxes». The STS scholar tries to open up black boxes in order to shed light on contingencies and controversies that are hidden beneath an apparent consensus in scientific communities. In some occasions, others do this sociological work. Programs of standardization of laboratory work routine are one of these situations. The scientists who promote these programs emphasize tacit or local dimensions of data production in order to foster their change towards more scientific practices. This presentation intends to investigate how the scientists' own descriptions of their knowledge and procedures as «science» or «non-science» are used as a means to change practical and instrumental configurations of a technological dense workplace such as the laboratory. Particularly, the basic research question is: is the discursive production of uncertainty used as a source of organizational innovation? How can this internal (de)constructivist perspective on scientific work interrelate with sociological analysis?

The data come from the ethnographic investigation of a specific program of standardization – tellingly called *From Magic to Scientific Practice* – that has been developed for the last ten years in the field of clinical cytogenetics. Firstly, I attended two different courses during which the new procedures are deployed. Secondly, I interviewed (one or more times) the founding promoters and the new scientific partners who support it. Thirdly, I interviewed 11 participants (both biologists and physicians) during the last days of the course and after some months, to see to what extent and how it affected the laboratory practices. Fourthly, I have analyzed scientific literature, guidelines, and protocols presented and cited in these circumstances.

Cytogenetics is often considered by practitioners as an «art» which requires the ability to operate confidently in a situation characterized by a high degree of uncertainty. These «artisanal» features were emphasized especially during the first part of the workshops, when procedures and technologies adopted by participants were subjected to systematic, critical inquiries. This sort of (de)constructivist analysis was a very effective introductory step to the «demystification» of old cytogenetics techniques and the establishment of a new and more «scientific» environment. In the second part, theoretical principles, pictures and videos of biological phenomena, and practical demonstrations of innovative protocols, equipment, and reagents were presented focusing both on *visual and conceptual narratives*, and on *procedures and technological devices*. Adopting these technological materials was crucial to the success of standardization. Anyway, even in these laboratories that have not adopted these instruments for lack of funding or managerial decisions, the discursive production of uncertainty has been able to destabilize in many respects the old cytogenetics procedures and to re-shape the very definition of science. Assonant with the STS approach, programs of standardization can be a productive subject of study in order to rethink scientific work and innovation strategies together with scientists.



## **TRACK 23**

# **Creativity and Innovation**

### **Convenors:**

**Cathrine Hasse (School of Education, Aarhus University, Denmark)**

**Estrid Sørensen (School of Education, Aarhus University, Denmark)**

## Knowledge exploring and exploiting in a University Organization

*Abbatino Giuseppe (University of Rome “La Sapienza”, Department of Innovation and Society; ISTAT – Italian National Institute of Statistics, Italy)*

The paper presents a research focused on the study of knowledge practices and flows, structures and objects in a University organization such as the “University of Rome Faculty of Economics”. The framework of the research is the even greater attention paid on knowledge practices and intangible assets in high knowledge intensity organizations such as Higher Educations, and the need to find a way to reveal, narrating and accounting them. During the last few years, the centrality of knowledge resources and intangible assets in organizing practices has become a very important issue in both economic and social studies. On the one hand, economic studies concentrate on the description, measurement and evaluation of knowledge resources, while on the other hand, social studies focus on knowledge and learning practices but also on organizations and social systems accountability and reliability. The theme, has now become a broad topic also applied to European Higher Education Institutions, as confirmed by the European Commission action in trying to support a common framework for universities that wish to adopt new forms of knowledge valorization and accountability.

In this context, the emerging topic is the trade-off or the equilibrium between knowledge creation and innovation (knowledge exploring) and knowledge learning and managing (knowledge exploiting).

Research questions moving and feeding the study were numerous at different analysis layers. What is missed codifying, standardizing and classifying? Which is better between knowledge codifying or knowledge personalization strategies? Using the statement by Wittgenstein “our world coincides with our language”, in other words our knowledge ends where our language ends, that is, is there no knowledge outside what we can express and communicate, or, according to Polanyi, “we do know more than what we can express”? As “Funes” in the book “Fictions” by Borges teaches us, is it true that “too much memory kills imagination”, that is, does knowledge codification and management penalize knowledge creation? How could knowledge translate from the individual learning situated in the organization to organizational learning becoming innovation in the forms of artifacts and routine? In a high intensity knowledge organization, but also in a weak ties organization, such as a university faculty, how do learning processes and practices take place? What are knowledge objects, practices, processes and places? What is the function of information and communication technologies creating, managing and communicating knowledge? And, generally speaking, how does the Faculty interpret its own mission of creating and spreading knowledge?

The starting points are classic quantitative approaches to the theme such as those based on intellectual capital, knowledge management, knowledge based resources theories. The challenge is to complete them with a qualitative approach based on a mid-long term ethnography experience due to achieve a comprehensive understanding of organizational dynamics and an unorthodox views of organizations. The integration of quantitative and qualitative approaches is the only way to look for knowledge in an organization like a



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university faculty, chasing and shadowing it as a person or an object, recognizing it in classes and lessons, in institutional events such as commissions and councils, in database and evaluation system, in relationships with stakeholders, in communication practices, etc.. The study of the Faculty of Economics has been conducted through institutional documentations scouting, data base and evaluation system analysis, specific surveys to collect data and information, but also through talks and focused interviews, ethnographic observation, value-objects scouting, key figures shadowing, participation in every day organizational life and special events.

## **The Conundrum of Time: Creativity in the Perception of Movement, Change and Innovation in Art, Science and Technology**

*Blassnigg Martha (University of Plymouth, Transtechnology Research, UK)*

This paper intends to extend the focus on studies of some of the underlying creative forces that shaped the emergence of audio-visual recording and projection technologies commonly undertaken from a reconstructed perspective on inventors, producers and exhibitors that are by necessity conducted by hindsight (as things past). It will do this by proposing a shift in attention toward a philosophical treatment of the dynamic processes involved in creativity that constitute the perceptual processes of the subject prior to the execution of any form of (creative) expression. This will result in a suggestive, historically and philosophically informed, consideration of approaches to innovation as creative potential for the future rather than a de facto analysis of the past.

In the way the term 'innovation' is used, it implies that something has changed and manifests some 'extra', something novel, unprecedented. It implies change and time, since it can only be detected by hindsight, by comparing a present state or condition with one that is past. Creativity instead refers to a dynamic process in the making, which seems to manifest foremost as an activity, as it happens, in preceding and producing the new. This paper will address the question if and how it is possible to talk about creativity and innovation in relation to each other, without the sleight of hand of passing from a conception of time as something past which is fixed and closed, to a condition of presentness, in the radicalism of change in continuity without ever reaching a definite materialising closure in its activity.

As an exemplary case-study this paper will examine some of the traceable manifestations of innovation in the origins of what we today call the cinema, which, in hindsight, has often been regarded as an inventive contribution to perception, which at the time provided something 'extra' to prior technologically mediated forms of projection and exhibition. The literature around what could be called the 'enigma of the early cinema' in its enormous popularity and immediate world-wide distribution reveals that the cinema was not invented but rather emerged from a network of forces and negotiations between creative impulses from scientists, instrument makers, entrepreneurs such as conjurers, and — rather significantly — their audiences.

With the aim to revisit the past in order to improve an understanding of the present, this paper will revisit significant innovations in science, art and technology in the late 19th century that converged in the context of the emerging cinematic technologies, in particular in relation to the preoccupation with movement and time in science (Marey), art (Rodin) and technology (seriography of instantaneous photography). Within this framework the dimension of time, inseparable from the activity of movement and motion, will be distinguished into a chronological account of the past and a conception of time as it happens as an experience in the perception of the perceiver. In doing so this paper will suggest that in this differentiation of time might lie a key to unravel the convergence of creativity and innovation as a problematic unit in materialised formations, as distinct from the dynamic processes that continuously shape and drive the human engagement with technologies and media as co-creators or co-producers.

## **Dreaming Up Ideas in Synthetic Biology**

*Cockerton Caitlin (BIOS Centre, London School of Economics and Political Science, UK)*

Practitioners in synthetic biology look through an engineer's lens at the incredibly complex, sensitive, reproducing and seemingly endless resources of living material and think about how to build modular, functional, well-characterised biological parts, devices and systems. When the immensity of plant and animal life as well as an array of microorganisms comprises the materials library for this line of work, I ask: how do life scientists and engineers initially come together to dream up ideas in order to design and build new synthetic biological forms? Of course, the logical research questions that follow look into how these ideas are then translated into laboratory and 'in silico' practices, as well as the kinds of biological materials that are created; however, for the scope of this paper, I focus on the creative moments in the imagining of new ideas in synthetic biology.

This paper draws its empirical content from a multi-sited laboratory ethnography in which I became the 'resident social scientist' following two groups of aspiring synthetic biologists participating in the 2009 International Genetically Engineered Machine Competition (iGEM). iGEM is an undergraduate competition that is arguably one of the most important drivers for the development of synthetic biology as an emerging global biotechnology (<http://2009.igem.org/About>) insofar as it is a medium through which pioneers of the field are inspiring, educating and indoctrinating a 'next generation' of life science and engineering students to think through the 'synthetic biology lens.' Furthermore, owing to the competition's open sharing and documenting of ideas, iGEM is an annual source of fresh research projects that might be taken up and pursued in professional laboratories. iGEM is also interestingly studied with respect to its conflicting ideologies: on the one hand, there are a number of restrictions that teams must adhere to (for example, using and giving back BioBrick™ parts as well as following certain protocols given by the Registry of Standard Biological Parts); while, on the other, an encouragement of creative and 'blue sky' thinking is at the core of the competition's philosophy. I will discuss the politics of knowledge production in iGEM in order to lay the foundations for this paper.

However, the main contribution of this work illustrates and examines the content of 'thought experiments' that go on in the initial dreaming up of ideas in groups of iGEM students. I do so by presenting a collection of photographic data that captures written and diagram forms of 'mind mapping' that were instrumental in both teams' brainstorming processes.

This paper contributes to a recent body of STS literature that focuses on the social study of synthetic biology. More broadly, I situate this work in the subject of scientific knowledge production and in the empirical tradition of laboratory ethnographies. Finally, given this paper's examination of visual representations in the crafting of a new idea, I also make a contribution to work in the area of visual cultures in science and technology.

## **Ludic mechanisms as practice and organization in the process of innovation.**

*Derpmann Stefan (Universität Duisburg-Essen, Institute of Sociology, Germany)*

Based on the conjunction of the empirical findings in a (user-centered) research project with the objective of the (further) development of robot assistants for the care sector and the presumption of a considerably proximity between innovation and play – as a modus shaping as well as providing creativity – the induration of this process is made visible and thereby explicable.

The research in a technology developing project – abovementioned case study – offers an insight in the obvious paradox (though representative) requirement of planning/controlling creativity and innovation. Projects as a framework are already the shape for amplifying organizational needed flexibility incubating creativity (Grabher, G. 2001).

This raises the question what assumptions are contained in the terms 'creativity' and 'innovation'. While regarding creativity "[...] as something genuinely spontaneous and irrational and hence, by its very definition, impossible to control [...]" (DeFillippi, R., Grabher, G., & Jones, C. 2007:511), the classical grasp of innovation is centered on 'goal-directedness' and 'goal definition' – in this case – on the modeling and development of technology. Mostly linked to an individual genius inventor, it follows Schumpeter's 'entrepreneur' assuring this invention's success (Braun-Thürmann 2005:40). These individualistic assumptions are most likely in retreat (DeFillippi, R., Grabher, G., & Jones, C. 2007:512; Blättel-Mink, B. 2006:73).

'Play' (Caillois 1982: 16), considered as an organizational and individual modus in a 'game', is framed out in the period of a project. During its term – starting with the application phase, the milestones and diverse presentations – the conceptual resemblance is striking and access to the social practice affording creativity as an act and form of action, processing models – as a framework – for further discussion, experience(s) and eventual knowledge can be obtained. Starting with minimum arrangements, smallest possible direction and dependencies, it is practicing a certain 'sense of possibility' (Möglichkeitensinn) (Holzinger 2007:11) – thus a scope for creativity – assembling and condensing to innovations. Caillois stating this effect with the different ways of play: 'ludus' and 'paidia' (Caillois 1982:20). 'Paidia' means the act of improvisation, fantasy and invention (Caillois 1982:36 and 45), while 'ludus' is the act of disciplining this as complement and advancement in the progress from creativity and innovation. It offers opportunity for training and ends in the acquisition of a skillful act (Caillois 1982:39). At the same time – over its enforcement – it records the new forms as rules, technology and therefore durable. This very modus makes innovative practice possible.

For this reason effects of the play as invitation, regarding creativity, innovation, development and creation of technology and its favorable (objective) factors, framework (how, where and when) and circumstances can be assumed.

The coalescence of an (theoretical) approach on play, its translation and impacts into action is obtained via qualitative case studies of designers and developers during the case study. It maintains eventually insights into the modes of creative work, action and its consequences for managing and intending innovation.

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## How does mutable immobile knowledge get innovative?

*Dupret Søndergaard Katia*

Taking a point of departure in an employee driven initiative to change and innovate the working practices of the group of personnel in adult psychiatry this paper discusses ways to conceptualize how new forms of knowledge that are not materialized in broader technological inscriptions from the psychiatric organisation get to be stabilized and acknowledged beyond the immediate performance of these types of knowledge. The paper is seeking to develop ways to conceptualize alternative ways of knowledge production as innovative.

The paper presents an empirical example of how the attempt to innovate the daily working practices are performed temporarily, spatially and agentially in ways that do not connect to broader and bigger technological networks as they are recognized outside the situated performances. To explain this kind of configuration the term *cutting connection* drawing on Strathern (1991) is used. The innovative efforts of the team are, in this respect, defined in relation to the team itself, rather than to something outside of the team. The team is configured as a closed circle without references or alliances outside the study group.

In the example is shown that the way the staff settles into the new type of meetings performs a certain temporality without reference to past and future. They perform a *present temporality*. This temporality creates a type of knowledge that seems mutable in the space in which it is created, because it is collectively created anew at every session. However, present temporality has difficulties travelling across practices; the knowledge that is created is created in the room and remains in the room as a shared experience. What becomes transportable is the form of the sessions (spatial setup, the way of settling in, rounds of conversations etc.), but not the knowledge that is performed in the sessions. Also, the spatial setup of the meeting room and the conversational form that is conducted in these types of settings adds to the immutable mobility of knowledge. The paper will explore how.

The situated performances of the team are contrasting the ways of performances which produce knowledge that can move across time and space, so-called *immutable mobiles* (Latour, 1987). Knowledge that can move across time and space in a psychiatric setting is a type of knowledge that is configured around, for example, diagnostics and clinical questionnaires or decisions of how to distribute professional responsibilities and working tasks. These immutable mobiles are made to travel without changing their shape. Contrary, in the empirical example of the paper, another type of knowledge is configured.

Immutable immobility is connected to the establishment of a new working practice that is not only emptied of the *transferability* of the content of knowledge, but also emptied of the *types* of knowledge that connects to the broader psychiatric networks.

What becomes of important relevance is how this type of knowledge needs to create different trajectories of travelling beyond the situations where it is created in order for it to be acknowledged and contribute to innovative creativity in an organisational setting.

## **Ambers, Electrons, and Heroes**

*Götschel Helene (Centre for Gender Research, Uppsala University, Finland)*

Young Greek Phaeton, if we follow the description of this ancient myth in Ovid's *Metamorphoses*, failed to replace his father Helios in piloting the chariot of the sun through the sky. When he lost control over the team of horses his overestimation of his own capabilities did not only bring disastrous destruction to earth, such as flood and fire, but his death also rushed his lover Cynos and his sisters, the Heliades, in desperation, the later transmuting into poplar trees and their tears turning into amber.

William Gilbert (1544-1603), a medical doctor trained at Cambridge University, worked for the British marine and was, in the last years of his life, even appointed as personal physician for Queen Elizabeth I of England and King James I of England. Gilbert studied magnetism for probably more than 20 years of his life and published his findings in London in 1600 under the title 'De Magnete'. By distinguishing magnetic and electrical phenomena, he was the first natural philosopher to undertake an elaborated series of scientific experiments.

Gilbert's knowledge in antique mythology, his professional training in Galen's humoral theory, his interests in improving the art of navigation as well as his engagement with gems and minerals creatively entangled in his theory on watery humor (body fluid) to describe the 'amber effect' or 'electrical attraction'. The concept of electrical fluid, although challenged in 18<sup>th</sup> century by other theories of electricity such as fire, aether, or currency, remained until today in physics education as the image of watery flow of electrons.

In my paper I discuss from a feminist cultural studies of science and technology perspective (McNeil 2007) how ephemeral human – nonhuman interactions at a specific time can lead to theory loaded materials, durable concepts in physics, and collective memories such as the admirable, daring attempt of an adolescent and the heritage of an unmated and childless physician who became the founding father of electricity. In doing so processes of innovation in the history of physics are taken into account from a gender studies perspective.

## Learning gendered techno fantasies

*Hasse Cathrine (School of Education, Aarhus University, Denmark)*

In the next decade a flood of new technologies like robots and other high tech devices will impact public workplaces. Many of the innovations will be sensible and well designed and the argument for their use well intended. With Japan as a forerunner European old people's homes can look forward to emotional social robots designed to soothe old people with stressful diseases like Alzheimer's and dementia as well as robot baths and feeding mechanisms which will help the nursing staff and care assistants in their daily chores. New mechanical machines are going to interact directly with human beings in the care for other human beings and form in themselves new learning challenges. The staff is sent on in-service training courses to learn how to handle the new technologies, but the real learning take place as practice-learning in cultural workplace contexts. The human-machine interactions become what Karin Knorr-Cetina and Lucy Suchman has discussed as an 'objectualization' of social relations, "in which objects progressively displace persons as relationship partners and increasingly mediate human relationships" (Suchman 2005, 380). Our research show, that many of these technologies begin as fantasies at physics and engineers institutes, where young men learn to become inspired and learn by science fiction literature to develop new types of technology, which eventually can solve some of the public sector problems. We also have studies of female employees in an old people's home learning to handle materialized science fiction-like objects like 'emotional robots'. As Suchman has underlined, we need to ask how projects to reclaim creativity, invention and the like might themselves be reproductive of a specific culture supporting particular values. In the first case techno fantasies inspired by science fiction become a rich source of creative drives for how primarily males learn to investment in techno science. In the second case the mainly female staff has to learn how to deal with the innovative objectualizations of the social relations at the old people's home. There is no explicit or causal relation between the two learning processes. Male techno fantasies are, however, the creative inspirational source behind many technologies introduced in the public sector, where many mainly female employees have to learn how to deal with these materialized male fantasies. This contribution outlines the gendered aspect of these human-machine interactions.



## **Socio-cognitive modeling of knowing, creating and innovating**

*Honkela Timo (Aalto University School of Science and Technology, Finland)*

*Janasik Nina (Aalto University School of Science and Technology, Finland)*

Experts, especially scientists and engineers, have always played a prominent role in societal decision making (Collins and Evans 2002; Renn et al. 1993). Typically, a distinction has been made between experts in possession of systematic knowledge, and lay persons possessing only contextual knowledge (Renn et al. 1993). Empirical research on human knowing and experience has shown that expertise is based on skills and knowledge that are difficult to represent explicitly and fully in linguistic form. Dijksterhuis et al. have recently shown that unconscious or intuitive decision making gives systematically better results than reliance on explicit or rational thinking in solving complex problems (Dijksterhuis et al. 2006). In general, it seems that an individual's rationality

is an adaptive tool that does not follow (only) the principles of symbolic logic or probability theory as such, but includes various "cognitive survival strategies", such as a collection of heuristics as pointed out by Gigerenzer and his colleagues (Gigerenzer 1999). The difference between explicit and implicit knowledge is usually defined by referring to language. If knowledge is represented as interpretable linguistic expressions, it is considered to be explicit, otherwise implicit. Computational intelligence methods such as neural networks and statistical machine learning have provided models of implicit (unconscious, intuitive) understanding.

Cognition and intelligent activity are not only individual processes but ones which rely on socio-culturally developed cognitive tools. These include physical and conceptual artifacts as well as socially distributed and shared processes of intelligent activity embedded in complex social and cultural environments (Hakkarainen et al. 2004). Expertise and knowing at the social level is constituted in interaction between individuals, communities, and larger networks supported by cognitive artifacts.

In this paper, we consider different approaches for understanding and modeling individual and social level of knowing and knowledge creation. We discuss the processes of internalization and externalization of explicit forms of knowledge as well as the implicit forms of knowledge. We consider the spatial metaphor of knowledge (Gärdenfors 2000), the processes of self-organization (Kohonen 2001), and their implication on the theory building. Furthermore, we categorize creative acts as combinatorial, blending and category-breaking "operations" and how these are characterized at the individual and social level. Based on this distinction into the three categories, we discuss different obstacles for diffusion of innovation, e.g., based on different degrees of communicability. Finally, we study how these aspects relate to the different elements of practice theory (see, e.g., Shove and Pantzar 2007).

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**Innovate!? Materializations, tensions and genderings of innovation & creativity**

*Lorenz-Meyer-Charles Dagmar (University Prague, Czech Republic)*

This paper tracks some materialisations and tensions of innovation and creativity, and their gendered and gendering effects as they are at work and at play in a Czech physical science research institution and juxtaposes them with recent feminist conceptions of creativity. While the intensification and acceleration of 'innovation activities' has become a centrepiece of current Czech (and EU) RD&I policies that aim at the capitalisation of knowledge through cooperation between research and industry and internationalisation of research, there is currently no explicit policy emphasis on furthering or enabling 'creativity'. The development of human resources for innovation, for example, is concerned with promoting entrepreneurial skills and the removal of barriers to international and intersectional mobility, mirroring the neoliberal vision of circulating people, ideas and innovations as a cornerstone of the European Research Area. The paper traces how the call to innovation plays out at a prominent basic research institution in the Czech Republic in response to but also beyond and despite these innovation policies. Here I focus on the transition to a flat management structure, and the materialisations of the enterprising laboratory and the risk-taking laboratory leader and the ways in which they can align with and promote a remasculinisation of research organisation. I will also examine moments of creative assemblages of humans, materials and machines, and the enabling conditions they point towards, particularly the importance of epistemic time, affective engagements, and sociality, often perceived at odds with permanent researcher mobility. I will then play this analysis against recent feminist ('post-gender') conceptions of creativity as 'a nomadic process that entails the active displacement of dominant formations of identity, memory and identification' (Braidotti 2008) as well as analyses that point to a link between innovation communities and a retraditionalisation of gender (e.g. Adkins 1999). A tentative argument is that the imperative to innovate can curtail conditions under which creativity can emerge; and that conversely attempts to engineer creativity (e.g. through 'serendipity management' of multi-disciplinary experts that advocates periods of organised slack and the integration of work and personal life) run counter mainstream innovation policies.

## **Creativity, imagination and innovation in primary school classrooms**

*Macknight Vicky Sandra*

The vision that guides the work of primary school teachers in Melbourne, Victoria is a future of innovation, sustainability and strong communities. According to curriculum, to be innovative means to 'solve new problems using a range of different approaches to create unique solutions.' This ability is considered the basis of future success in an increasingly challenging world. But how can creative and innovative thinking be taught? My answer here will be that teachers help children perform themselves as creative individuals. Children learn to transform themselves and the material around them in innovative ways. To this end teachers arrange time and space to enable creative performances from their students. These material and temporal arrangements will be the topic of this talk. I will argue in particular that teachers use discipline to make creative performances possible.

## **Distributed innovation in the music software industry**

*Monsalvez Ledesma Cristian (Institute of Sociology, Technical University of Berlin, Germany)*

New technologies have become increasingly important in the field of music creation, music studio production and live performance. Companies in the music software industry are permanently searching and following new approaches to improve their products and to create innovations. Thus, new approaches as participatory design, user lead, user-centred design, co-design, contextual design, empathic design and so on, have become widely spread in software development. Additionally, in the last twenty years, empirical research has shown the creative potential of users and communities participation in the innovation process, moreover, when users get involved in a cooperative, democratic and distributed way (Oudshoorn and Pinch, 2003; Rohrer, 2005; von Hippel, 2005).

However, STS scholars have illustrated that in the user-technology-developer relationship users can be domesticated, configured, reconfigured, scripted, performed and enacted (Akrich, 1994; Mackay et al., 2000; Stewart and Williams, 2005), therefore the above-mentioned creative and innovative user potential is entirely uncertain. Furthermore, those practices of hybrid cooperation and distributed innovation -among human and technical agencies- are highly reflexive, contingent, interactive and heterogeneous (Callon, 2004: The role of hybrid communities and socio-technical arrangements in the participatory design, *Journal of the Center for Information Studies*. Rammert, 2008: Where the action is: Distributed agency between humans, machines, and programs, *Technical University Technology Studies Working Papers* titles, TUTS-WP-4-2008 In: Technische Universität Berlin, *Techniksoziologie* (Hg.): *Technical University Technology Studies Working Papers*. (Berlin: Technische Universität Berlin, *Techniksoziologie*.) <http://www2.tu-berlin.de/~soziologie/Tuts/index>. (Callon, 2004; Rammert, 2008). In other words, that “boundary territory” of experimental interactivity, design and learning where heterogeneous users (from different social worlds), developers/designers and technologies converge is more complex than seems to be at first glance and remains unanswered.

Hence, this “boundary territory” of distributed innovation is the focus of the paper, exploring two main questions: How do heterogeneous users, technologies and developers cooperate to innovate? How do participatory design projects deal with the diversity of visions, meanings, identities and rationalities to create a novelty?

Following STS approach and using a qualitative approach, this paper explores these questions through two case studies of companies in the field of music software development located in Berlin.

**Socio-material assemblages in music performance: the musical work as infrastructure and site for creative enactment**

*Nerland Monika (University of Oslo, Institute for Educational Research, Norway)*

*Fenwick Tara (University of Stirling, Institute of Education, UK)*

This paper examines how creative possibilities are embedded in and enacted through professional musicians' ways of approaching musical works. Innovation studies tend to focus on the production and circulation of 'new' objects – e.g. related to products of scientific activities or work practices. In this paper however we argue that practices with long traditions in the performing arts can be a productive site for revealing dynamics of creative enactment and their material configurations. By understanding creativity as unfolding processes of material performance which oscillate between the open-ended and the temporarily fixed, and which through this dynamic generate new questions, sites for exploration and further inventions, the paper explores two interrelated questions:

How do musical works and their incorporated socio-material assemblages configure creative possibilities in music performance?

And next, how do the material enactments of these possibilities configure new interpretations, inventions and expressions of the objects which again constitute a basis for further creative engagement?

To explore these questions we present and employ two orientations within the socio-material strand of theory. First, Karin Knorr Cetina's perspective on the sociality of objects is utilized to describe and discuss the relational dynamics between the musician and the musical work. From this perspective, musical works are conceptualized as knowledge objects marked by their unfolding character and opportunities for refinement. They are always in the process of being materially defined, and when individuals attempt to reveal them they typically increase rather than reduce their complexity. In this way knowledge objects are relational. Their capacity to display opportunities for further investigation at the same time as they enmesh the practitioners' attention and engagement, make them potential objects of attachment for individuals.

Second, ANT is employed to explore how the musical works as a field of interpretative possibilities are rooted in socio-material ecologies and enacted within circulations of multiple objects and actor-networks. Special attention is given to circulating networks of musical production, which serve to stabilize the musical work as an object to be 'performed' and which at the same time generate ambivalences where new interpretations become possible.

By employing these orientations to examine socio-material dynamics of creativity in different examples of musical performance, we show how the musical work serves as an infrastructure of multiple historical discourses and possibilities for interpretation which are explored by musicians and enacted in variegated ways. We identify different forms of creative enactment in music performance, and point to how the affiliation between subject and object, and the oscillation between openness and stabilization characteristic for objectual practice, forms a core mechanism in creative engagement. The paper concludes by considering the implications of our findings for how creativity may be conceptualized and enhanced within organizations more broadly.

## **The diffuse innovation and creativity**

*Parolin Laura Lucia (Milano Bicocca University, Italy)*

Inside the furniture industry there are firms that offer high quality and luxury products. In this kind of firms there are characteristics of mass industry organization of work mixed with handcraft ones. The new object project, coming from famous architects have to be translated in industrial process and material serial products. In high quality furniture industry the semi-handcraft character of work imply a complex relation between these two activities and many others.

Architect, or designer, has an important role in the process of creation of new product but its materialization is a choice and rich activity of elaboration of final product that have important influence on output. In this process a network of actors are involved. Designers, architect, technicians, handcrafts, sales man, marketing are and clients. These actors have different kinds of expertise that allow to translate the project in a concrete solution that can be translated in a (semi)standard process of production. This knowledge is to a large extent practical being a characteristic of handcraft expertise. In the case of soft furniture, for instant, it means to study practical solution for mechanical structure (with its movement, materials, plasticity and performance), padding (with different degree of softness and performance). The material product emerges from a process of collective negotiation based on a practical handle of some object like pencil draws, 3D figures, scale models, prototypes, etc. It is a process of progressive closure implied in the industrialization procedure which leads to a stable productive procedure. Some of these closures are made by actors through practical and material adjustments inside an aesthetic evaluation that is characteristic of the handcraft work. Who are the creative actor in this system? Where does creativity reside?

Showing how handcraft-supplier and firm technicians cooperate to materialize new object, I'm going to illustrate how heterogeneous material like pictures, design object, descriptions, emotional feeling and aesthetical consideration participate at the new object definition practices.

## **Two Levels of Tools for Creativity: Humans, artifacts and the making of the creative researcher**

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Since the early 1990s, there has been an ongoing debate about the importance and impact of mixed research communities working and cooperating over disciplinary borders, while at the same time also morphing into an amalgamation of the academy, industry and government. The necessity and awaited results of this tripartite constellation have not only addressed financial and material effects. One reason for the interest in and claimed necessity of this kind of collaboration is a desire to develop advanced devices based on what is defined as the technology of the future and furthermore, contribute to economic growth, based on prototypes that can be transformed into innovations. The aim of this paper is twofold: In a first section, I will discuss how ICT technology and devices are defined as tools to augment humans creativity. Here, we learn the informants' definition of technology and become acquainted with their values and visions vis-à-vis technology production, and the informants' definition of technology in relation ICT and the technological prototypes produced is discussed. The concepts "enlightenment optimism" and "romantic uneasiness" are theoretical entrances to the analysis. This is the background for an discussion of the future- and speed-oriented discourse that characterizes the informants' perception of technology. The endeavor of using technology to support human creativity, challenge presence and facilitate multi-cultural communication is then developed. The second aim is to discuss how research and the researcher is defined in attempts to establish a creative and innovative research environment. "Research", deals with interpretations and negotiations of the concept of research and the researcher conducted by the informants at Tools for Creativity. An important part of the making of the researcher is the trading of skills in the attempt of legitimizing the individuals' efforts at conducting research. Here, focus is the negotiation of research as an activity between individuals representing the sciences and the arts, as well as those with formal education and autodidacts. Attempts to manage a broader research concept are placed in relation to academic quality demands. The data is collected through ethnographic field work with participant observations and deep interviews at the so called "research studio" Tools for Creativity. The unique feature of my ethnographic field site is that the entire staff is defined as "researchers", despite the fact that only a handful of the employees are academically-trained. A sign for the environment was high-tech equipment, a staff equipped with diverse skills, and a flexible approach with the ambition of developing innovative tools based on ICT to strengthen human creativity.



## **Solar Energy – Up-scaling Gender Impacts**

*Scheich Elvira (TU-Berlin, Germany)*

Concepts for renewable energy production and sustainable forms of energy consumption began to take shape within the anti-nuclear protest movement. They formed an integral part of a deliberate political opposition to a technology that was seen as a threat to the well-being of the natural environment and human society. Women participated actively in the quest for alternative energies with a creative influence spawning new advances in science and technology.

Meanwhile solar technologies have grown into large-scale undertakings and the latest plans span entire continents, e.g., project Desertec supplying Europe with electric power from vast fields of solar cells in the Sahara desert. However, the financial and scientific boards of these projects as well as the political councils which define their institutional framework and public objectives continue to be as male dominated as the existing energy and corporate sectors.

In my contribution I employ gender as an analytical category for studying the transformation towards organized innovation in the energy sector. This entails linking the following questions and topics:

How is the escalating growth of solar technology projects for energy production entrenched in the gendered division of labour? Does this testify to structural patterns of gender inequalities in energy and power consumption? Why the sustained neglect of knowledge and incompetence in the matters of everyday life?

In the industrialized North the use of energy is closely related to decisions about how to maintain high standards of affluence. In contrast, the situation of in the South including that of women is characterized by a bitter fight against poverty and deprivation. Analyzing these stark differences is facilitated by a nuanced understanding of gender, allowing for the combination of a multiplicity of power relations which surround large energy projects. How do they materialize around questions of energy supply? Are these projects inevitably characterized by path dependency? Can they be harnessed for multiple ends?

The concept of gender has the cross-cutting power for comprehending situations of this kind and suggesting avenues for liberating changes.

**Adapting a revolution. Creativity and the deployment of information and communication technologies (ICTs) for health care in Rwanda**

*Schräpel Norman (Seminar for Social Anthropology, University of Halle, Germany)*

The spread of information and communication technologies (ICTs) in the last two decades produced a huge number of possible applications and devices. Some of them are considered as *the* innovations of the last century. After the invention of analogue technologies of notation (e.g. writing and the printing press), digital ICTs are thought to lead the way into a new network society. In Africa, moreover, these processes are subject to specific adaptations. In the last decades ICTs were rapidly integrated into the development aid paradigm as well as the good state narrative. A rhetoric of 'revolution' frequently accompanies talk about ICTs for the use in development. The late 1990s coined the term ICT4D (information and communication technologies for development), and within this discourse it was generally accepted that ICTs potentially support the poor and marginalised in their access to information and knowledge. It is often argued that by bridging the information gap through spreading ICTs, economic growth will be accelerated, agriculture, industrial productivity and the efficiency of public administration will be increased, and the competitiveness of developing countries strengthened. Such imaginaries of so-called 'technical fixes' can easily be refuted. The complex technological and institutional presuppositions that these technologies require to function are often missing in African contexts. Neglecting this aspect has far-reaching implications yet thus far only few recent works on Africa address this issue directly. The paper therefore will look on how in the context of global entanglements and flows of ideas and artefacts, actors in post-colonial Africa deal with multiple challenges by mobilising and transforming their institutional capacities of adaptation and creativity. By providing some preliminary empirical examples in the attempts to deploy ICTs for health care in Rwanda the paper will concentrate on the shaping and development of new devices. The rather questionable success of implementing standardised ICT-solutions for health care in Africa in the last decade leads to the assumption that the majority of these devices could not be translated adequately when they were transferred. However, recently there are cases, where existing ICT infrastructures (such as cell phone networks) are adapted and merged to create new fields of applications or to include additional devices (e.g. using a cell phone as a medical device to produce adherence for antiretroviral treatments or workstations connected to the Internet as a replacement for specialised medical services). In concentrating on these processes various ways of creativity can be identified and will be the purpose of this paper.

## Opening up cultural diversity policy and practices: assembling an art exhibition

*Shaw Isabel (Imperial College London, UK)*

The concepts of 'creativity' and 'innovation' are closely associated with the work of art galleries and museums. Be it in government and policy discourses that position their socio-economic value in terms of a contribution to the 'culture industries' in the UK, or in the commonly held notion of the individual artist (or curator) that produces 'new' ideas and meanings in and through the assemblage of art forms. Barry (2001) suggests a different view of innovation where inventiveness does not necessarily equate with technical novelty or individual genius. For Barry, "What is inventive is not the novelty of artefacts and devices in themselves, but the novelty of the arrangements with other objects and activities within which artefacts are situated" (Barry, 2001: 212). Inventiveness is therefore understood as the degree to which possibilities are made available for different socio-material configurations (ibid: 211). With this in mind, I consider the everyday work entailed in exhibition development in a national art museum in the UK. In particular, I look at how employees attempt to 'operationalize' a government policy of cultural diversity as an audience development initiative. Within the art museum in question, diversity policy is discursively positioned as central to creativity and innovation; 'difference' is viewed as a creative resource from which to inform 'innovative' work and products. Rather than viewing 'difference' as an organizational resource to be unproblematically tapped, I approach diversity policy as a contested object; performed and shaped by actors involved in practices of exhibition development.

In the art museum there exists heterogeneous professional know-how, socio-material practices, and relationships. Various professionals inform the process of exhibition development, and with them bring competing approaches to cultural diversity policy initiatives. Indeed, diversity policy is a controversial topic; tensions exist over audience development practices that configure both audiences and exhibition development in terms of ethnicity and race specifically. Given such differences, I discuss how competing approaches to diversity policy were aligned to certain professional identities, practices, and relationships; differences that brought to the fore an unevenness between departments over the extent to which certain art museum professionals possessed greater agency to shape the exhibition process. This paper therefore addresses how cultural diversity policy is negotiated as a collective, although not consensual, practice of exhibition development, and asks with what effect? Attention is paid to how multiple actors perform cultural policy in and through the assemblage of an art exhibition (e.g. competing definitions of the 'art object', the selection of paintings, the organization of gallery space, and the development of interpretation materials) and show how these socio-material arrangements were assembled and shaped to provide the possible means to engender, and resist, organizational change. The discussion is informed by observational notes of internal meetings and in-depth interviews with actors involved in the development of the exhibition, carried out as part of a nine-month ethnographic study at a national gallery in the UK.

## **Creativity in everyday use of a risky technology: the case of violent computer games**

*Sørensen Estrid (School of Education, Aarhus University, Denmark)*

The paper is founded on a view on creativity as a hybrid phenomenon distributed across socio-material relations. This post-humanist approach allows us to inquire empirically how, where and when creativity comes into being as related to an individual human, as embedded in a cultural practice, as instantiated by materials, or other. Such an empirical investigation is presented in the paper.

Focus is on creativity involved in the implementation and use of violent computer games in children's everyday practices. Such use is considered to entail a certain risk to the individual child. In most of the world computer games are equipped with a label indicating the age a child should (or must) have in order to purchase the game. This assessment is based on expertise of which age groups may be harmed by playing the game in question.

The labels on violent computer games provide on the one hand unambiguous clarity: if a person is younger than the age printed on the label then the game is not suitable for that person. However, in terms of practice, the label is far from unambiguous. 'Age group' is an extremely rough category ranging from on the one hand very mature children with much game experience and competence in understanding games to on the other hand children who have never been in contact with violent computer games and who are thus more likely be overwhelmed and harmed by them. For this reason the number on the label is usually read not as a simple reference to the number of years a person has lived since birth, but as a matter of maturity in the specific area of computer game use. Furthermore, younger children play with older ones and the former thereby often come in contact with games not intended for them. Children are generally aware that they are defined as being at risk when playing violent computer games. Parents also have this awareness and being responsible for the child most parents relate to this risk in one way or the other. Even though the label is only intended to refer to the individual child player and her psyche, the risk comes to concern a complexity of cultural practices.

For these and other reasons violent computer games require of the practices in which they are used that they ways to deal with the risk that accompany the games. Since the label does not provide any standard way to deal with risk, a certain amount of creativity is needed of these practices in order for the technology to be implemented. More than being a set of complicated relations between children, parents and violent computer games the implementation of this technology involves the young users' (sometimes older) peers just as they involve cultures and habits for how to deal with the kind of media in question and the routines and rituals of the everyday practices become part of.

Based on interviews with five German families the paper presents the ways in which the risk to children of violent computer games is dealt with and translated when implementing violent computer games in everyday practices. Particularly, the paper asks where, when and how creativity is involved in this process, and to whom this creativity is granted.

## Truth-spots and time-out for innovative lighting design

*Schulte-Roemer Nona (Social Science Research Centre Berlin, Cultural Sources of Newness, Germany)*

Lighting design for night-time urban spaces involves a wide range of innovations and requires creative site-specific solutions. This proposal aims to explore creativity and innovation through the lens of singular lighting design events. First insights from my ethnographic research during the festival “Luminale” and the trade fair “Light&Building” in Frankfurt/Main suggest that these temporal configurations constitute specific ‘truth-spots’ for the encounter of accomplished innovations and ephemeral creativity. They also seem to offer a time-out for experimenting and for experiencing the new.

The research is led by the question of how festivals of light and trade fairs affect innovative permanent urban lighting design. Since the 1980s, new institutions for the training of lighting designers and for the representation of their interests have been established. A growing number of professionals and projects lead to new standards and planning practices arranging the professional field. However, individual “creatives” alone cannot be credited for new concepts in lighting design, as their ideas occur entangled in actor-networks and are based on different, distributed forms of knowledge and know-how.

Neither can new technologies account for nocturnal urban renewal. Currently, innovations such as Light Emitting Diodes (LED) revolutionise the use of luminaires, offering new energy saving opportunities and challenging lighting designers, engineers and architects to think of novel applications for atmospheric lighting, for marketing or medial purposes. Technologies provide the resources to meet new demands and to put schemes into practice. But under what circumstances do they act as a creative source for innovative designs?

In design processes, technical requirements are played against economic constraints and scientific evidence, against aesthetic experience and cultural dispositions. They assemble experts and clients, technologies, master-plans, standards and artistic claims. In this, creativity seems to offer solutions to problems of disintegration, allocating projected as well as perfected innovation.

This project focuses on festivals and trade fairs assuming that such temporal configurations not only set off or break-up everyday routines, messy design practices, time pressured business and confined spaces, but also perform and produce, transfer and transform know-how and knowledge of light and lighting.

Both, festivals and trade fairs, organise in their specific ways the interaction and intersection of experts or users, of technology or standards and the performances of knowledge. During those events, the actor-network of lighting design practices is temporarily disassembled to be tested and for trying out new ties without the danger of commitment. The exceptional circumstances allow experts to experiment, to build and modify their networks, and to exchange their latest news. They also invite potential clients to experience and to form an opinion without risk. And they invite the general public to playfully engage in light-related practices – all this with serious consequences for creativity and innovation processes.

My aim is to understand how festivals and trade fairs *produce* and *constitute* those truth-spots and time-outs – each according to their own logics – as specific places for the display of creativity and the reflection of innovation.

## **Open is the New Secret: Managing Intellectual Content and Competitive Advantage in Open Collaboration**

*Tatum Clifford (Virtual Knowledge Studio for the Humanities & Social Sciences, Royal Netherlands Academy of Arts & Sciences)*

The emergence of openness as a collaborative practice is often at odds with entrenched modes of secrecy as a means to protect intellectual resources. To complicate matters, popular conceptions of openness, from projects like open source and open access, have come to represent an exaggerated ideal of the Internet as an egalitarian medium. Nevertheless, openness appears increasingly as an alternative to closed modes of collaboration, which historically were oriented towards a 'skunk works' conception, one that held secrecy as a quintessential dimension of successful research and innovation. In today's ICT-mediated world, open is the new secret—it is rapidly displacing secrecy as the popular mode of collaboration. While there has been much attention paid to the few high profile successes, such as Linux, Wikipedia, and the Open Knowledge Project, there is little known about openness as a dimension across collaborative contexts. Openness is therefore itself still a secret. The aim of this study is to examine openness across different knowledge production domains, to both locate it as a move away from closed collaboration and to develop a better understanding of its affordances and limitations in contemporary practice.

Innovative new practices are emerging in informal ICT-mediated collaborative spaces, outpacing development of new practices within the disciplinary boundaries of, in particular, the Humanities and Social Sciences. These informal academic practices are valuable sites for understanding current use and future potential of ICTs. While informality breeds opportunities for open exchange, presenting new ideas, and testing new claims, the lack of boundaries expands what counts as scholarly discourse, both in terms of content and contributors. Common among these informal nodes of collaboration is the ethic and practice of openness. While principles of open science has been a core value in scholarship for centuries the use of ICTs in scholarship increases openness in such a way to challenge these long-held principles. For example, the notion of 'radical transparency' is the practice of providing access to the inter-workings of collaboration to contributors and stakeholders alike—as well as to competitors and often the public at large—instead of the traditional practice of only providing open access to the final results.

The apparent contradictions in the value of openness with respect to collaboration points to a problem area in realizing the benefits of actively sought after e-Research infrastructures. In this study, I examine sites of mediated collaboration through the lens of openness. I operationalize openness in terms of access of tools and resources, the level of inclusivity that allows contribution to the collaborative product, and the transparency of organization and process, which together provide an empirical framework for the practice of openness. Additionally, I consider three potential sociological roles of the open movement as an analytical frame; its role in the mobilization of cultural capital, in emerging forms of social relationships, and in disrupting existing power structures.

## Engaging Creatively through the Multi Material

*Wallace Jamie (Department for Learning, School of Education, University of Aarhus, Denmark)*

Design practices are largely centred on creative and organisational processes involving different types of representations and objects. Design artefacts support processes of innovation by providing workers with mediums for learning, experimentation and creative change through the reflexive and collaborative interchange with techniques, procedures, materialities and embodied meaning. Within multidisciplined settings multiple skills, knowledge and methods are not imposed through particular artefact materialities but are inseparable from them through tacit, haptic and sense bound forms of knowing entwined with forms of creative interaction. The creative opportunities provided by artefacts are related to their associated ways of knowing involving a mutual combination of their material and semiotic makeup. Consequently both reasoning and creative activities relate to the opportunities available through the particular range of artefact materialities and associated practices.

This paper considers how creative design work within industrial design is related to the changing material opportunities that multiple practices, spaces and artefacts provide. Given the richness and diversity of objects employed within collaborative design activity do multiple material practices play a part in enabling designers to develop new creative approaches to their means of enquiry? Taking a multi material view sheds light upon ways in which movements between the simultaneous generation and creative use of different artefact types provides a shifting between accompanying ways of perceiving, engaging and knowing. Concurrent artefacts seen to provide a flux of embodied meanings between related issues through which design workers can apply creative forms of engagement.

This paper builds upon empirical findings within a Danish industrial design firm considering how creative design work can be seen in terms of shifting engagements as interrelated artefacts are created and transformed during the unfolding activity. It draws attention to the way in which material diversity becomes a resource for creative enquiry and provides opportunities for the improvisation and hybridisation of practices. In other words how creative design and innovation work is dependant upon the multi materialities of different artefacts.

## Technological Tendency, Innovation and the Remote Control

*Wellner Galit (Bar Ilan University, Israel)*

In an effort to understand how innovation operates, Bernard Stiegler triangulates Bertrand Gilles' technical system, Andre Leroi-Gourhan's technical tendency and Gilbert Simondon's mechanology. Stiegler places the innovation question in a wider context aiming at the comprehension of our relations with technology. His fundamental question is "who invents what". I will explore into this question with the evolution of the remote control as a case study.

The single best known inventor of a remote control is Dr. Robert Adler, who invented Zenith's first wireless remote control. However, most of the inventors of the variations and mutations of the remote control remain anonymous to the general public. Stiegler's notions may provide an explanation to this phenomenon.

Neither invention nor innovation happens in vacuum. They are part of larger technical systems, in the Gilles-ian sense. Moreover, the choices for future development are limited and hence the technological artifact evolves within a technical tendency. "Individual genius explains nothing about invention." (Stiegler 1998, 57) The inventor is no more than a member of an ethnic group, operating in a certain "milieu".

Simondon assigns an even more active role to technology. His mechanology is to technology like psychology or sociology to the human. "There is in technical objects a dynamic that stems neither from the soul nor from human societies, but that ... must be studied for its own sake." (ibid, 67) It means that technological evolution is not fully determined by human beings but has its own dynamics. However, mechanology cannot be fully paralleled to psychology, for technological artifacts don't show Husserlian intentionality, Heideggerian care, or other human references to the world. Mechanology has different mechanisms, such as "concretization by functional overdetermination" (ibid, 68).

The proposed paper will elaborate on technical tendency and mechanology. It will question the inclination to technological determinism which may be imputed to such explanations.

The triangulation serves for Stiegler as a spring board to develop a theory of technological evolution. The evolution of technology is not by innovation and invention but rather through epiphylogenesis. Epiphylogenesis co-develops with human genetics, and serves as an externalization of human memory. Under this construct technology is viewed as organized inorganic matter.

The paper will further attempt at identifying the key principles for epiphylogenesis of technical artifacts like the remote control. One of them is the rhizomatic structure of these evolutions, a structure that has no single origin but multiplicity of sources. This characteristic may explain the emergence of remote control in other domains out of the realm of mass media, like air-conditioning control unit or garage opener. It will also explain the inability to point at a single starting point.



## **Pressing the point of symmetry: The creativity of technologies**

*Willems Dick (AMC/ University of Amsterdam, The Netherlands)*

*Pols Jeannette (AMC/ University of Amsterdam, The Netherlands)*

The call for the track 'creativity and innovation' assumes that human users make creative and innovative uses of their mechanical friends. However, having read all the obligatory literature on STS, the point of symmetry has been hammered home so effectively, that the call could only provoke us into looking for the creativity of machines rather than humans.

Our material comes from care practices where new technologies are being implemented. How could we study and understand these innovations? We adapted the terminology of 'domesticating' a technology, as it is used in STS theory. Domestication here came to mean the mutual activity of humans and technologies adapting to one another. It formed a counter story to deterministic understandings of technologies, where the fate of a certain practice is completely at the mercy of the workings of a technology. Domestication theory grants humans more agency: animals, plants and technologies come to live with us, in our homes, and on our terms. What we lack is term to stress the mutuality of adaptations, where animals, plants and technologies would also allow humans in their environment (e.g. nomadic people following the reindeer, or animals becoming extinct because of humans exploitation), and having them influence the way of living together.

Telecare technologies are far from being domesticated yet, which would be signified to a more or less common (set of) culture bound use practice(s). The study of pre-domestication processes might grant the space to look for this mutuality. Our suggestion is that, preceding domestication, there are four, sometimes overlapping activities. First, there are taming processes, in which technologies are tamed by humans, but humans are also tamed by machines. Second, there are processes of unleashing, in which humans as well as technologies are set free/ let out of their boxes and run away with a particular practice. Our suggestion is that in this unleashed technology lies its creativity. Exactly what their effects and workings will be, is unpredictable. By working through some examples from our studies in telecare, we hope to be able to argue for more symmetry in thinking about creativity. Stories will be told about a technology's multiple practices, and about the way technologies can make themselves be loved.



## **TRACK 24**

# **Innovation Networks and Real-World Experimentation**

### **Convenors:**

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**Future restricted by first modernity blinders? How users iThe transition of electronic identity management: from planned system innovation to real- world experimentation?**

*Aichholzer Georg (Institute of Technology Assessment, Germany)*

*Strauß Stefan (Institute of Technology Assessment, Germany)*

The transition of electronic identity management: from planned system innovation to real-world experimentation?

Our contribution aims at a better understanding of the innovation process involved in the introduction of national systems for electronic identity management (e-IDMS). We use the integrative framework developed by Geels et al. (2004) as a theoretical approach for exploring the potential of the “system innovation” perspective and analyze the e-IDMS implementation in Austria as an empirical example. Governments across Europe are introducing e-IDMS at national level which represents a complex innovation process in the public sector. The system-level transformation implied, the variety of requirements and components affected, the controversial nature of objectives and the multitude of actors involved create an enormous challenge. It is driven by the need to adapt existing institutions of identification and authentication of citizens to the requirements of the new era of electronic interaction with government. Key actors are stakeholders from public administration and the field of e-government, expecting higher levels of security and efficiency of electronic interaction with and increased online service usage by citizens. The transition from a traditional (paper-based) form of identification to an electronic system for use across all levels of government involves a change from one socio-technical system to another; with a broad scope of changes, encompassing social, organizational and technical dimensions and many other components (artifacts, knowledge, regulations, infrastructure, cultural meaning, markets). These characteristics clearly reflect a “system innovation”.

System innovations are conceived as co-evolutionary, architectural innovations “writ large”, involving a change in the fulfillment of major societal functions (in the e-IDMS case the important function of identification in the context of relations between citizen and government, represented in specific institutions, technical means and social practices). Integral assumptions of the approach include disrupting existing technology and user linkages, unfolding within long timescales and multi-actor processes, involving different societal groups, technological substitution and emergence of new functionalities. Different levels and phases of transition are distinguished: from a start in technological niches, to technical specialization in niches and exploration of new functionalities, to wider diffusion and competition with an established “regime”, up to its gradual replacement and wider transformation.

Based on a combination of methods, the main source being interviews with major stakeholders carried out in 2008, the system innovation framework proved to be a fruitful perspective in the eIDMS-context. In Austria, the transition has reached a stage characterized by implementation of core components, application in niches, exploration of new functionalities, gradual diffusion and competition with the existing IDM regime. Improving privacy and security of e-transactions was an important objective of the innovation process. However, low usage and unresolved concerns about potential privacy threats indicate an imbalanced realization of innovation goals regarding secure authentication, respect for privacy requirements, and the accordance with administrative practice. The situation reflects the suspense which an integral change of a societal function – citizen identification – entails and the unintended quasi-experimental character it may assume. The e-IDMS example also points to the demand for specific adjustments at a certain development stage of a system innovation itself induced by its socio-technical landscape.

## Learning work organisations as micro foundation of innovation networks

*Asheim Björn (Lund University, Sweden)*

Regional innovation systems (RIS) can be conceptualised as 'Creative Knowledge Environments' (CKEs). Characteristic of a systems approach to innovation is the acknowledgement that innovations are carried out through a network of various actors underpinned by an institutional framework. This dynamic and complex interaction constitutes what is commonly labeled systems of innovation, i.e. systems understood as interactive learning networks. CKE are environments where new knowledge is generated and used by people, especially in their work environments. CKEs can be found on *macro*- (systems), *meso*- (universities/firms) and *micro*- (research groups/work organisations) levels. Key aspects of this perspective are that it emphasises the importance of partly embedding the innovation process at the micro and meso levels, and partly the dynamic interplay between the micro, meso and macro levels.

New research on work organisations shows that learning can be *developmental* and *creative* and not only *reproductive* and *adaptive* as is the traditional view. Such developmental and creative learning are found in *learning* work organisations providing superior conditions for learning and innovation and even a larger propensity for patenting due to a high degree of work autonomy and learning dynamics found in this form of work organisation. As such it can be viewed as a genuine renewal project characterised by a *high* degree of *action* renewal ('to change') as well as a *high* degree of *knowledge* renewal ('to learn and to innovate') in contrast to a traditional understanding of learning organisations as learning projects of a recurrent nature (i.e. 'more of the same' but over time more effectively) characterised by a *low* degree of *action* renewal and a *high* degree of *knowledge* renewal.

The paper will discuss the further theoretical and practical implications of this new perspective on learning work organisations as the micro foundation of innovation networks with respect to the dynamics of RIS perceived as CKEs. Special attention will be paid to how this partly can improve the operation of the *DUI* (*Doing, Using, Interacting*) mode of innovation of firms in the context of RIS broadly defined, and partly can support *DUI*-based firms' linking up with the *STI* (*Science, Technology, Innovation*) mode of innovation of RIS narrowly defined by increasing the firms' *absorptive capacity* and reducing the *cognitive distance* between actors in *DUI* and *STI* based innovation networks.

## **Innovate mobility concepts**

*Beck Gerald (Münchner Projektgruppe für Sozialforschung, Germany)*

*Kropp Cordula (Münchner Projektgruppe für Sozialforschung, Germany)*

Innovative products and services to enhance sustainability – as there are low/zero-energy buildings, zero-emission vehicles or intelligent mobility concepts for the future – often stay in the corner of the market or lack, in spite of their technical potential, customer's acceptance at all. But positive effects for the environment can only be achieved if ecological products are successful on the market and if they are widely used. Processes of open innovation promise to improve the market introduction and the distribution of products by directly involving later users and their ideas in the design process (von Hippel 1998, Reinicke 2004, Piller & Walcher 2006). The integration of (especially "lead") users in innovation processes is expected to incorporate customers' ideas into new product development, to improve customers satisfaction, to early detect unintended side-effects in later contexts, to foster public awareness and thus to accelerate the distribution of innovative products and services. This is why open innovation collaboration and user integration is assumed to produce products that are better adapted to the needs and expectations of users' everyday life and to better capture markets. Following these promises our research analyses results of several scenario based innovation workshops with users. The aim of the workshops was to create scenarios and future concepts of mobility. The results show, that users have a rather linear (first modernity) understanding of progress and blind out possible social transformations. We will contrast these workshops with expert scenarios of future ideas about mobility (e.g. Dennis/Urry 2009) and discuss the question what the linear approach of users means for transformations towards sustainability. Our paper will argue, that we need new imaginations and visualizations of the present and the future to better integrate users in innovation networks and processes

## Hybrid regimes of knowledge: challenges for specifying non-knowledge in the context of the regulation of chemicals

*Böschen Stefan (University of Augsburg, Germany)*

Over the last two decades there has been a remarkable shift of attention to scientific ignorance or non-knowledge, particularly to what J. Ravetz (1990: 26) has termed „science-based ignorance“, i.e. an absence of relevant knowledge generated by science itself. The concept of non-knowledge criticizes the inherent limitations of the dominant framings of „risk“ issues and focuses on the possibility of “unknown unknowns”. Why was this debate evolving? There are many cases of historical evidence about the power of non-knowledge (cp. EEA 2001). In the meantime the topos of non-knowledge conducted many regulatory processes under the label of the precautionary principle. But the general question remains: How to decide under conditions of diverging practical, cognitive and social framings of non-knowledge? Against this background, this paper focuses on the history of chemicals regulation as a real-world experimentation (Groß et al. 2005) and put the thesis forward that the new EU legislation on chemicals (REACH = Registration, Evaluation, Authorisation and Restriction of Chemicals) is affected by an inherent tension between an ambitious institutional framework and the missing of an appropriate structure of knowledge practices to support this framework. Against this background, the argumentation is based on four lines. In the *first* step I will underline that the mentioned conflicts of non-knowledge are based on the different practices of diverging “evidential cultures” (cp. Böschen 2009) in the field of chemical politics. In the *second* step I will focus on three stages of chemical politics to underpin the thesis that the influence of non-knowledge increased in this debate. The *third* step is attended to the phenomenon of hybrid regimes of knowledge. These regimes are hybrid with respect of the diverse and confused interactions between knowledge and power in specific risk policy fields like the debate about chemicals. Nevertheless, specific structures crystallize to what Sheila Jasanoff called “civic epistemologies.” “Civic epistemology refers to the institutionalized practices by which members of a given society test and deploy knowledge claims used as a basis for making collective choices” (Jasanoff 2005: 255). But, the tension between knowledge and power remains – and therefore the conflicts of non-knowledge. Within the *fourth* step I cast a critical eye over different institutional and scientific strategies, which just have been implemented to pacify the conflicts of non-knowledge under the new regime of REACH in the EU politics.

**The transition from one non-sustainable large technical system to another one? Real-world experimenting with carbon capture and storage world-wide**

*Braun-Thürmann Holger (University of Hamburg, Germany)*

Quite a lot of Science and Technology Studies dedicated themselves to the mission in finding chances and obstacles for the "great transformation" towards a sustainable society with environmentally compatible energy, mobility and production systems. For this purpose "niche", "transition management", and "regime change" concepts won recognition. However, most of these studies are based on the assumption that it is "a priori" evident which technologies are worth to be assessed as sustainable (wind, solar, hydro power) and which ones should be overcome (oil, coal, nuclear power). In my paper I'd like to present a case that stands out for its ambiguity concerning its contribution to world climate protection. It's a technology that may undermine a familiar categorization of "good" and "bad" technologies.

Background of my paper is the discussion on "global warming". According to several scientific assessments (among others IPCC) deep cuts in the emission of carbon dioxide (CO<sub>2</sub>) and other greenhouse gases are recommended. Emission reductions are necessary to hold the increase of temperature below a level that is expected to avert the dangers of drastic sea level rises, enduring droughts etc. The public perception of this global environmental problem legitimizes the political and economic decisions for change towards a system based on optimized energy efficiency and energy supply stemming from renewable resources like wind, sunlight, hydro-power etc. Besides these technological strategies, a couple of OECD member states and the EU as a supranational organisation are funding research and development of a large technical system that is supposed to capture, transport, and store carbon dioxide in large scale repositories, called Carbon Capture and Storage (CCS)(for example USA: USD 3.4 bn, EU: Euro EUR 1.05 bn. Australia USD 1.65 bn). CCS is mainly determined to mitigate the carbon dioxide emissions of coal-fired power plants. As a technology-in-the-making CCS causes controversies that can't be settled neither by natural, nor by social sciences. In this context two issues are suited for an elaborated discussion:

1) On the one hand CCS perfectly is in line with the existing centralized system of coal- and nuclear-powered electricity production. Thus, it can be characterized as a "follow-up innovation" within the trajectory of a type of electricity generation, established after the World War II. CCS can be interpreted as a phenomenon of path dependence implicating the exclusion of alternatives. On the other hand CCS can not only be considered as a radical innovation dealing with the negative side effects of a widespread energy source, but also as an attempt to build up a new "large technical system" as a strategy to recapture carbon dioxide that was polluted since the outset of the industrial age.

2) On the one hand certain methods of Carbon Capture and Storage are already applied in the natural gas processing industry, fertilizer manufacturing, and in hydrogen production as parts of a mature and economically feasible process technology. On the other hand large scale CCS both is yet unproven, and characterized as an "experiment" even by the energy companies

Based on qualitative interviews and other documents the paper reconstructs the possible and heavily contested "innovation journey" of CCS, highlighting the various "methods", that the actors (politicians, scientists, environmentalists etc.) apply to take part in the real-work experiment.



## **Design, activism and the network society**

*Correia Vanda (University of Lisbon, Portugal)*

The aim is to think about the effect of network communications on the activist movements and the role of communication design in this framework. The main focus of the article comes from design, specifically the design of digital communications, but also intends to explore the notion of activism in the context of the network society, as defined by Manuel Castells. On the website Design Activism, Ann Thorpe poses the question: "isn't all design activism?" She says that to design effectively for a cause, designers have to become activists to a certain extent. The word "activism" is used to nominate the intentional action that seeks change, concerning challenging issues.

Nowadays it is easy to verify the association between social networks, enhanced by the Internet, and citizens' movements – they grow, gain expression and reach a wide audience in a glance. There are some recent cases in Portugal - they will be analyzed, especially the area of communications conducted through the Internet, in order to illustrate a phenomenon that is both local and global. One of them is "FERVE" (<http://fartosdestesrecibosverdes.blogspot.com>) – a group that claims to promote an open debate about the abuses of precarious work, in order to promote change. They have extensively used the Internet to disseminate ideas, capture media attention, mobilize supporters and launch applications. Another one is "Limpar Portugal" (<http://www.limparportugal.org>) – inspired by a video watched on YouTube that showed how 50 thousand citizens in Estonia ended up with ten thousand small dumps around the country. This movement was created by three friends that started by opening a social network on the platform Ning, and a few days later had more than a thousand people willing to participate.

It is easy to see the advantages of the Internet: e-mail is an effective and inexpensive way to communicate with thousands of people, the blogosphere and social networks like Twitter and Facebook are particularly suited to the dissemination of messages that spread like viruses to the network of contacts and "friends" - Facebook even has a specific mechanism to form groups around causes; on the Web exist tools to create petitions, and there are simple services that allow people without technical skills to create sophisticated discussion forums or even a whole social network dedicated to a particular topic. All of these forms of communication suffer the intervention of design – in structuring the systems and the graphical interfaces.

Faced with the increasing complexity and apparatus of digital communication, the designer has to rethink the work process, refocusing the methods and considering the consequences of the creative choices.

Victor Margolin is one of the authors that sees the current conjecture as favorable to the designer that wants to assume a relevant social role: when shaping digital media, he gains increased responsibilities – beyond the response to customer requests, the designer may take a more active role in society in general, giving voice to relevant causes, promoting thought, discussion and action on the most pressing issues, which can range from global warming, to any matter at the local community.

The article is intended to highlight the importance of communication design in the network society, especially when considering the issues of social innovation and social responsibility.

## **Examining governance frameworks for clinical innovation: facilitating quality and patient safety**

*Cowie Luke (King's College London, UK)*

Within the field of health and healthcare technologies, the regulation of innovation is of crucial importance. The development of innovative products and practices provides clinical professionals with new ways of treating patients, but such innovation necessarily implies the existence of significant risks. The regulatory apparatus surrounding the development and clinical management of new medicines is well established. The material nature of new chemical entities enables a robust approach to testing efficacy, safety and cost-effectiveness, whilst a separation between innovation and clinical usage (usually) ensures certain thresholds of safety. In regulation practice, the evaluative process is highly structured and entails a network of professionals and organisations, representing government, clinicians and patients. The cumulative evaluative work enacted on the medicine determines whether a new medicine will be licensed for use within specific patient populations, and in this way, the regulation can itself be constitutive of technologies, contributing to their eventual success and stability.

This paper focuses on the extension of regulatory measures to innovative surgical procedures, the nature of which demand an alternative model of governance. Whereas a medicine will have been subject to thorough evaluation prior to licensing for use in clinical populations, for surgical procedures, the proper and timely assessment of innovation is complicated by the relation between innovation and practice. This is in part due to the different ways in which clinical innovation can occur: the need for innovation is often prompted by a problem at operation, and the process of innovation may therefore be wholly improvised in situ. Other issues concern the question of exactly what constitutes an innovation, for example, when does a change in practice become significant enough that it warrants regulatory attention? Moreover, how and when should surgical procedures be evaluated? This question is pertinent given that the ideal of randomised controlled trials is arguably only of practical use once the procedure has been perfected, by which point the innovation may have already been widely adopted within surgical communities. Qualitative data from in-depth interviews with clinical staff from two large hospitals in central London will be used to address some of these questions. There already exist national and more localised governance frameworks for the regulation of innovative procedures. But, they are arguably relatively underdeveloped in comparison to that which regulates the drugs industry, the involvement of innovators is largely voluntary and they are yet to conclusively demonstrate their contribution to quality and patient safety. This paper concludes by asking whether or not the governance framework for innovative clinical procedures operates in a similar fashion to that which governs the development of new medicines. For the latter the innovation process draws upon the expertise and evaluative criteria of a range of professionals and organisations, helping to ensure the successful translation of innovative research into valuable healthcare products. In what ways does the governance of innovative clinical procedures differ from this model, and with what consequences for the encouragement of safe and successful clinical innovation?

**Renewable Energies, sustainable development and the development of photovoltaics in Germany. A case study in university-industry-government interactions**

*Fuchs Gerard (University of Stuttgart, Germany)*

Renewable Energies, sustainable development and the development of Photovoltaics in Germany. A case study in university - industry - government interactions Photovoltaics (PV) in Germany is a booming industry. It is a knowledge based industry insofar as it is dependent on new knowledge constantly being created in research institutes (at universities as well as para-public non-university research institutes like those of the Fraunhofer Association) and from knowledge coming from supplier industries like the machine building industry (since important innovations in PV can only be realized by appropriate and constantly updated production processes). The nature of the industry-research/university-government nexus has changed over time, however. The present paper will analyse the relationship between the three partners over the life course of the industry. The relationship has varied between total mutual neglect and close cooperation, between open conflict and a close cooperation in the setting of common goals. A special emphasis will be laid on an analysis of the changes in knowledge generation in the recent growth period of the industry in which the production of scientific knowledge at research institutes has been nearly totally given up in favour of doing projects for the industry. This is due to the special architecture of the U-I-G relationship in this field.

## **Modernization of innovative development of regions**

*Gusakov Mikhail (Russian Academy of Sciences, Russia)*

Article theme is devoted a problem of innovative development of regions on an example of the Northwest of Russia. Subject of the given research is development of directions and possibility of consolidation of regions on innovative strategy of the Northwest, a choice of priorities of development, construction of regional innovative system, a choice of adequate tools of management of long-term innovative development. As methodology and a source of actual materials in given article studying of experience of approaches to transition to an innovative way of development in regions of the Northwest on the basis of working out of Strategy of development of a complex «a science - formation - innovations» and the Complex scientific and technical program of Northwest region of Russia till 2030 (the author is one of executives) is accepted. Feature of a theme is consideration of radical directions and development of measures on transition to innovative type of development, i.e. modernization of economy and management of development of regions. Modernization of economy and society in a direction of democratisation and business freedom, improvement of a life quality, readiness of a society for transformations are a basic precondition of regions transition on innovative type of development. The system of actions directions on modernization for transition of regions to innovative development, on radical updating of moral, cultural, public, political, economic, technological, scientific base, change of relations and productive forces is offered. It includes:

- A choice of innovative strategy and scientifically-technological priorities;
- A choice of directions of formation and key elements of regional innovative system;
- A substantiation of the spatial organisation of scientifically-innovative process (overcoming by regions of thresholds on a way to innovative type of development, formation of innovative shifts of regions, formation of poles of innovative development, formation of the propotent purposes);
- Management modernization by innovative development.

As consolidation directions what correspond to actions on modernization for transition of regions to innovative development get out. The choice of regions innovative strategy concentrates within the limits of participation in federal target programs (in 7 of 10 regions of the Northwest), and regions pay prime attention to federal programs. However, possibilities for consolidation of efforts of regions here are limited, as essentially differs specialization of the regions industries and consequently they participate in different programs. At the same time, the scientific organizations concentrate researches in priority directions, including nanotechnology, biotechnologies, pharmaceuticals, information technologies and others. Association of efforts on innovative development occurs, basically on the basis of a scientifically-technologically-educational complex of St.-Petersburg. At the same time, there are also communications within the limits of those or other two-three regions of the Northwest without participation of the given megacity. Especially regional programs concern basically developments of scientific and technical potential (the Vologda area), information (Kareliya), innovative-technological development of the industries (St.-Petersburg). As a whole on the Northwest variety of branch and inter-branch complexes possesses clusterization potential. Development measures and tools for actions directions on modernization of innovative development on the basis of consolidation of regions has the essential importance for transition of regions to an innovative way of development.

## **Power of the few vs the crowd's wisdom: Visualizing dynamics of collaboration in Wikipedia**

*He Zejie (University of York, UK)*

Wikipedia's profound success swings on organising volunteer contributions to a process of knowledge production. Thus, it is increasingly necessary to understand the dynamics of collaboration. More to the point, we need to assess the veracity of Wikipedia's claim to be a product of large group collaboration in face of the possibility that it has actually been created by a small group of elite members. Through description of administrator election policy this paper explores such dynamics by differentiating contributors into three groups: 'crowd', 'elites' and 'bourgeoisie'. The paper moves on to examine the contributions of these three groups over time by using available data on the number of changes made by different participants. The result is a discussion of how primary contribution shifts between these groups and how this mirrors the development of online mass collaboration. Furthermore, it suggests the founders of online communities need to focus more on providing a hospitable environment rather than special services for particular groups. This paper also aspires to contribute to methodology by demonstrating the application of digital by-product data to social research and suggests how we might further adopt such data as a replacement for traditional transactions forms.

## The “Federal-Länder Programme Socially Integrative City” as Urban Laboratory

Krey Björn (Johannes-Gutenberg University Mainz, Germany)

Lieg Michael (Johannes-Gutenberg University Mainz, Germany)

In our paper we develop an STS approach towards one of the most prominent urban development programs in Germany during the last decade, the „Federal-Länder Programme Socially Integrative City (Soziale Stadt)“. Initially inspired by UN's action plan for sustainability “Agenda 21”, this joint project of Federal State and Länder (states) cultivates almost an NGO attitude to urban development, assembling, activating and associating participants as citizens of a/the neighborhood, initiating and installing citizens' participation and commitment to community and one's immediate surroundings (neighborhood). At the heart of the program is its local focus (act locally!) of neighborhood management, which is incorporated in Kiezbüro<sup>5</sup> agencies championing local identification. Thus it is foremost a politics of local space “Soziale Stadt” provides and produces general formats for modeling, problematizing, framing and managing urban areas and takes part in the discursive fabrication of the urban. Taking the notion of the “laboratory” as it is formulated by authors like Bruno Latour (1993) and Karin Knorr Cetina (1999) as a starting point we will spell out how urban development programs like „Soziale Stadt“ install quasi scientific experimental settings and tie together scientific and political programs as a means for managing and monitoring social and material change. In that sense *doing laboratory* consists of making space, drawing boundaries, determining and associating objects, „treating“ those with particular „programs“ and monitoring „reactions“. In our paper we ask about location and spatial configuration. We find several localizations: a website-as-archive presenting definitions and problematizations, (scientific) knowledge of and about the urban, criteria for “areas for urban development”. Here we can observe production of the urban as a specific entity and also programs of action associating participants (human and non-human) to take “Soziale Stadt” as an obligatory passage-point in a socio-logic of translation (Callon 1986) for (en)acting a certain idea of the a “social” city. In our research we take the website “as” a starting point, as resource, representation, network/link and technology of ordering and sorting populations and areas. The process of *laboratorization* of the urban contains practices of making empirically observable (in and with empirical methods and models, statistical formulas and indices, representative figures etc.) and politically treatable the problems of urban life by drawing boundaries (an area and a population), forming discourse about this area (the character of it), calling it a neighborhood as part of a city. Thus laboratorization figures prominently in the ways of urban restructuring and development, and the transition management of urban neighborhoods and local identities.

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<sup>5</sup> “Kiez” is slang for neighborhood like “hood or barrio”.

**Case study: Social acceptance of deep geothermal technology in Germany. A techno-economical network approach**

*Leucht Martina (EIFER Institut)*

*Viejo Pablo (EIFER Institut)*

In spite of the political and market awareness of the high potential of geothermal energy the technological implementation shows a rather slow rate of diffusion in Germany compared to water, solar and wind energy technologies. Especially the problem of “induced seismicity” of deep geothermal technology and “induced damage in residential areas” as effects of drilling, stimulating and exploiting geothermal resources of the ground source heat pump technology are currently causing anxiety and opposition among public actors.

How to deal with the potentials, risks and challenges of deep geothermal technology? Within a 3 years project the factor of “social (non-) acceptance” for the current and future technology development of deep geothermal technology is in focus of the research.

In this study, social acceptance is perceived as a concept to analyze adoption and adaptation processes in the interface of society and technology (niche potentials). Hereby we observe the main acceptance processes like knowledge building, opinion building and decision-making as well as the (inter-)actions in different societal spheres such as science, politics, market and civil society. Concerning the technology we consider different aspects like believes, potentials and specific implementation features such as particular techniques, project sites and involved actors.

The project has the aim to draw on scientific input for improvement strategies, particularly communication strategies to improve the acceptance of this technology in society.

In order to achieve a long-term effect and impact, improvement strategies have to go beyond short-term strategic communication. Thus, the goal of this study is to supply an in-depth-analysis of the barriers that are in opposition to the “niche requirements” of deep geothermal technology. These niche requirements show on the one hand a technical dimension in terms of technical options and alternatives, and on the other hand a social dimension in terms of societal values, interests, believes and needs.

*Transferring (“hardware” and “software”) elements and procedures of technology development into a network model and experimental research*

For a conference presentation and/or article we (1) shortly introduce our trans-disciplinary research approach of modeling the techno-economical network (TEN) of deep geothermal technology in Germany and analyzing the main elements, structures and processes of the technological development. We (2) present the main theoretical and methodological challenges of this approach in applying different methods for data collection and analysis such as qualitative and semi-quantitative methods of empirical social research, database development and management, network analysis tools and communication analysis methods. We (3) present first results of the analysis regarding the techno-economical network structures of deep geothermal technology and the issue of “social acceptance” in Germany. As the results of this study are thought to be used for strategic action we outline the challenges in the interface of real world interactions out of our project experience (4).

## **The discrimination method for the transformation process of results of research projects into practical applications**

*Manikowski Arkadiusz (Warsaw University, Poland)*

During 2004-2008 in Institute for Sustainable Technologies in Radom was realized the multi-year programme PW -004 entitled "Development of innovative systems of manufacturing and maintenance 2004-2008". As a part of this programme, tens of the innovative type researched projects were performed. They concentrated on areas such as:

1. apparatus, devices and products for medical uses,
2. optimization of productive processes by automatisation and robotisation,
3. nanotechnology in surface engineering,
4. systems of rationalization of the resources waste,
5. recycling and the utilization systems,
6. prevention of the technical emergencies and removing effects of catastrophes,
7. ecological devices and technologies,
8. methods and the apparatus in the range of products, processes and the technical safety,
9. support of quality systems in the production and maintenance processes.

Every project was considered as multidimensional object described by set of 37 chosen features (the parameters). Each of them potentially affecting the result of implementation. The multidimensional-ness of projects suggested using the discrimination methods well-known in the statistical multidimensional analyses.

The issue of discrimination depends on distributing the elements of a set of observation among  $K$  of classes (groups) so that every of them is characterized by a maximum homogeneity. The membership of elements of these classes is known. In literature such a set of observation is being called the teaching set.

In the proposed research, the teaching set contained historical data concerning 52 projects. Every  $i$ -th element (project) of set was described by vector, where component  $x_{im}$  indicates the value of  $m$ -th parameter of  $i$ -th project ( $i = 1, \dots, 52$ ;  $m = 1, \dots, 37$ ).

The division of population into classes were possible through defining effects of implementing the research – the number of years indispensable to transfer results of these research into practical application. Because of that, three classes of projects were distinguished:

1. first class which contains 10 implemented projects or these which implementation is sure,
2. second class which contains 14 projects having a chance for implementing within one year,
3. third class which contains 28 projects having a chances for implementing during at least two years,

Using discrimination methods, some features of projects were determined. These features within every group are the most similar (homogeneous), whereas a maximum different for projects of other groups.

One of the effects of above is the specification of parameters which influence results of implementing the research project and are significant from statistical point of view, indicating the success or the failure of the final result. Summing up, the essential results of using discriminatory methods are following:



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1. Identification of factors which significantly influence the level of advancement of the implementation;
2. Assigning to above factors the importance. This importance defines with what strength factors affect the effectiveness of the transformation of scientific and research achievements into practical applications;
3. Definition of mathematical tool as a classification functions which enable the prediction of application effect of innovative project.

The results of realized research allow to look promising at the possibility of using discriminatory tools in transformations of results for practical uses.

## **Challenges to build up commitment in distributed organisations**

*Moensted Mette (Copenhagen Business School, Denmark)*

*Bonifacio Matteo (University of Trento, Italy)*

*Hansson Finn (Copenhagen Business School, Denmark)*

The article is focusing on effective managing in networks and creating integration across knowledge organisations in different countries. The article takes as its point of departure the development of programmes in the EU, where the bulk of resources allocated to Research, Technology transfer and Development activities have been used to support the creation of collaboration as a form of research organizations. The new forms of collaborations demanded, such as e.g. Joint Technology Initiatives and European Institute of Innovation and Technology, are based on large partnerships involving universities, research institutes, industry, innovation agents and, some times, policy making institutions. They are requested to manage a considerable amount of resources on a programme basis, but still with substantial (50-75%) co-financing, which create local rather than collaboration commitment. The networks are requested to adopt new governance models where formal legal structures are set up and managing roles are more clearly defined, but are challenged with building up commitment across geographical space, university-industry relations.

The establishment and management of these pan-European partnerships are demanded for nearly all European and strategic financing. Therefore, these initiatives today face the risk not to have at their disposal appropriate organization and management reference models. Besides the experimentation that will occur along the life time of these initiatives, there is a lack of literature and analysis on the management and governance of pan-EU research networks. Theoretically this is tied to network management and innovation management.

This form of programmes are challenging as they stress the organisation in many ways, and are stretching management of innovations as well as commitment

The article will be based on the findings from a survey and case studies of the Pilot Projects for Cooperation between European partners from the university and industry. The methodology is literature review, interviews, and case studies. The emphasis is on collaboration models and networks. The findings from the data suggest what the need for combining methods from management, networking and knowledge management perspectives.

## **Refining complex simulation design techniques to sustain end user mashup networks**

*Polso Debra (Queensland University of Technology, Australia)*

As a group of Interaction Designers we have developed and tested a number of experimental simulation projects for a variety of real world contexts. These wide ranging contexts have included a multi-user simulation tool for negotiating urban development in an Australian neighbourhood (SCAPE) and an interactive interface for practicing sustainable farming techniques in Iceland (Farm It Right). Both of these projects were designed for young students to provide them with insight into the processes involved in the shaping of their world, resulting in a new appreciation for the complex, and often controversial, decisions made by scientific experts and professional policy makers. The main role of the interaction designer in these cases was to source, interpret, and present complex data from multiple sources into a single valuable user experience. Essentially translating multiple domain knowledge into a single interface with a variety of visual, textual and audio display and feedback. The Interaction Designer develops an interface between the user and the data, giving them an opportunity to experiment with real world data in simulated environments.

Traditionally, it has required experienced experts in data visualization with access to professional production resources to design effective learning simulations. However, recent technical developments in open source technology in combination with the release of data to the public by many government organizations has made it increasingly possible for more and more people to produce intelligent data visualizations for distribution and discussion. In particular web based 'mashup' tools and services provide a relatively new way for expressing innovation with little technical knowledge.

As such, this team of interaction designers has turned its focus to developing and distributing simple resources to support young designers to rapidly prototype data visualizations using available mashup APIs and editors. These young designers are also equipped with the basic skills needed to present and distribute these mashups using various accessible online networks. What is most significant about this change in approach is that these young designers are able to respond quickly to societal issues by creating and distributing mashups using data relevant to currently social and cultural concerns. Transforming statistical data into consumable visualizations in a timely manner. Conversely, it is an important outcome from this experiment to accept the rate of disposability of the work. However, the constant iterative ability to make and dispose the work is an essential feature of emerging networks of innovation whose members sustain a practice that is relevant in a community that is active.

This paper will present the tools and resources developed to create and sustain a community of young designers. It will also detail a number of the simple works created by this group using open source tools and public data.

## **Collaborative research results in EU funded research networks: what is expected what is achieved**

*Rakhmatullin Ruslan (School of Business Studies, Trinity College, Dublin, Ireland)*

*Brennan Louis (School of Business Studies, Trinity College, Dublin, Ireland)*

At the Lisbon Summit in 2000 the European Union (EU) Heads of States agreed to make the EU the most competitive knowledge-driven economy. Practical EU initiatives under this Lisbon innovation policy include financing a number of formal networking programmes aiming at a better deployment of existing national research capacities. One such funding framework known as European Cooperation in Science and Technology (COST) only covers researchers' networking related activities. The core activity of this intergovernmental institution is facilitation of scientific networking projects (COST Actions), which allow researchers to cooperate on specific research issues in the field of science and technology. COST networking research projects are expected to bring together researchers who are working on the same research issue and whose research has already attracted national funding. Despite certain bureaucratic burden and additional workload that participation in formal networking research (FNR) projects can bring to participating researchers, there is a persistently strong response to the COST Open Calls. The nature of research funding often means that researchers wishing to obtain new funding have to go through a competitive evaluation process. This often implies that during such an evaluation process potential research proposals are evaluated and only the most capable and/or promising researchers will eventually receive funding. The evaluation process often aims to examine whether proposals are capable of delivering certain results and it often feeds into final evaluation of completed research projects. Most collaborative research projects funded by the European Union (such as COST Actions) go through multiple evaluative processes carried out by expert panels and committees.

Often policymakers and funding providers expect that any investment in collaborative research should produce a certain range of tangible and intangible research outputs. Some possible disappointment with the actually reported research outcomes can arise at the later stages of funded collaborative research projects. This dissatisfaction can be a consequence of the differences between what is expected of participants, and what participants actually deliver as a result of their involvement in FNR projects. Similarly to other funding schemes, COST experts are involved in initial proposal assessment and approval, general progress monitoring and final evaluation of all projects. In case of COST, these experts are normally nominated by their home countries and are generally experienced researchers in their fields. However, the research outputs these experts expect from FNR participants may differ from the research results that actual participants attribute to their participation in funded FNR projects

This paper is one of the few empirical attempts to examine FNR projects by comparing the extent to which certain research outputs are expected by funding sponsors and policymakers and the extent to which project participants actually achieve them. This analysis utilises data collected in a survey of individual researchers involved in FNR projects and national experts involved in evaluation of FNR projects. Based on the empirical findings, this research further explores whether there are any differences in the expectations of experts with and without personal FNR experience. The implications for future research will also be considered.

## **Experiments, Medicine and Governance in African Contexts**

*Rottenburg Richard (Max Planck Institute for Social Anthropology, Germany)*

In this paper I argue that in certain contemporaneous African contexts the boundary between laboratory and life outside the laboratory is being transgressed in specific ways resulting in the emergence of novel forms of social and public experiments. The main focus of the paper is on biomedical research and its relation to health care, both of them being situated in a larger frame of biopolitics, recent reconfigurations of neoliberal regimes of governance, privatization of research and human rights developments. The novelty to be worked out in more detail is not the boundary transgression between laboratory and the world outside of it, but the particular form this ubiquitous transgression is taking. I will develop my argument in a critical dialogue with recent literature on global health, humanitarian interventions, therapeutic domination, and science and technology studies.

## **Agent-based Modelling of Heating System Adoption in Norway**

*Sopha Berta (Norwegian University of Science and Technology)*

*Klößner Christian (Norwegian University of Science and Technology)*

*Hertwich Edgar (Norwegian University of Science and Technology)*

The high dependency on electric heating combined with the high electricity price in 2002/2003 prompted a significant number of Norwegian households to consider alternative heating systems. Norway's rich forest stock and under-utilized sawmill wastes have made wood pellets produced from the wood industry's leftovers an obvious alternative for home heating. Thus, the government introduced economic support for wood pellet heating and heat pumps. In contrast to the fast growing heat pump market, this financial support has not resulted in a widespread adoption of wood pellet heating. As clean heating systems need to be adopted at a fastest possible rate in order to fulfill the heating demand while reducing emissions of greenhouse gases (GHG), the sluggish adoption of wood pellet heating becomes important issue in Norway.

This paper introduces agent-based modelling as a methodological approach to understand the decision making mechanism leading to the adoption of heating systems of Norwegian households. The model is used as an experimental/learning tool to design possible interventions to increase the intake of wood pellet heating. The intended users of the model are therefore policy designers. Primary heating system adoptions of electric heating, heat pump and wood pellet heating were selected. Random topology was chosen to represent social network among households. Agents were households with certain location, number of peers to whom households communicate their heating system, current adopted heating system, employed decision strategy, and degree of social influence in decision making.

The conceptual framework of decision-making was constructed by integrating theories from different disciplines; meta-theory (consumer behavior), utility theory (behavioral economics), theory of planned behavior (psychology), and diffusion of innovation (technology management), in order to capture as representative as possible the decision making processes in households.

A mail survey of 270 Norwegian households conducted in 2008 was designed specifically for acquiring data for parameters and weights of different components in the conceptual model. This method was chosen to produce quantitative data that are statistically representative of the boarder population.

The model represents real geographic area of households and simulates the overall fraction of adopted heating system under study. The model was validated with historical data from Statistics Norway (SSB). Interventions with respects to soft approach (i.e. norms), financial support (i.e. subsidy, fuel price regulation) and technical approach (i.e. functional reliability, automation) could be explored using the model.

The theoretical-based, empirical founded, agent-based simulation demonstrates that regulations alone are not enough to initiate and speed up wood pellet adoption. Regulation and technical development have to be established all at the same time for a successful wood pellet market to start.

## **Getting bugs tracked – How open source software projects cope with complexity**

*Taubert Niels-Christian (Bielefeld University, Germany)*

Two characteristics are often attributed to mature open source software: stability and reliability. From the viewpoint of innovation studies, this attribution is somewhat surprising. The circumstances that characterise open source software development – especially in community driven projects – do not make it likely that high quality and bug-free software is developed. A considerable amount of fluctuation in the participation of software developers, sporadic engagement in the development process, weak hierarchy, and a low degree of the division of labour are typical. In the talk, these empirical observations act as a starting point to pose the question how community driven open source software projects manage to get a piece of complex software run stable in different technical environments. The central question is: What are the specific mechanisms that allow the projects to cope with this task successfully?

In the talk, I will argue that these characteristics are a result of the way the innovation process is organised. The development of open source software takes place in short loops of incremental steps of innovation activities. Each loop consists of changes in the code, tests that have some similarities to scientific experiments within laboratories, and parallel conducted real-world experiments that lead to every-day use of the program in the end. This process will be analysed by focussing on the production of knowledge about the program and its interaction with different environments. Attention will also be given to the necessary preconditions for this kind of knowledge production. The talk concludes with an outlook on the generalisability of this innovation model for the field of proprietary software development.

## Adopting and adapting

*Watts Christopher (University of Surrey, UK)*

We discuss the use of simulation models as tools for rethinking innovation in a way more compatible with Science and Technology Studies (STS) than that encoded in standard models of the diffusion of innovation. In the standard conception of innovation, often dubbed the “linear model”, innovation processes are divided into phases, including an origin and a diffusion phase. Key components in this conception include diffusion models with their characteristic S-curve shaped growth data. The use of such models – which are often based on disease models – is easiest when one assumes: that there are only a few innovations in competition (perhaps no more than one); that would-be adopters are homogeneous in their susceptibility to adoption, and mix evenly with each other; that adoption does not come by degrees; that one and only one version of an innovation is being adopted, and; that the innovations remain unchanged during the course of the diffusion. Studies in the literature of sociology of translation, or Actor-Network Theory, and the social construction of technology (SCOT) have drawn attention to how there is a complexity among the determinants of the success of a particular technology, product or project. The agents involved are diverse in their attributes and interests. The successful product emerging from innovation processes has undergone many adaptations in response to events and constraints not anticipated (nor capable of being anticipated) by an originator or inventor, and identifying it with an earlier invention or a product at time of launch may be problematic. Indeed, the very notion of a single originator is in question, when success depends so much on experimentation or tinkering on the part of users / adopters, and accidental influences along the way. How can models of innovation incorporate this very different conception?

We employ computer simulations, but rather different ones to those traditionally used for modelling the diffusion of innovations. Innovation is represented less as a diffusion phenomenon and more as multiple problems in constraint satisfaction, tackled in parallel in socio-technical networks. Mathematical analyses, curve fitting and forecasts are seen to be of little use. Qualitative data and qualitative model outcomes become more important, as we seek to communicate better an understanding of innovation. Issues raised under this revised understanding include ownership of innovation and the rewards for an identified “innovator”, the degree to which would-be users / adopters should be constrained in their manipulation and reinterpretation of an innovation, and the extent to which organisations can plan for innovation. Our models, used as tools for rethinking innovation, bring together work on complex adaptive systems and that of STS.





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September 2<sup>nd</sup>-4<sup>th</sup> 2010

## **TRACK 25**

# **Rhetoric in Science, Technology and Innovation Policies**

**Convenors:**

**Benoit Godín (University of Quebec, Canada)**

**Reijo Miettinen (University of Helsinki, Finland)**

## **Deconstructing narratives about science, technology & innovation within the 2010 Italian National Research Program**

*Agodi Maria Carmela (Università of Naples "Federico II", Italy)*

The paper looks for conceptual frameworks in the 2010 Italian National Research Program, the main governmental programmatic document delivered as a three years plan to direct national research policy.

The main purpose is to deconstruct the logic and the rhetoric underlying what is intended as policy design and strategic intervention in scientific research and innovation by the Italian government, to trace their emergence within the previous National Research Programs and their endorsement of the EU Framework Programs.

The repertoires investigated are those implied by the use of buzzwords as “the knowledge based economy”, the “national innovation system”, the “triple helix” and the others already described in Benoit Godin’s and others’ work. The narratives are deconstructed by means of a revised version of Event Structure Analysis, an analytical tool proposed years ago by David Heise and recently revisited as heuristically very promising by Larry J. Griffin.

Legitimizing public funds strictures towards academic research is one apparent goal of the narratives implied in that rhetoric. Introducing incentives to industrial R&D activities and directing them towards those research areas reputed by policy makers and their counsellors as the most innovative ones is its obvious companion.

Possible consequences in the practices of research doing and research evaluation in academic and industrial contexts, as well as social processes through which scientific knowledge circulates and produces its impact on society and economy, are just intended as not problematic means to those goals. Their hypothetical functioning is left to black-box mechanisms, not worth to be studied according to the logic in use.

The paper identifies the concept of knowledge transfer, a crucial knot in the causal processes implied, as a key example of that kind of black-boxism in the representation of the innovation process. What is at stake when new techno-scientific knowledge is passed through is being inquired in an empirical work in progress where academic inventors are being interviewed about their experience with innovation and its transferability in economic and social activities. The intermediate results of that research are used to suggest some tentative typology to be added to other conceptual and empirical tools aiming to give some contribution to redirect research about techno-science impact on social and economic development and to alternatively advice data collection practices about it.

## **Social Innovation: a new policy fashion?**

*Bonifacio Matteo (University of Trento, Italy)*

*Rizzi Carlo (University of Trento, Italy)*

A growing debate about the Social Innovation is emerging in Europe. Social Innovation has emerged as a concept and practice in the 1990's as a way to cope with the consequences of economic restructuring, the changes introduced by IT improvements and mass unemployment. As the continued development of new communication technologies and their uses by the younger generations, the development of socially and ethically responsible initiatives - added to the polarised discourse on old fashioned public services v/s dynamism of the market - and the spread of cooperative and network arrangements in social and economic organisations, have nowadays created a renewed interest in social innovation. The financial crisis has further enhanced this new interest as a promise for the self creation of quality jobs and affordable solutions to address the challenges of shrinking budgets and increased social needs. Indeed, social innovation now is increasingly appearing in the policy debate, ranging from the OECD innovation strategy to the forthcoming report of the European Commission on Social Innovation. Such a trend culminates with the new European Lisbon Strategy, the so called Europe 2020, which explicitly refers to this concept.

The negative side of this increasing interest is that, as for any "appealing" concept, the meaning of social innovation risks becoming overloaded. Definitions abound and a casual observer can quickly become entangled in a debate over meaning and nuance. Some argue that this is because social innovation is a poorly researched concept in comparison to its counterparts in business, science and technology. From this perspective, they call for more research and policy experimentation on this issue.

Differently, we argue about the risk to view social innovation as renaming or relabeling all those initiatives and practices that carry some social dimension. From this perspective, social innovation risks to become a new fashion, either in the business or in the policy world, to reposition old solutions and controversial policy trade-offs within a renovated framework. In particular, as we propose, social innovation fits well in the current policy agenda because it allows to conjugate to major policy strands whose promises of delivery have actually failed; namely to so called Lisbon Agenda, which places innovation at the core of European economic growth, and the Social Agenda, which claimed to be an answer to European pressing social demands. These two policies have been profoundly questioned in light of the recent economic crisis and of the dramatic social and environmental challenges.

We further claim that, for a range of reasons, from the EU governance to the European social-market tradition, social innovation could be instrumentally used as a tool to avoid the embarrassing question of whether the market or the public shall take the lead in providing answers to the issues at stake.

## **Rhetorics of Academic Resistance and the Concept of Sectoral Research**

*Eklund Magnus (Department of Economic History, Uppsala University, Sweden)*

It has been argued that industrialized countries have gone through similar phases of post-war science policy due to influence from the OECD (Ruivo 1994). From viewing free basic research as an automatic motor of progress, policy makers increasingly made use of science to solve social and political problems. From the 1980s and onwards there was a blending of research and innovation policies. Bob Jessop (2002, 2008) argues that previously accepted distinctions between economic and extra-economic spheres have disintegrated in the last decades and that an economic logic is increasingly colonizing areas that once were considered to be residing outside the economy, such as science policy.

These transformations of science policy are often normatively presented as natural and inevitable, which has limited attention to the processes of struggle and resistance that should have accompanied them. Recently though, some scholars have shown an interest in the rhetorical strategies trying to promote and legitimize these transformations (Miettinen 2002, Godin 2006, Albert & Laberge 2007, Eklund 2007, Jessop 2008). Often, the legitimation process has involved the use of new concepts such as innovation system, cluster, mode 2, triple helix and knowledge-based economy. Still, there has been little analysis of rhetorical actors resisting transformations of science policy and their conceptual use. This paper will analyze how the concept of “sectoral research” was used and modified in Sweden as part of such a resistance strategy. My analysis departs from Quentin Skinner’s (2002) brand of conceptual history and how actors used concepts to attack or defend contested and controversial social institutions.

The concept of sectoral research was originally a technical term denoting research procured by government agencies to increase their policy capacity. In the 1980s Swedish proponents of academic freedom and autonomy appropriated the concept, extended it to include the support of technical change and made it refer to all research that was instrumentally motivated rather than based on an internal scientific agenda. Sectoral research was also presented as problematic and of poor quality due to the lack of academic influence. This conceptual manipulation was an integral part of an academic counter-offensive that forced proponents of research based on societal relevance on the defensive during the 1980s and 1990s.

## **Innovation Through Time: De-contestation of an Essentially Contested Concept**

*Godin Benoit (INRS, Montreal, Canada)*

Innovation as a category is a political and contested concept. For over 2 500 years, the category was used mainly by political authorities and innovating was forbidden. The twentieth Century has brought in new perspectives on innovation. Innovation has become a central value of society and everyone is expected to innovate. Innovation has become a decontested concept or ideology. How did this occur?

This communication looks at how those who have been responsible for the contestation of the category (governments) have been responsible for the de-contestation too. With the aid of academics as consultants to public organizations governments have developed discourses and narratives on innovation which made of them advocates of innovation.

The communication documents the role of sociologists and economists in this rhetorical move. It documents the co-production of ideas on innovation between academics and governments. It concentrates on the work of W.F. Ogburn, W.R. Maclaurin and C. Freeman as 'innovative ideologists' and studies what the academics' ideas owe to the collaboration with governments and what policy owe to the academics.

## **Goal alignment and conflict in science, technology and innovation policy discourse**

*Kallerud Egil (Norwegian Institute for Studies in Innovation, Research and Education, Oslo)*

Discursive frameworks for science, technology and innovation (STI) policy often emphasize novelty, transition and change. At several junctures in the history of STI policy, a strong discursive emphasis can be detected in many attempts to promote policy frameworks that, according to its promoters, are more consonant than outdated framework to the “new” realities of STI itself, or to new, emerging economic, political and political conditions, are better aligned with best policy practices, etc. This binary rhetorical figure by which the triumphant new is pitted against the waning old is saliently present in much influential recent STI (policy) discourse, such as e.g. the concepts of mode 1 vs mode 2 knowledge production, traditional vs entrepreneurial universities, linear vs systemic models of innovation, and many others. The figure is however not only germane to these recent discourse, but has also been integral to previous discursive STI policy frameworks. Some earlier conceptual models of discursive transition and change have been reconstructed by, e.g., Ruivo (1994) and Elzinga & Jamison (1995), emphasizing that changes in STI policy take place through shifts between discrete phases or paradigms. Earlier reconstructions have, however, had a dominant tripartite conceptual structure (push/pull/push-and-pull; basic/applied/strategic research; etc).

Common to both binary and tripartite conceptual models is, however, that they frame the shifts and changes within a “science and (vs; in) society (economy)” conceptual framework. This contribution addresses aspects of the discourse of transition and novelty in STI policy that are not easily captured within such a “science and society/economy” framework, but which seems to assume increasing importance in contemporary STI policy discourse: the re-articulation involved in such changes or shifts in the relationship between main (“horizontal”) *policy goals*, viz. social objectives (welfare, equality); economic objectives (growth, competitiveness); security; sustainability. Major shifts and re-articulations of goal conflicts, complementarities, alignments etc in STI policy frameworks will be indicated by highlighting some key passages from OECD reports that are (most of them) well-established as having a “paradigmatic” status in the history of STI policy discourse (Pigagniol report (1963); Brooks report (1971); Delapalme report (1979); Sundqvist report (1989); TEP report (1993), MONIT report (2004)). We will use a brief historical review of major STI policy “paradigm shifts” in terms of how they re-order overall dominant/subordinate relationships between policy goals or values, as a basis for some observations on emergent trends in contemporary discourse of STI policy. We will in this part focus on signs that the hegemony of the “innovation systems” framework during the 1990s and most of the 2000s is giving way to novel overall approaches – often recognizable by the now commonly used, by the EUC as well by the OECD, terms of “grand/social/global challenges”.

**Narratives of emergence. The problems, priorities and programmes of contemporary science policy**

*Kearnes Matthew (Durham University, UK)*

*Wienroth Matthias (Durham University, UK)*

Over the last half-century a range of new research programmes has come to dominate public and policy discussion of the nature of scientific and technological innovation. Cybernetics and systems research, followed by information and bio-technologies, and latterly areas such as nanotechnology and synthetic biology have emerged as new and interdisciplinary technoscientific programmes. Though often presented in technical terms – as epistemic developments within hitherto disconnected fields – such programmes are also typically established through forms of state sponsorship and strategic coordination. Fuelled by a range of strategic concerns, the emergence and development of research programmes in areas such as nanotechnology and synthetic biology have become archetypal sites for innovation in scientific governance.

This paper begins from a simple proposition – how might we understand the emergence and consolidation of research programmes in nanotechnology and synthetic biology symmetrically? That is: how might we attend to the constitution of the emergence of new research communities and objects in both epistemic and political terms?

Through an analysis of UK science and research policy we develop a narrative account of contemporary technoscientific governance. In particular, we explore the circulation of a range of problematic narratives that inform the development of science policy priorities and programmes. These narratives draw on wider discourses concerning both knowledge-based innovation and risk-based precaution in the context of pre-existing institutional structures and perceptions of national needs and capabilities to address these. Modes of argumentation implicit to contemporary science policy suggest that mechanisms of research support and coordination are one key instrument with which nations address strategic problems – the future of the nation, the future of democracy and the future of society itself. Informed by a range of overlapping theories of innovation and technological development, these narratives operate both symbolically and instrumentally. Accordingly, we suggest that they are deployed, and must be interpreted, in light of a discursively complex institutional landscape in which the role of the state in coordinating the emergence of new research programmes is mediated by a range of intermediary organisations.

## **Foresight work and foresight rhetoric in Finland**

*Kettunen Anu (University of Jyväskylä, Finland)*

Future has arisen strongly to the political agenda in Finland in recent years. The administrative elites and the decision-makers from different fields of society have become increasingly interested in anticipating future trends. As a result, several reports have been published and different actors have presented their visions of the successful Finland of the future and introduced strategies for achieving it.

The paper studies foresight work and foresight rhetoric in Finland and focuses on texts that outline the future of the whole society or nation. Firstly, the paper examines what kinds of projects and groups have been formed to outline the future of Finland during the past ten years and who have participated in them. The role of different actors in shaping the future of Finland is discussed. It is asked who outlines the future and for whom and what kind of expertise is used in its production. Secondly, the paper studies one future strategy, "the Finland 2015 programme" published by the Finnish Innovation Fund, Sitra, as an example of foresight rhetoric. The paper discusses how the future society looks like, when the vision of it has been formulated from a viewpoint that stresses economical competitiveness, innovativeness and creativity. The role of the citizens and the place for politics in Sitra's future society is discussed.



## **Inventing innovation? Analyzing science and technology interfaces at industrial research institutes**

*Larsen Katarina (The Royal Institute of Technology, Sweden)*

One key question in studies of innovation processes is how organizations integrate new skills in the quest for exploring emerging technology applications. These innovation processes can utilize scientific knowledge and technical skills from several scientific fields. Also the diversity in terms of organizations involved (private firms, universities, corporate research labs and public research institutes) influences the character of innovation networks.

By examining the practical arrangements of collaborative projects involving semi-public research institutes, this study also raises questions at the heart of public-private knowledge regimes. Previous studies illustrate the critical role of public research organizations for cohesiveness of innovation networks in the area of biotechnology (Owen-Smith and Powell 2004, pp. 10-11). In Sweden, there is a surge of collaborative R&D programs and centers of excellence involving industrial research institutes. These R&D programs and centers promote participation (and matching funding) from industry besides involvement of PhD students from academia.

In the framework of rhetoric in science, technology and innovation studies (and policy) this brings urgency to an increased understanding of arguments put forward in the locus of collaborative innovation processes involving actors with inherently different norms, values and practices for knowledge production and dissemination.

The concept of absorptive capacity (Cohen and Levinthal 1989, 1990) serves as another starting point discussing science and technology interfaces. Absorptive capacity is defined as “ability to identify, assimilate, and exploit knowledge from the environment” also including “the ability to exploit knowledge of a more intermediate sort, such as basic research results that provide the basis for subsequent applied research and development” (Cohen and Levinthal 1989, p. 569-570). This linear notion of innovation is in contrast to ‘chain-linked’ and subsequent ‘open’ models of innovation proposed by scholars of science and technology studies.

Lastly, industrial research institutes provides interesting examples from the discourse on public-private realms of science and innovation over time dating back to the 1940s and 50s. These debates reflect national industrial policy, before R&D indicators started to take shape by international definitions (Godin 2003). Studies of scientific publication and patenting activity of universities argue that there is a “fundamental change in the rules governing universities’ knowledge dissemination practices” (Owen-Smith 2003, p. 1099). Studies of practices for managing knowledge in collaborative R&D can provide further understanding of this ‘hybrid-order’ with a longstanding tradition at research institutes.

## **Paradoxes of the idea of learning economy**

*Miettinen Reijo (University of Helsinki, Finland)*

The term learning economy was developed as an alternative to the term knowledge-based economy (Lundvall & Johnson 1994). Instead of knowledge base (accumulation, availability and use of knowledge artifacts and commodities), the focus should be put on the active processes of knowing, development of expertise and interactive learning. In the definitions of learning economy the distinctions between tacit and explicit knowledge suggested by Michel Polanyi as well as on the distinction between know-how and know-that by Gilbert Ryle play a central role. These philosophical distinctions are interpreted by learning economy theories suggesting that the economically significant expertise and knowledge exists first of all in the form of practical, 'sticky' situated expertise. It develops as a part of everyday and organizational practice or by experiential learning rather than in formal education. The paper argues that concepts of knowledge and learning based on tacit/explicit dichotomy provide a very limited view of the challenges of today's economy and society. An alternative conception of learning and expertise based on cultural-historical psychology, empirical studies of skill formation as well as sociology of expertise is outlined. It finds historicity, domain specificity of knowledge and expertise, significance of quality of education and training, as well the capacity of learn and transfer knowledge across organizational and disciplinary boundaries as essential for learning and innovation. The implications of this alternative view of learning and expertise for innovation policy are discussed.

**“Learning Research Programmes”. Why that fails and why talking about failure is taboo**

*Moldaschl Manfred (Chemnitz University of Technology, Germany)*

While the evaluation of educational programmes has a relatively long tradition in German politics, the idea of evaluation just entered recently the agenda setting process and the administration of research programmes in the the German Ministry of Education and Research. There is no new research programme without a “meta-project” or an “evaluation project”, consuming between 4 and 10% of the dedicated funds. Furthermore, almost all research programmes of this national ministry were reformulated in a semantic of innovation, justifying and demanding every research activity (and spending) either as innovative or in general by its contribution to the national competitiveness in the innovation field.

The idea of evaluation is a traditional regulatory idea rooting in the legitimation needs of social policy, giving it the role of a substitute for efficacy and efficiency control where the market as the adequate institution fails or is not applicable. Thus, evaluation was always a rhetoric figure and a recursive principle of learning at the same time, constituting a quasi-natural contradiction of functions. Since the scientific study of evaluation practices in innovation policy is itself a recursive or reflexive practice, an evaluation of evaluation, the interesting question is not the pure revelation its legitimatory functions or the deconstruction of rhetorics in innovation policy, but the analysis of the complex interrelations between legitimatory and critical (learning) functions, intended and unintended outcomes, designed failure and ordered success.

With Michael Power such evaluative practices could be interpreted as an integral part of the audit society in which these practices have become standard rationality demonstrations with irrational outcomes. We study and interpret the new practices of programme evaluation in process with the concept of institutional reflexivity, including power relations and strategy analysis, along the methodological-epistemological perspective in the sociology of science and against Giddens.

### **Discussing the concepts of cluster and industrial district**

*Ortega-Colomer Francisco Javier, (INGENIO, Consejo Superior de Investigaciones Científicas y Universidad Politécnica de Valencia, Spain)*

*Molina-Morales Francesc Xavier (Jaume I University of Castellón, Spain)*

*Gabaldón-Estevan Daniel (INGENIO, Spain)*

Different 'neologisms' have been invented by regional scientists (mainly by economists and geographers) in order to explain the set of actors that interact in a specific location and the dynamics that enhance regional innovative performance. The primary aim of this paper is to discuss the different origins and the subsequent evolution of two of these terms: 'Industrial district' and 'Cluster'. The industrial district concept has not been widely recognized as an operational concept and has only been applied in a few countries, such as Italy and Spain. Since the 1990s, it has been progressively substituted by the apparently fresher and clearer ideas of the cluster concept. Nevertheless, some authors have characterized the latter as ambiguous and vague, while others have highlighted this nebulous quality as an 'added value' fostering theoretical debate across different disciplines.

Bearing in mind the aforementioned, we then propose a typology based on two key factors: first, the nature of a model's foundation and sustainability and, second, the suitability of the institutional environment where the model is applied. We then apply this dual-typology to various agglomerations of firms in different countries, illustrating graphically their peculiarities. In fact, we are convinced that our typology can be used not only to integrate both concepts (ID & CI) but also to facilitate their application in a less chaotic fashion. Finally, we offer possible answers to the question of under which conditions a specific model should be applied.

## **Transfer, interface, brokerage or else? On the discursive framing of the role of science in policy-making**

*Pregernig Michael (University of Freiburg, Germany)*

The social systems of science and politics are increasingly influencing and mutually depending on each other. Concurrently, scientific policy advice, in the sense of the deliberate efforts of scientists to inform policy-makers in science-laden questions, has become a key issue in public debate and scientific analysis alike. As policy issues become increasingly complex, political decisions are said to be strongly depending on the insights derived from science. Effectively linking substantive knowledge and authoritative political decision-making has, however, proven to be a chronically difficult task. In the scientific realm, a number of theoretical models and frameworks have been developed which strive to conceptualize the relationship between „truth“ and „power“ (D.K. Price); in the realm of praxis, numerous initiatives have been started which put efforts into the more effective linking of the two social systems.

This contribution does not aim at illuminating the interaction between science and policy-making in an empirical way, but – by taking a kind of meta-perspective – it investigates how the role of science in policy-making is *discursively framed*. I thereby proceed from the assumption that the way the interplay between science and policy-making is interpreted and reproduced by relevant (scientific and political) actors has an influence on the set of approaches and methods that are suggested and implemented in real-world science-policy interactions. For example, in recent years, the sciento-political discourse frequently drew on the image of a “*science-policy interface*”. Here, the image of an “interface” undoubtedly builds on, evokes and reproduces specific conceptions about the – often problematized– relationship between the two social systems. The image of the “interface”, however, provides only one possible perspective. A decade earlier, the problem would have been framed in a different way, probably drawing on the concept of “*knowledge transfer*”. Only very recently, the image of “*knowledge brokerage*” has gained some acceptance, especially in an EU-led discourse.

In this contribution, first I develop a comprehensive typology of conceptual and discursive framings of the relationship between science and policy-making, thereby drawing on – both historic and recent – scientific as well as political discourses or frames. Second, I make use of selected empirical reference cases from the field of environmental policy to demonstrate which real-world consequences are tied to different sciento-political framings, i.e. which problem definitions call for which type of solution. Finally, I discuss if and to what extent science-policy interactions could be shaped in a more productive way if – instead of taking unquestioned, narrow framings for granted – the role of science in policy-making were perceived, discussed and enacted in a more frame-reflective way.

## **Intellectual Property Rights and the rhetoric of the “knowledge society”**

*Schneider Ingrid*

The term “knowledge society” or „knowledge-based economy“ seems to mark a shift in science, technology and innovation policies. Knowledge and information are deemed precious resources, particularly in post-industrial economies which are poor in natural resources. Knowledge is increasingly regarded as a form of capital or a product which requires special forms of treatment to make it socially and economically productive (cf. Stehr 1994). In this context, more and more attention has been paid to markets and property relations, in particular Intellectual Property (patents, copyright, trademarks) as a form of fostering knowledge production (Drahos 2010; May/Sell 2005).

The rhetoric of the “knowledge society” was developed by the OECD and emerged further in the context of the EU’s Lisbon Agenda. In my presentation, I will focus on the research question how the concept of the “knowledge society” was used to justify the expansion of Intellectual Property Rights (IPRs). I will show that this rhetoric, combined with appeals to the single market and to international competition, was instrumental for the extension of the EU’s competences concerning the regulation of IP protection. In the 1990s, it was used to introduce a number of directives related to IPRs (Borrás 2003) which aimed at codifying, harmonizing, and strengthening of IPRs, in accordance with the international agenda as set by the WTO’s TRIPS agreement. Some of these policy initiatives of the European Commission, however, especially the biotech patent directive and the software patent directive which are used as case studies, faced fierce opposition from civil society and the European Parliament. The main rhetorical counter-frames developed in those controversies were “ethics” in the biopatent case, and “open innovation” in the software patent case (Schneider 2009, Haunss/Shadlen 2009).

The outcome of these controversies and the result of implementing the new IP framework is mixed: We can observe both a strengthening of IPRs and - possibly even as a victim of its own success - a crisis of the IP system, particularly in patents and copyrights (Cornish 2000; Besen/Meurer 2008). Economists are questioning the efficiency of the contemporary IP system in fostering innovation, and point to trade-offs between costs and benefits. In the context of public controversies about IPRs, new concepts emerged which put knowledge and innovation into different cognitive, legal and economic frameworks. As a result, a constitutionalization of IPRs is emerging in which IP protection has to be re-regulated and balanced with other normative and political goals in society and policy-making. Thus, the social contract underpinning IPRs in the knowledge society is being questioned and in the process of being rewritten. This transformation also produces and requires a reframed rhetoric.

## **The Rhetoric of Interdisciplinarity and the Development of Nanotechnology**

*Sutherland Olsen Dorothy (University of Oslo, Norway)*

In 1972 the OECD convened a group to look at the issue of interdisciplinarity. There were many reasons for this initiative, among them the desire to react to perceived changes in the way that scientific knowledge was produced (subsequently referred to as mode 2) and the idea that more disciplines working together might produce better research or more radical innovations. In the wake of this initiative there has been a steady flow of literature on the theme of interdisciplinarity. This paper reviews some of this literature and presents some of the different ways the theme has been presented by various fields. These fields include technology and innovation studies, collaborative learning, and organisation of universities. The literature suggests that attempts are being made to “add interdisciplinarity” to some research programs as a kind of magic ingredient to improve creativity, while in other cases it is seen as a transitory phase on the path towards a new field i.e. two or more disciplines converge and spawn new ones.

The paper then explores the particular case of nanotechnology and how these different interpretations have been used in discourse on its development. This analysis suggests that the perceived link between novelty and interdisciplinarity has been the main focus of the nanotechnology discourse, perhaps to the detriment of our understanding of the more everyday challenge of communication between researchers of different disciplinary backgrounds trying to develop new technologies. Implications for research policy are discussed.



## **TRACK 26**

# **The Shaping of Patient 2.0. Exploring Agencies, Technologies and Discourses in New Healthcare Practices**

### **Convenors:**

**Peter Danholt (Aarhus University, Denmark)**

**Enrico Maria Piras (Fondazione Bruno Kessler, Italy)**

**Cristiano Storni (University of Limerick, Ireland)**

**Alberto Zanutto (University of Trento, Italy)**



**Genetically Responsible Selfhood: A Non-Humanist Reading of Patient 2.0**

*Tamar Sharon (Bar Ilan University, Israel)*

The discourses and practices of genetics surround us today as never before, and have become a major component of our ideas of personhood and identity. In contemporary biomedicine, many illnesses and pathologies have been reorganized along a genetic axis. The growing use of predictive genetic diagnostics and genome analysis – now offered by private companies directly to the public – and the new dimension of “genetic risk” they introduce, have contributed to the emergence of a new “genetically responsible subject” – a striking example of the notion of patient 2.0.

Discussion on genetically responsible selfhood is usually framed by two models, a libertarian and a critical one. The first embraces this new type of involvement as a manifestation of individual empowerment in a context of autonomous decision-making. The second views idealized images of empowered individuals making free, informed choices in an unregulated genomic marketplace under a skeptic eye, and raises critiques of consumerism, a new eugenics and the creation of a new category of “irresponsible” individuals aimed at those who do not adopt an active and informed medical behavior.

Both these models presume a certain understanding of autonomy and freedom, or lack of it, that is based in liberal humanism, a point which I argue misses some of the novel and fascinating aspects of genetically responsible subjectivity. An extension of Foucault's notion of “technologies of the self” and “care of the self” to subject constitution in the context of the new genetics, I suggest, allows us to shed light on other aspects of genetic responsibility.

Proceeding from this non-humanist model, genetic responsibility can be seen as the expression of a responsibility toward the self, in the form of attempts to decrease the likelihood of disease by the prudent management of genetic risks. In this framework, the new genetic technologies and the language of genetic risk provide an ethical framework that informs decisions on how to conduct one's life and allow individuals to develop a relationship to, and actively intervene in, the technological mediations that help shape their subjectivity.

This genetically responsible self is neither an empowered, autonomous subject who is master of his/her destiny, nor simply a target of biomed companies acting according to the dictates of the market. Rather he/she is a prudent, responsible, interdependent subject, who seeks to act in the present in relation to potential futures that have come into view thanks to genetic technologies. While it is true that the enactment of genetically responsible behavior has become something that is expected of ill and at-risk individuals, and so complicates the question of individual autonomy, and that this responsibility, based in one's biological identity, intersects with other forms of self-government characteristic of advanced liberal democracies, it is an ethics nonetheless, and it opens up a space of freedom – not from technology – but in the ability to relate to and to contribute to shaping those technologies that constitute the self.

**Finding a role for e-patients in information sharing between healthcare providers**

*Duysburgh Pieter (IBBT-SMIT/VUB, Belgium)*

*Jacobs An (IBBT-SMIT/VUB, Belgium)*

*Naessens Kris (IBBT-SMIT/VUB, Belgium)*

In this paper, we want to describe the tensions between the interests of patients and those of healthcare providers that arose in the Flemish IBBT research project 'Share4Health', which researched and developed a proof of concept platform to facilitate information exchange between healthcare providers.

There are many digital documents with medical information on a single patient that lay scattered over the many servers and computers of GPs, specialists, pharmacists and hospitals. Within the Share4Health project, it was aspired to make these informational sources accessible to those who needed more insight in other medical details of a patient, by providing secure access control, including decision support and exploring the potential of web 2.0 technology.

Even though this project was directed towards healthcare providers, patients were several times at the core of Share4Health discussions. This became very apparent during talks about the sharing of the so-called Sumehr, short for Summarized Electronic Health Record, between certain healthcare providers. This caused several issues with privacy. While some healthcare providers part of the consortium were of the opinion that they had to have access to this information, from a patients' rights point of view this was unacceptable and illegal.

This conflict also came to the fore during some focus groups with doctors and pharmacists that were done during the project. Given the health 2.0 developments, we also tried to integrate personal medical information that patients manage themselves on for instance the Google Health platform, into the platform. This however stirred emotions as some professionals considered this data to be unreliable and therefore useless.

Based on these observations and a careful review of the academic and grey literature available, we detected three streams of thought of how health 2.0 applications are being defined and regarded: 1) the technological approach, focussing solely on the technical aspects involved; 2) the innovation approach, formulating a hope or ambition for a more efficient healthcare; and 3) the empowerment approach, envisioning a more patient-centric healthcare. We will argue that these approaches of health 2.0 spur many differences in opinions and dialogues of the deaf in consortia of projects such as Share4Health. We think that more awareness of these different views can help to clarify discussions, prevent misunderstandings and ease the creation of health 2.0 applications.

To illustrate this, we looked into the discussions that took place within the consortium of the Share4Health project and the focus groups related to the inclusion of health 2.0 functionalities in the platform. We will show how difficult it can be to find a fit between different approaches and how the patients' position is often being discussed and questioned. We will reflect on how the patient's view can have a more prominent role in these type of research projects: will it be by active participation or other approaches?

**Expectations and practice in healthcare innovations in the Netherlands**

*Birrer Frans A.J. (Science & Society, Leiden University, The Netherlands)*

*Mensink Wouter (Leiden Institute of Advanced Computer Science, Leiden University, The Netherlands)*

For about two decades plans are being discussed for an Electronic Health Record (EHR) in the Netherlands. Expectations concerning the way such a system will function tend to be an important drive in such cases. In the case of the EHR in the Netherlands, these expectations concern both technical possibilities and the social context in which these systems are to function.

At the level of policy, two main views on the EHR can be discerned. One sees the EHR as an all encompassing national health information system; the other envisions a more modest system for information exchange where it is actually needed. A striking point in the discussion on the EHR is that whereas several commentators have pointed out that some of these expectations may be unrealistic, proponents seldom directly address these objections. For instance, particular for the first perspective, it has been questioned whether information can be decontextualised to such an extent as to make the proposed systems feasible; policy documents tend to ignore or sidestep such objections.

The expectations concerning social context raise similar questions as to whether assumptions concerning how the system will be operated are not overidealised. In fact, these assumptions show a strong similarity to those made in other, organisational innovations in the Dutch healthcare system, such as the personalised budget. For instance, both have strong 'neoliberal' overtones. For the organisational innovations that have already been implemented, it turns out that when policy has to be translated into practice, the result is significantly different (and considerably more moderate) than the original policy documents suggest.

In sketching and analysing these developments and discourses we will draw on studies we did on the EHR and other healthcare innovations in the Netherlands.

**Towards Patient 2.0 - Empowerment and self-management Technologies**

*Olesen Finn (Aarhus University, Denmark)*

Currently we see a significant shift in public health recommendations regarding the responsibility of the state to support patients with chronic health conditions, like diabetes, or chronic obstructive lung disease. These patients are often able to live in their own home and surroundings with support from family and health professionals. Following such shift, discourses of 'patient-centered' health care practices, and 'patient schools' have intensified, expressing health politicians' and professionals' wish for more patient autonomy and liberations from biomedical hospital regimes. This liberation is often labeled 'empowerment' (as opposed to 'compliance'). One ambition of such empowerment is for individual patients to be able to handle their disease in accordance with own values and desires. New personalized healthcare technologies are being researched and developed to help empower these patients, not least under headings such as 'patient 2.0', 'hometelecare medicine', and 'pervasive computing'.

In the presentation, I will discuss, from a sociotechnical, posthuman stance, how to interpret the shifting roles and agencies of patients with chronic diseases submitted to the conditions described above. New sociotechnical orders also bring new disorders, and we need terms to verbalize the altered states, so we are also able to verbalise unexpected transformations of the patients' role and environment. Based on case studies and literature reviews, I will argue that health care policies to empower sufferers through sociotechnical strategies may not just transform, but also diminish intended agencies and powers of the individual patient. Well-intentioned arrangements to individualise health technologies may thus dilute conceptual boundaries between our notions of patient, user, client and citizen. A blurred, or vague notion of patient identity can easily lead to a decrease in public responsibility towards patients, because (s)he is mixed up with the idea of a citizen.

## Boundary-Making & Boundary-Breaking: The Role of Information in the Practice of Clinical Research

*Polk Jessica (Georgetown University, Department of Communication Culture & Technology, USA)*

This paper investigates the evolving relationship between the patient participant (as a human subject) and the clinical researcher (as medical expert), in an environment where medical information is increasingly accessible, consumed and produced online. Research suggests online health searching creates an emerging patient “expert”—the ePatient<sup>6</sup>—who challenges traditional medical expertise (Marie Haug; Michael Hardy; Kristin Barker). Research also indicates certain groups of patient activists (such as those within the HIV/AIDS community) acquire and comprehend medical knowledge on par with medical experts. Many patient activists have and continue to influence various medical institutions, such as clinical trial work (Steven Epstein). However, no existing research connects the dots between the informed patient (as a research participant), the Internet, and the clinical study setting. How does the ePatient influence: 1) the participant-researcher relationship, 2) participant expertise within a clinical study setting, and 3) the work and practice of conducting a clinical research?

While many forms of medical knowledge production (i.e. the clinical trial) establish walls between the medical professional and the patient—instances of ‘boundary-making’—current trends in medical information accessibility and use illustrate moments whereby medical content works in breaking these very barriers down—the emergence of ‘boundary-breaking.’ By contrast to boundary-making, boundary-breaking describes instances in which information use enables both the medical professional and the patient to participate in the process of medical discovery and understanding.

For instance, Kristin K. Barker argues that patients with contested or controversial conditions, such as Fibromyalgia, band together in efforts to secure physician-compliance—demanding that physicians “accept [their] patient expertise...[and acknowledge, respect, and adhere to] a patients’ embodied knowledge.”<sup>7</sup> Can Barker’s notion of ‘embodied experience’ and physician-compliance extend to the clinical study setting, resulting in a trend towards researcher-compliance? Furthermore, how might patient-generated information seeking online, impact the nature (i.e. structure) and goals (initial purpose) of clinical study work? That is, can a patient’s (or participant’s) own use of informational tools and resources influence the practice of clinical research?

Typically, the researcher “sees” components of the study (and participant) that the participant is shielded from. Strict study protocols and design represent two examples of tools facilitating boundaries between expert and lay—what the research team knows differs from what the participant base knows. Protocols ensure the credibility of the study and that the objectives of the overall research are met. Nevertheless, patients, physicians, researchers and even

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<sup>6</sup>Fox, Susannah & Sydney Jones. (June 2009). “The social life of health information: Americans’ pursuit of health takes place within a widening network of both online and offline sources.” *Pew Internet & American Life Project*. Washington, DC: The Pew Internet & American Life Project.

<sup>7</sup>Barker, Kristin K. (2008). “Electronic Support Groups, Patient-Consumers, and Medicalization: The Case of Contested Illness.” *Journal of Health and Social Behavior*, 49(March): pp. 23, 31.

pharmaceutical companies are beginning to rethink what it means to conduct medical research in the Digital Age. While lay expertise in the context of clinical studies and trials first emerged in the form of traditional patient activism (i.e. the HIV/AIDS movement),<sup>8</sup> this paper focuses on participants' online use and clinical research—highlighting one online patient community, [www.PatientsLikeMe.com](http://www.PatientsLikeMe.com). PatientsLikeMe, (with ~40,000 members, suffering from over 17 different conditions), facilitates patient-to-patient information sharing— seeking “to spawn ‘a new system of medicine by patients for patients.’”<sup>9</sup> By examining this online venue, this paper seeks to foster conversation in order to better understand what it means to study a ‘knowing patient.’

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<sup>8</sup> Epstein, S. (1995) “The Construction of Lay Expertise: AIDS Activism and the Forging of Credibility in the Reform of Clinical Trials.” *Science, Technology & Human Values*, 20(4): pp. 409-10.

<sup>9</sup> Malorye, A. (2009) “Can web 2.0 reboot clinical trials?” *Nature Biotechnology*, 27(10): 895.

## From communities of practice to community of experience

*Rossi Paolo (Department of Sociology and Social Research, University of Milan-Bicocca, Italy)*

Self-help groups (SHGs) represent an emergent and peculiar phenomenon within the sector of health and social services [Katz, 1981; Katz and Bender, 1976]. These groups are an important source of mutual aid among people who share common medical pathologies, situations of psychological disease, experiences of social exclusions and so on [Tognetti Bordogna, 2005]. Face-to-face interaction is still the main form of relationship for members of SHGs: this kind of interaction, which implies physical proximity among members, is the traditional communication pattern of mutual aid practices, and it is also a constitutive element of the organizing processes of SHGs, since proximity facilitates the sharing of a mission, the coordination of interaction mechanisms and the integration of new members [Del Rio, 2005]. New forms of SHGs are now taking place on-line, through the use of discussion boards, chats, virtual communities and other instruments for social networking. The activities of these groups differ significantly from traditional SHGs, because of structural and subjective factors: the communication has a different structural configuration, because interactions may take place from different sites, synchronicity of interaction is no longer a binding element and multi-medial artifacts may facilitate the participation of people with physical handicaps. As a consequence, the individual and collective perception of SHGs is radically different: an online experience of mutual aid provides different resources and generates different expectations as well.

The purpose of this paper is to analyze the experiences of mutual aid performed on-line, in order to examine their patterns of interaction and their formal and substantial organizing processes and to compare them with those of traditional SHGs: since self-help groups have traditionally been outlined as “empowerment” context [Piccardo, 1995; Terranova Cecchini, 2005], the leading question of the study is whether a peculiar form of individual and collective empowerment is emerging in online SHGs.

The study is based on the observation of the discussion board of a website involved in the advocacy of the rights of people with handicap. The research will follow a qualitative approach; the observation will be made through the methodology of virtual ethnography [Hine 2000; Kozinets, 2002]. The object of the research is the examination of the practices of conversations among the members of the website [Gherardi, 2009], which is functional both for a direct activity of mutual and for the creation of a memory of the community, through the textualization of the posts.

The thesis proposed in the paper is that on-line SHGs may be described as “communities of experience” (COE): this concept is proposed in juxtaposition with the classical notion of community of practice (COP) [Wenger, 1998]. Instead of sharing practices, in COE people share personal experiences, feelings and emotions, which do not imply the performance of an activity. COE are organized contexts in which individuals perform mutual aid through direct and indirect interaction.

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## When Patient 2.0 meets the enlightened Turkish woman: Medicalization of menopause in Turkey

Erol Maral (Duke University, UK)

This paper explores the medicalization of menopause in Turkey within the framework of the country's neoliberal transformations. Starting with awareness campaigns and menopause clinics in the early 1990's, menopause slowly became a part of popular vocabulary, sometimes half-jokingly dubbed as "second spring," and a health concern discussed in the media. The medical discourse on menopause and hormone replacement therapy in Turkey is related to with the identity of a "modern woman" who accepts the authority of science and medicine, and the notion of *bilinç* (consciousness/conscientiousness). As symbolic carriers of modernity, women's role was a particularly important in the modernization project (Durakbaşa and İlyasoğlu 2001, White 2003). With the structural and discursive changes brought about by the neoliberal politics of 1980's, modernization ideals have changed their meanings too. In this environment, being a "conscious" menopausal woman involves awareness of medical information, regular doctor visits and ability to make decisions about healthcare at the face of conflicting medical information. I argue that there is a continuity between ideals of modernization and consumer oriented neoliberal healthcare ideas of creating awareness about a condition or a disease instead of promoting the product directly. In the Turkish case, this continuity was based on the shifting meanings of consciousness and shaped the identity of the menopausal woman.

The empirical base of the paper draws on ethnographic research done in Istanbul, Turkey between June 2006 and March 2007, which involved participant observation in gynecology clinics and interviews with clinicians and menopausal women. It is supplemented by archival research on the presentations of menopause and HRT in the Turkish media between 1999 and 2006. The importance of awareness of and information about menopause and regular check-ups were common points in the narratives of both menopausal women and doctors; while the meanings of being a "conscious" patient changed from acceptance of medical authority to shopping for doctors and seeking information through media. Turkish Society for Menopause and Osteoporosis emerged as one of the most important actors in increasing awareness of and affecting the discourse around menopause with media campaigns, interviews, and workshops for healthcare professionals.

Following the argument for focusing on the interactions between gender and transnationalism, paying more attention to the intersections of gender, globalization and technoscientific practices is necessary for a more sophisticated analysis in Science and Technology Studies. Gendered biomedical technologies and increased medicalization of different life stages like menopause constitute examples of these interactions. Addressing the discourse surrounding medicalization allows us to further the discussions of co-construction of users and technologies (Oudshoorn 1999) as well as seeing the links between the global, the local, and what falls in between these concepts. Furthermore, focusing on how narratives and notions (like *bilinç*) are co-opted by the awareness campaigns helps us to understand not only the local conditions of Turkey, but also the more broadly applicable discursive strategies of biomedicalization (Clarke et al. 2003).

**Living chronic disease. About 'patient knowledge'**

*Pols Jeannette (AMC/University of Amsterdam, Dept. General Practice, Section of Medical Ethics, The Netherlands)*

In talk about patient 2.0, it is suggested that patients become more and more independent, and will manage their disease with the help of good professional knowledge and technologies. The ideal patient in its 2.0 version is an autonomous and rational individual, who is at home and armed with the computer takes matters into his or her own hands.

This image of the super-patient pushes away other images of patient life. It misses out on the struggles of living with disease: Living with a chronic disease is no fun, and is troubled by ups and downs, attempts and failures. However, it also misses out on the *strengths* of these practices: the creative ways of developing and using knowledge. This is a collective rather than an individual endeavour.

People with chronic disease live in *knowledge practices*, meaning that they actively use, develop and coordinate knowledge in order to live with their disease. This 'patient knowledge' may be tacitly used or explicitly discussed, and is aimed at helping people to live their daily life practices with their chronic disease in acceptable ways. Patients obtain their knowledge from professionals, from their own experiences and from various sources such as the internet.

To study these patients' practices of using and developing knowledge to cope with disease in daily life, I will connect it to Canguilhem's notion of 'clinical knowledge'. Canguilhem opposes clinical knowledge to 'laboratory knowledge', roughly: scientific knowledge. Not much analysis is done on this clinical knowledge, what it consists of and how it works. Often, it is described as 'tacit knowledge', knowledge that is difficult to translate into propositions and is knowledge-in-use that is embedded in routines or embodied in skills, and is hard –or impossible– to put into words by the one using it (like the knowledge needed for driving a car). It gains its strength not from objective distance, but from close experience.

So far, STS research into patients' relation to knowledge studies how patient organisations influence the production of (explicit) medical knowledge; knowledge itself remains within the biomedical research paradigms. In this presentation I want to open the black box of what patient – and clinical knowledge is a bit more. The research hence develops the work on patients' practices as practices of shaping daily life with chronic disease, and elaborates by studying the use and development of patient knowledge 'in action' and with the help of certain technologies.

**Health-e patients? Critical reflections on technology-mediated self care**

*Henwood Flis (University of Brighton, UK)*

Self care has been identified by both policy and provider communities as a key building block for a patient-centred health service, linking it to both improved health outcomes and the empowerment of patients, especially in the context of long-term and chronic conditions. New patient identities (the 'informed patient', the 'e-patient', 'Patient 2.0' etc.) are said to emerge in this new model of health care delivery and organisation, in which access to information, and the technologies that mediate information provision and sharing, are understood as essential prerequisites for these emergent and empowered identities. This paper explores these new patient identities – both in terms of their articulation in policy, and in terms of the 'lived experience' of those engaged in self care. It examines these identities within the wider context of 'e-health discourse', which is often understood as configuring information, technologies and users in narrow and restrictive terms and relationships with one another.

The analysis draws on data collected during an empirical study of self care in the context of obesity and weight management that took place in one city in the South of England between 2007 and 2009. The study used both conventional quantitative and qualitative research tools (survey, focus groups, interviews) together with more participatory approaches, which involved exploring factors shaping user engagement with information and ICTs in a series of workshops designed to reflect participants' changing interests and priorities.

The paper explores the ways in study participants, who might be thought of as the imagined and already 'partly performed' Patient(s) 2.0, engaged with the idealisations found in e-health discourse. It demonstrates how, through their interactions with information, with technologies and with each other, they sought to accomplish these new patient identities whilst simultaneously resisting the restrictive positionings offered by them.

**There's no place like home? Chronic illness and the strategic mobilization of the home**

*Langstrup Henriette (University of Copenhagen, Denmark)*

With the increased focus on the individual patient as an untapped resource in the quest to make public health care service delivery more effective and efficient, the geographies of care are changing (Willams, 2002). Patients – in particular those with chronic illnesses – are being delegated more responsibility in handling various clinical tasks in relations to the monitoring and treatment of their disease and most of these activities are to be performed outside the institutional setting of health care or more explicitly, at home. Conceptual innovations such as self-care and self-management and technological innovations such as telehomecare and computer-assisted patient monitoring promote the home as a location, which can and should be made useful if the management of chronic disease is to be rational, cost-effective and patient-centered. However, this strategic and technologically supported mobilization of the home as a patient-centered *and* economic-rational solution to growing health spending has been practically challenged by failing success in implementing and sustaining the use of self-care technologies (see e.g. Langstrup, 2008). On a more conceptual level the strategies seem to rest on a particular and limited notion of the home. In this version the home is primarily a spatio-physical location clearly delimited from the clinic, and a more or less empty space to be filled with externally defined 'clinical homework' (Grøn et al., 2008). In this paper I will argue for that a more refined notion of the home is needed, which may recognize the ways in which the home always already is a site of various forms of care (Schillmeier & Domènech, 2009) in ways that might both support or challenge the particular version of self-care promoted in treatment regimes. Also the calls for more technology to bridge the supposed gap between the clinic and the home fail to acknowledge the ways in which there are infrastructures not only connecting but also defining the locations in question (Bowker & Star, 1999). Any strategic attempts to produce particular e.g. computer supported connections are thus necessarily preceded by and forced to co-habitate an infrastructure including other mediating things such medication, information material, phone calls, control visits and more (Willems, 1995).

My discussion will employ the emerging results of a comparative ethnography of the infrastructures connecting and delimiting the home and the clinic in hemophilia and asthma treatment and analyze the ways in which the home is enacted in and through these networks. Apart from getting a more nuanced understanding of existing and emerging geographies of care in relation to chronic illness and their consequences for patients and professionals, the research should also be seen as an attempt to engage differently in technological innovation. The results are thus intended to inform designers and policymakers in the area of telehomecare.

## **The Promise of American eHealth: Instrument of Neoliberalism or Stately Performance?**

*Rowland Nicholas (Pennsylvania State University, USA)*

*Passoth Jan-Hendrik (University of Bielefeld, Germany)*

Health care reform increasingly means health care supported by information and communication technology (ICT). Governmentality studies view the spread of modern health care as highly-technical citizen-oriented projects also referred to as the rise of "biopolitics." However, post-foucauldian studies bring with them a decidedly "instrumentalist" view of technology wherein the spread of projects such as eHealth are conceptualized as tools of neoliberal advancement in health care. As STSers, we find instrumentalist views of technology unacceptable. Instead, we adopt a practice orientation to eHealth that brings biopolitic and performativity together by seeing states as actor-networks, which emphasizes the complexity, multiplicity, and indefiniteness of technological assemblages. Rather than hyperbole and value judgments, we examined these socio-technical projects empirically using a practice oriented theory of the state (Passoth and Rowland 2010). This research direction, we contend, is a possible improvement on post-foucauldian studies as it avoids instrumentalism but includes discursive elements like theories. To improve this approach by developing a model of diffusion, we turn to research on technological expectations (Brown, Rappert, and Webster 2000, Rosenberg 1976, Selin 2007) and to early Latourian (1987) ANT, which offers a particularly nuanced but underutilized perspective on diffusion. Our data come from publicly available documentation from the "eHealth Initiative" (eHI), a nonprofit organization in the United States, whose self-proclaimed mission is to: "drive improvement in the quality, safety, and efficiency of health care through [use of interoperable] information and information technology" (eHealth Initiative 2009). eHI becomes what Robert Merton would call a "strategic research site" because their aim is to engage and integrate multiple and diverse stakeholders -- including hospitals and other health care organizations, clinician groups, consumer and patient groups, employers and purchasers, health plans, health care information technology organizations, manufacturers, public health agencies, academic and research institutions, and public sector stakeholders (eHealth Initiative 2009). We argue that in the documents we studied eHealth is depicted as a political, a technological, and a social project. Additionally, the multiplicity and flexibility of the technology are a necessary prerequisite for linking the technology to the social project; the technology has to be open enough to integrate all attempts to start using it. In lashing-together these three projects, we find that eHI is trying to build-up its own vision of eHealth such that it becomes what ANT has called an obligatory passage point (OPP); an actor so influential and important that it becomes impossible to ignore it and the only way to realize your interests is by pursuing those of the unavoidable, centrally-located actor. But building up this OPP means building up a new "register" for possible actors, their relations, their possible actions, and the alignment of their interests, that is, (re-)enacting a certain performance of the state, mainly, that technology and economics will make America (and its economy) a united and healthy one.

## **Alzheimer's disease organisations and technologies of 'independent living': Tracking transformations in patienthood and organisational cause**

*O'Donovan Orla (University College Cork, Ireland)*

*Moreira Tiago (Durham University, UK)*

*Howlett Etaoine (University College Cork, Ireland)*

While originally the primary cause around which the Alzheimer Society of Ireland (ASI) and the Alzheimer's Society (AS) in the UK, the first two Alzheimer's disease organisations established in Europe, were mobilised was to provide mutual support for carers of people diagnosed with Alzheimer's disease, both now publicly identify as hybrid carers' and patients' organisations. This shift is linked to the identity work (Snow and McAdam, 2000) in which these organisations are engaged (with others) that has led to a recent pluralisation of Alzheimer's disease patient identities. These identities include the long-authorised advanced stage Alzheimer's disease patient who is deemed incapable of self-advocacy and the recently-authorised patient in the early stages of the disease who resists the social disenfranchisement that frequently accompanies a diagnosis of dementia (Landzelius, 2006; Beard and Fox, 2008). In many respects the latter resembles the archetypal construct of Patient 2.0 whereby s/he is deemed to be not only capable of engaging in the organisations' advocacy and knowledge-related activities, but also of making informed choices and self-management of her/his personal healthcare. In this paper, which is based primarily on an analysis of public pronouncements made by the two organisations, we track these transformations in patienthood and organisational cause analysing the organisations' identity work and the tensions arising from the hybridization of their primary constituencies. Sites in which this identity work is performed which provide the focus of our analysis include:

ASI: the Telecare Research Project and a CLARITY research project, both of which investigate the benefits of networked monitoring technologies

AS: the Living with Dementia Programme and the recently established Talking Point, an online forum for people with dementia and their carers, family and friends to discuss all aspects of the condition

All of these technologies are inscribed with a discourse of empowerment through their potential to prolong the 'independent living' capacity of the individual diagnosed with Alzheimer's disease. We consider their roles in reproducing or reducing the dehumanised and debased subjectivity once attributed to all people diagnosed with the disease (Herskovits, 1995). In addition, we question whether these technologies are patient- or carer-centric— in other words, who are their primary end beneficiaries? Furthermore, drawing on Ivan Illich's (1973) work we ask if they are 'tools for conviviality', devices that can enlarge the range of Alzheimer's disease patients' competence, control and initiative. This alerts to how the ASI's projects have to balance support for personal freedom with concerns about surveillance and compulsory consumption, and how the AS's projects experience a continuing tension between public demonstrations of autonomy and the reinforcement of the centrality of the needs and dependency of the Alzheimer's disease patient. Finally, we consider what part these technologies have played, or could potentially play, in reconciling the tensions arising from the hybridisation of the cause of these two national organisations. This is an initial presentation of research from the international collaborative project European Patient Organisations in Knowledge Society (EPOKS).

**Informed consent in the newborn screening practice**

*van der Burg Simone (University of Twente, The Netherlands)*

Since 2004 the amount of diseases for which babies are screened in the Netherlands in the first week of their life has augmented to 17 diseases. This screening takes place in the form of a short prick in the heel of the infant, and the withdrawal of a few drops of blood. This blood is researched for a broad variety of metabolic diseases, sickle cell disease, phenylketonury and hypercholesterolemia.

Informed consent has been the generally accepted way of making this type of screening publicly acceptable, and ethically legitimate. However, in this paper I want to ask the question whether informed consent is suitable for this screening practice. Next to practical difficulties in carrying out informed consent –such as parent's difficulty in understanding the implications of the broad variety of diseases for which is screened, and the parent's difficulty to concentrate on this decision in the first busy period after the birth of a child- the question should be asked whether informed consent is the appropriate way to legitimize screening in general, and this newborn screening in particular.

Originally informed consent was introduced in the medical world in doctor-patient relationships. These relationships were characterized by a patient who suffers symptoms of a disease and who requests help from a physician. After this, the patient has to give her consent to the treatment that the physician proposes. In this patient-physician relation, informed consent has helped to counter paternalism and to protect the autonomy of the patient in deciding how far she wants to go in treating her disease. It has made patients more able to manage their own lives in the face of the overwhelming possibilities for further treatment that medical specialists sometimes offer.

Informed consent, however, has now also been transported to other types of relationships, and is expected to offer the same type of legitimation there. In screening programs, for example, the relationship between the stakeholders is quite different than the patient-physician relationship. Usually screening is offered to the whole population, such as in this case; newborn babies. This screening is not an answer to a question of a patient who suffers a complaint; it is offered to healthy individuals who do not ask for medical assistance. The benefits of screening are also often difficult to determine at an individual level. They are determined at the level of the population. The health of a population as a whole is thought to benefit from screening.

In my paper I would like to analyze the discrepancies between these relationships and show how informed consent is able to protect the autonomy of the patient in the patient-physician relationship, and how its function to protect autonomy is difficult to grasp in the screening-context. Consequently, I want to show that it is hard to use it in the same way as a legitimation in the screening context. The conclusion of my paper will be that the well-known ethical language of informed consent is unfitting for contexts of public health ethics, which involves not individuals but groups of people.

**Consumer medicine and cross-border medical treatment – patients at the crossroads of health policy and business strategy**

*Tupasela Aaro (University of Helsinki, Finland)*

The notion of consumer medicine may appear as a recent phenomenon, but from an historical perspective the roots of advertising to consumers goes back at least three-hundred years. In many ways the notion of consumer medicine is related to the acceleration of the movements of goods, services and patients across various borders and territories, which have been traditionally understood in political terms. Increasingly, however, new technologies, such as the internet, help to transcend such boundaries creating new areas of operation that are more challenging to govern and regulate. At the same time, increased interest has focussed on the 'creation' of the 'expert' or 'informed' patient whose autonomy and independence has been seen as an important development in the transition from what some have called paternalistic progressivism towards medical modernization (Brown and Zavestoski 2004; Fox et al. 2006).

At the juncture of consumer medicine and empowered patients we can locate the development and emergence of cross-border medical treatment whereby patients are no longer restricted to the services offered within their own country. Increasingly, there is a movement of patients from one country to another to receive treatment for ailments or conditions for which they cannot receive or afford in their own countries. In some countries the 'business' of attracting foreign patients is a matter of national policy whereby new revenues are gained by 'tapping' into new customer populations. At the same time, however, the possibilities that arise through cross-border medical treatment relate to what some have termed 'vital geographies' (Kearns and Reid-Henry 2009) whereby the movement of patients across border is limited to only certain segments of the worlds population and in relation to only some technologies, such as IVF.

In this paper I seek to examine the challenges and problems related to the notion of the patient 2.0 in relation to patient empowerment on the one hand and national healthcare policies on the other. The emergence of healthcare policies which emphasize the empowerment of patients through consumer choice the scenario that emerges in relation to health policy is quite problematic and distorted in relation to equality and access to treatments. One can ask how should the issue of cross-border medical treatment be approached within the European policy context?



## **Re-shaping the map of agency in wound treatment? Exploring knowledge and responsibility in emerging practices of sharing patient information through a web based journal**

*Ekeland Anne G. (Norwegian Centre for Integrated Care and Telemedicine)*

The paper reports from a research project that falls within the broad category of performance of new distributions of responsibility, tasks and knowledge in emerging care practices resulting from health care reforms with use of new ICT's. The Norwegian centre of integrated care and telemedicine is currently conducting a number of inter-related projects in this area. This one starts July 2010, runs through 2011 and is funded by Helse Nord.

### **Outline**

The new interaction reform in Norway aims at facilitating new ways of practicing shared patient information between the patient, primary health services and specialist services. The objective is to treat patients at the best effective level. (1)

Access to relevant knowledge and information is considered to be of utmost importance when patients are followed up in primary care between hospital treatments. (2) Helse Nord recommends large scale teledermatology services because patients can be treated regularly at lower cost, which also includes self treatment. (3) There is evidence for high diagnostic accuracy for digital images of wounds. (4-5)

The wound team at the Department of Dermatology, University Hospital of Tromsø is starting to use a mobile, web-based wound journal with the objective of sharing relevant information with the family doctor, the patient and the home healthcare services. Via cell phones or computers all partners have access to reading and documenting text or images in the journal. It will be possible for patients to keep posted on treatments and plans, and those who treat wounds themselves, can access the journal and enclose images taken with a cell phone. It is expected that this will help access, produce, manage and share health related information to improve treatment. (6)

How practices of shearing patient information through web based journals are enacting or reshaping distribution of agency (responsibility, empowerment, autonomy) has not been extensively investigated. This project hopes to contribute to insight in how agency is acted out, and how it might be otherwise according to partners in the project. The goal is to participate in ongoing improvements. By mapping the current situation and options attributed to the new services on information, tasks and responsibility with the different partners and by facilitating dialogue, reflexivity and transparency, the project aims at obtaining partly shared opinions on how to best facilitate and develop best distribution of responsibility and agency.

In this paper, results of the mapping of patient's responsibility and agency will be discussed, as well as expectations attributed to the new services, with attention to the dilemmas between technologically empowered patients and potentials for reduction of autonomy resulting from extension of technological infrastructures into domestic environments.

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## Patient 2.0 figure and practice in the eyes of the patient record computerization

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As mentioned in the call for paper, the figure of the patient 2.0 is a very strange one: it is either considered an abstract 'homo oeconomicus' looking for the best information or service supply and managing his/her health (c.f. Google health 2.0's advertising), or the subject/object of a health service supply aiming cost limitation through a 'juste-in-time hospitalisation'.

In this paper, we would like to question this ambiguous figure linked to a technology-in-project, through a technology-in-use (Orlikowski, 2001): the patient record computerization.

Since mid 2008, our research team is carrying on a research program focusing on the implementation of computerised patient records and their use. The first stage of computerization dealt with administrative and medical data which were gathered from specialised activities, such as laboratory tests' results; French healthcare establishments are nowadays demanded to establish procedural prescriptions aiming the cure and care activity planning and follow up.

We choose qualitative methods to analyze such an on-going and diffuse change: interviews (members of project team; nurses met before computarization), and, mostly, observation (of training sessions, of follow-up meetings, of medical activities with computerized records in different departements of the studied healthcare establishment).

To question the figure of @ patient, we will discuss the results of the above mentioned program in relation with a new research program that focuses on the web 2.0, social networks according to the web 2.0, with a specific focus on @ health and @ patient (Program SyGeo funded by DGCIS; partners: MLstate, CERTOP, HEC, ENIT, Scan & Target; coordinator MLstate).

In the documents and speeches concerning patient record computerization, 'real' patient agency is fairly lacking: the focus is on his medical records, with the perspective of a data flow combined with an on-going activity peacefully and homogeneously carried on.

However, when observing the effective activities of nurses and physicians, patient agency appears vividly in its diversity, and according to a partly unpredictable process: patients refusing to take their medicine, prescriptions that cannot be completed; urgent prescriptions required because of patient acute pain; patients who hesitate to come when admitted, who have to be admitted because of the disease aggravation, whose departure is difficult...

Dujarier (2009) identifies three main forms in the way contemporary organizations have the job made by the consumers, in our case, the patients: guided auto-production, when they produce for themselves through the organization tools; collaborative coproduction, that consists of capturing voluntary work and selling the result (crowdsourcing principle); delegating the organizational work, when the consumer has to find out the solution to his problems. We will specify these forms concerning @ patient as a project, and the questions this rises in taking into account what we observe in the triangle linking patients, computerized records and medical employees. Patients are involved in action nets (Czarniawska, 2006), with a variety of human and non human agents. Tensions and relationships between on the one side, the economics of free, and on the other side, merchant services, can also be explored according to these different patient production forms.

## **Installing Patient 2.0: efforts to effect an appropriate medical discharge of patients from acute geriatric care**

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Understanding changing enrolments of “the patient” in discursive and material practices within healthcare is a pressing concern. On-going changes of healthcare services and settings are arguably under way, involving the configuration of new patient identities and the formatting of multiple forms of patient participation. In this paper we address the salient matter of the changed patient by focusing on the aftermath of events such as a stroke, a heart attack, or a serious bone fracture. Such occurrences can prompt sustained change in the “normal version” of a particular patient, in particular when this person is elderly. Drawing on material from ethnographic studies of every-day work at two Swedish geriatric wards with specializations in „generic acute geriatric care, we see how efforts to rehabilitate patients with such conditions require their enrollment in larger medical infrastructures which extend into domestic environments. These arrangements are complex, spanning across organizations, professional and laymen groups and time.

Our interest has been to follow the means by which patients and their surroundings are (re)configured to fit each other. We do this through two lenses: First, the efforts to (re)-equip patients with various support technologies – material, social and so on – prior to re-entering every-day living outside of the hospital ward. Second, the negotiation of patients exit from the ward in the bi-weekly multi-professional team meetings. Both of these activities involve numerous participants – professional practitioners, the individual patient, his/her next-of-kin, civil servants at the individual patient’s resident municipality, home care service providers and so on. It further draws on a broad repertoire of technologies – electronic patient journals, walkers, nutritional supplements, care plans, standard operating procedures and so on.

Our study highlights intricate work in which multiple versions of a patient converge and diverge in efforts to establish and realize the “un-patient”, a person no longer entangled with the hospital ward. This necessitates coordinating and reconciling of different cognitive and material configurations and inscriptions of the patient, of the home setting and of the ward (cf. Mol 2002). As part of this coordination work, we see mediation between versions of healthcare practice as choice or care (Mol 2006). Within the studied patient group, medical events (notably stroke) serve to redefine and challenge both individual and general formatting of “functional agency”. By extension, the study takes issue with the capacity to reconcile conflicting definitions and enactments of the patient ex ante.

**Telecare for the elderly living at home: New care arrangements, practices, relations and definitions**

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This paper addresses the introduction of new telecare technologies for elderly people living at home, investigates how they change care arrangements, practices and relations, and analyses how care is redefined and redistributed in these new configurations. For this it draws on data from a European research project exploring the introduction of telecare for elderly people in Spain, Norway, the UK and the Netherlands (EFORTT). The research is based on ethnographic studies as well as citizen panels in all four countries, and analyses the data according to script-analyses.

The paper argues against the dream of telecare as the technical fix and solution to aging populations, care crises, workforce shortage, and rising care costs and spending. The results from this collaborative research project show that telecare does not replace or come instead of care networks; telecare depends upon, brings along and or mobilizes care collectives. As part of these care collectives, it also introduces and assigns tasks, skills and responsibilities to a range of new actors and figures, including technologies, operators, installers, instructors, and service providers. Further, telecare requires a lot of work of relating, negotiating, and adjusting from users, patients and carers in order for people to integrate and live with these new technologies, and for them to work well and do good.

But telecare also makes users/patients aware of themselves, their bodies, needs, relations, limits and separations, in new ways. They learn to know, examine, recognize, and explicate themselves and their condition in ways that used to be taken care of by others. Telecare also gives the patients the task of being more active, self-aware, responsible and self-managed than used to be expected. This means that telecare implies a new definition of care, and of good care, as looking after yourself and being independent – rather than being cared for by others. Care is redistributed onto the patient/user her- or himself. Accordingly, telecare users have to be relatively fit and able. At the same time, however, telecare makes visible that users/patients are *not* independent individuals, independency is at best an achievement, depending on networks and collectives.

**Not every patient is 2.0: importance of mediation for accessible healthcare services**

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Patient 2.0 conveys a representation of the citizen as being the main actor in its own health management. Far from being a passive consumer of services, patient 2.0 is expected to actively participate in health care system through the access, control and sharing of health-care information.

This vision seems to fit well with the profile of a young, socially integrated and IT-skilled person, but seems to exclude all those citizens that live in a situation of social or technological marginality.

Our studies conducted in the field of Ambient Assisted Living and Tele-assistance suggest the importance of trust and mediation in connecting frail citizens to health care services. The main goal of our study was the evaluation of a tele-assistance service (TAS) integrated with a wireless sensors network (humidity, temperature, smoke, gas and water) installed in the users' houses. The TAS is intended to guarantee protection and safety for older adults living independently at home. It is based on a call centre and acts both as a bridge between the person in need and first aid, and as a data collector about health and psychological user's status. The TAS operators call users weekly in order to check their situation, perceive their psychological and health status, and keep track of every change. Three different sources of information contribute to create an integrated user profile: (i) the user who voluntarily communicates health-related information about his/her status to the contact centre operators; (ii) the sensors, which collect data automatically from the environment; and (iii) the call centre operator, who gathers information thorough direct questions to users and indirectly by inferring user status from the conversation with her/him. All the information about users and their environment are collected in a local database accessible only by call centre operators that forward information through e-mail or telephone to social workers, medical staff or informal caregivers, depending on the type and relevance of information. The longitudinal evaluation of this service was conducted over 3 months in the homes of 10 selected users. Two aspects emerged from the study that can be useful to drive the design of patient-centric infrastructures in order to be acceptable and accessible by frail older people: (i) the resistance of older adults to share personal and private information with strangers, and (ii) the strategic role played by the call-centre operators in filtering, interpreting and mediating the information flow between older adults, health related services and informal caregivers. It is worth noting that the "human factor" emerged as a crucial requirement in determining the trust of users toward the call centres operators.

In conclusion, when talking about patient 2.0, different levels of autonomy and participation should be foreseen to allow equal opportunities to access future health-care infrastructures. Besides this, it is crucial to consider that a sort of "mediated participation" should be taken into account to guarantee a more accessible healthcare system, by leveraging on human agencies that connect low IT-skilled patients with a wider digital source of information.

**Evaluation of usefulness concerning web based support for young carers of persons with mental illness**

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Many young carers of persons with mental illness shoulder great responsibility but have little support from others and are not well recognised by health care. They are vulnerable and risk falling ill; for this reason it is important to develop useful support that meets needs important to them. Since this group is experienced Internet users they might benefit from a web based support. However, information and communication technology (ICT) in terms of web based support via Internet is a new arena for health care; it is a new way to communicate and interact. Consequently there is a need to examine quality and usefulness of such ICT interventions for different target groups. This requires adaptation and further development of theories and methods concerning quality of care, since these originally are developed for a health care based on personal meetings face to face.

The presented study focuses on the evaluation concerning usefulness of a web based support (ICT intervention) for young carers. The study is a part of the research project *Ps Young Support* conducted in Sweden, which comprises development of an ICT intervention and evaluation of its effect on health and usefulness in concern of carers' needs. The project is based on a participative design process and the ICT intervention is developed in collaboration with participants from the target group. The web support contains information, as well as possibilities to communicate with experts and with others in the same situation.

About 220 young persons, 16-25 years of age, caring for a family member or a close friend with mental illness, were randomised into two groups. One group got access to the ICT intervention and the other group got an information brochure about other supports for young people available in the community. The participants were asked to complete questionnaires at three occasions during the intervention; at baseline just before the intervention, after 4 months, and after 8 months in March 2010.

In this study, usefulness is measured in terms of the intervention's ability to meet important needs of support for young carers. The intervention is therefore evaluated by means of a process perspective. Data is collected concerning the participants' expectations, their experiences and use of support as well as their view on the importance of different types of support, including the ICT intervention. Data will be presented and discussed considering dimensions related to quality of care and evaluation of usefulness concerning web based support.

**Patient 2.0 Revisited: Towards Empowering Networked Care***Christensen Lars Rune (Department of Computer Science, Aarhus University, Denmark)**Grönvall Erik (Department of Computer Science, Aarhus University, Denmark)*

One perspective on patient 2.0 is rendered through the rhetoric of technology-empowered citizens able to self-organise, self-manage and self-care. This perspective seems to be based on two premises. First, it seems to imply resourceful citizens, rather than citizens with few resources such as for example weaker groups among elderly. Secondly, it seems to focus on the individual, rather than networks of actors comprised of for example the elderly, caretakers, health-workers and relatives.

Our project is part of a national Health-Innovation initiative ([www.bdsi.dk](http://www.bdsi.dk)). It is aimed at coordinating the care of the elderly living at home with assistance from caregivers and usually also family members. At this early stage, we have identified the elderly, family members, volunteers and professional caregivers as heterogeneous participants in a loosely coupled care network. We currently explore settings where elderly due to age or sickness encounter problems in self-management of their care. These elderly still live at home, even if they are not as resourceful as they used to be. For example, one elderly woman in a wheelchair used to call the local electrician if a light bulb had broken and have him replace it. While she can still use a phone, nowadays she is reluctant to call unfamiliar persons and remains in the dark until family or friends discover and replace the broken bulb - this kind of light maintenance work is not part of the care offered by the municipality. Can elderly that e.g. have partly lost the ability to use well known technology such as a phone benefit from Patient 2.0, introducing new technology aimed at self-care and self-management?

The patient 2.0 perspective seems to focus on the individual, rather than networks of actors. This is evident not least in the repeated use of the combining form of the noun 'self' as in e.g. 'self-organise' and 'self-care'. This language use seems to emphasise the individual, rather than a network of individuals that may be important for the support for an elderly person. In our project we have identified that care of elderly is usually a shared responsibility among family members, friends and professional caregivers. For instance, in one case in connection to an elderly women's out clinic eye-surgery, it was the daughter that managed transportation and handled post surgery medication. That is, the daughter called the taxi company and made sure to inform the caretakers that her mother needed to take some prescribed drugs after the surgery.

In cases where care is managed in a network of actors (e.g. by relatives, caregivers and elderly) rather than through self-management or self-care, is the current notion of patient 2.0 sufficient in relation to for example technology design in connection to 'network-managed care'? Perhaps it would be a good idea if the discourse surrounding the patient 2.0 perspective included uses of the noun 'network' as in for example 'network-organise', 'network-manage' and 'network-care'? In some cases it is the 'network' of actors that needs empowering, rather than merely the 'self'.



## Prototyping Patient 2.0

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Lately, another kind of electronic health record, often called to as the Personal Health Record (PHR), has received increased attention from both private and public enterprises. Essentially, the PHR is a patient-centric web-application by which patients can access, produce and share health related information. The PHR addresses multiple, sometimes competing, motivations for creating improved patient satisfaction and disease management as well as increased efficiency and patient empowerment (Kaelber et al., 2008). We report on a participatory design research project\* where we prototype a PHR as a tool for chronic ill ICD-patients\*\* and their healthcare network. As part of the project, patients co-design PHR functionality and thereby re-shape their own role and practice. By prototyping several versions of PHRs we negotiate a particular Patient 2.0 which is what we present and discuss in the following.

The PHR-prototype we introduce is a relatively simple web-application but in practice it re-positions patients and consequently challenges healthcare professionals' treatment of them. In one part of the PHR we provided twelve patients the possibility to record symptoms, write their anamnesis and keep an online diary for ten weeks. The produced content provoked strong reactions from healthcare professionals and basic disagreements among patients. When patients record utterances and experiences as text and as selected categories in the PHR, content is transformed from silent expressions into formal and powerful information. It induces design implications on what (patient produced) health content is, who its recipients are, and who and what are to act upon recordings of critical symptoms. Patient-generated content makes for a new practice that renders Patient 2.0 a more responsible and consequently disciplined actor (Berg, 1997) with increased expectations of active membership attached.

Another part of the PHR challenges the remote monitoring setup of sending and interpreting quantitative data from the implanted ICD-device. The remote setup has changed the process of interpretation from being performed locally into a now distributed and asynchronous setup. As shown by Bjørn (2010) this changes the process of interpretation and evaluation of the condition in significant ways. Primarily, the new distributed setup results in a lack of contextual information being available to the healthcare professionals. By prototyping the PHR we probe into ways of re-positioning the patient as a reliable and valuable content provider, while still maintaining the benefits of remote monitoring. Patients are required to keep an authorized list of medication, a personal profile as well to formulate changes in their condition, by which affordances similar to the earlier local process are introduced – mediated by the PHR.

When the PHR enters the healthcare network, patients are re-introduced as technologically empowered actors with increased expectations towards taking part in their own treatment. The patients become actively engaged but are simultaneously required to take on increased workload to realize the full potential of Patient 2.0, which challenges the logic of care (Mol, 2008).

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\*The CITH project (Co-constructing IT and Healthcare) is an ongoing 4-year interdisciplinary research project, which investigates while intervenes in the collaborative practices involved in disease management of remote monitored ICD-patients. [www.cith.dk] (Andersen, 2009).

\*\* Chronic heart patients with an ICD (Implantable Cardioverter-Defibrillator), which is an advanced pacemaker.

## **Living Profiles: Using Human-Centered Design Research Methodology to Create a Personal Health Record to Transition Teens with Special Healthcare Needs**

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LIVING PROFILES, funded by the Robert Wood Johnson Foundation (Project HealthDesign), is a personal health record (PHR) application designed to address the needs of teens with chronic health conditions through an integrated and personalized environment. Our PHR concept incorporates a Mood Meter that captures teen texting data and visualizes it in a compelling landscape format that depicts frequency and content. By incorporating mood tracking through existing behaviors, teens are encouraged to self manage their health through observations of daily living.

In addition to capturing teen texting data the PHR platform allows teen-centric personalization and customization such as photo/music/video uploads from mobile phones and goal setting. These features help sustain engagement enriching the overall experience. Other modules include teleport medicine which allows for immediate feedback with a member of their health care team and a reminder device that offers gentle nudges of life management. By allowing sole privacy control by the teen, the PHR platform empowers them to reflect on how their behavior impacts their therapy and effects their quality of life.

We employed a design-centered research methodology by creating 6 unique probe activities that solicited data using a teen-centric language. These included deploying new mobile phones connected to a personalized blog for mobile journaling and a blank CD with an iTunes gift card that encouraged creating a personal playlist of their life. These activities when combined with in-home interviews with the teen and their best friend, created evocative returns fueling our end prototype.

Utilizing co-creation with an iterative process we engaged the same teens over time and found that on a singular level the PHR platform gives the teen the opportunity to reflect on their daily activities. However, we also found that the teens longed to invite friends to compare their data. They were excited by the concept of seeing the visualization of their friend's current health as well as share their own. This desire to create social networks in their health management raises issues of privacy and potential risk for all teens.

Through our research we found that teens are invested in their relationship with their health care provider and paired with their ease of engagement with technology, are poised to change the existing landscape of managed health. All participants concurred that this device created a critical new, and much needed, communication bridge between teens and their doctors which allowed patients to express themselves more effectively with the healthcare team. In turn, doctors were able to personalize treatments and improve both compliance and quality of life for these young adults.

LIVING PROFILES was developed over three years through collaboration with teens, health providers, designers, and technologists located at Stanford University, Children's Hospital at Orange County, Art Center College of Design, and MOTO development group.

**EnCoRe (Ensuring Consent and Revocation) and E-Health: Building Novel Tools for Better Individual Control in the Management of Personal Data**

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In today's information society, individuals increasingly tend to provide personal information via digital means to companies, government bodies and other public and private institutions. Data provision and sharing practices are expanding as governments internationally embrace the promises of digital economy for the delivery of services and benefits to their citizens. However there is also increased reporting of data losses, identity fraud, and recognition of the legal ambiguities and limitations of current regulatory powers to monitor and protect privacy. This has made increasingly aware that they currently have very little control over how their personal information is used once it has been passed to a third party. As informational technology develops and increases the pace with which personal information is collected and processed, so do calls for 'user-centric' technology by which individuals can assume meaningful control over 'their' information. In this context, intuitive mechanisms that can empower individuals to access, self-manage, share their personal information and actively make choices about its use are increasingly in demand.

The EnCoRe project is developing an integrated approach for user-centric management of personal data in selected contexts, two of which focus on health-related technologies: 1) human biobanking and 2) assisted living telecare. Both areas are considered to be crucial for the development of health infrastructures across Europe and beyond, and attract generous research funding at local, national, international levels. This project is a large interdisciplinary research platform between academic and industrial partners committed to developing joint technological and regulatory mechanisms that can protect individual privacy and nurture individual empowerment and choice. A core area for this project is the design of integrated patient and health consumer-centric tools to improve current management of consent and revocation of consent practices in the use of personal data.

Research initiatives and platforms such as EnCoRe emerge as new forms of alignments with the potential to transform the social and techno-scientific dynamics of health and healthcare. They employ notions of informational 'citizenship' and patient empowerment but also critically acknowledge their advantages, limitations, and implications. EnCoRe is developing a conceptual framework that integrates notions of informational 'self-performance', self-management and individual control to the design of robust technological and regulatory solutions aimed at enhancing individual choice, service provision, and use of personal data in healthcare. This paper critically presents the conceptual underpinnings of this novel framework in tandem with emerging shifts in self-care, promotion of patient choice, and self-management. It also reports on the focus group research that we have undertaken with biobank participants regarding concepts of privacy and preferences for governance mechanisms to protect privacy. It places the project in a broader social, regulatory and policy context, and discusses how such considerations affect individual agency in informationally-driven healthcare. Furthermore, this paper aims to contribute to the current debates on the role of large interdisciplinary initiatives as social, techno-scientific actors within shifting regulatory and informational environments.

EnCoRe: <http://www.encore-project.info/index.html>

HeLEX: <http://helex.medsci.ox.ac.uk>

## **Empowering Patients in the Communities of Healthcare Practices - A Knowledge Management Model of Healthcare Organizations in the age of Patient 2.0**

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Since the 1990s, Japanese healthcare organizations such as hospitals have been implementing relationship management and knowledge management that were developed by commercial service providers. While these "Hospital 2.0" projects may reproduce and/or reinforce forms of dominance, control, and oppression of the patients, they may also increase the possibility of collaboration between patients and healthcare professionals in order to improve and create new healthcare knowledge and practices.

In terms of research on knowledge management, situated cognition including "community of practice" and "cultural-historical activity theory," institutional theory of organizations, empowerment (Minkler & Wallerstein), narrative/story-telling, and multicultural societies, this paper elaborates a model of knowledge management of healthcare organizations based on a knowledge-creating relationship of healthcare organizations/professionals and patients, who are empowered in the communities of practices. It aims at creating new healthcare knowledge and practices in and around a healthcare organization as a self-organizing network of the self-managing and knowledge-creating "communities of healthcare practices," which includes communities of "patients' mutual help," "clinical collaboration of patients and healthcare professionals," and "professional projects." This knowledge management model of healthcare organization assumes a "communitarian" (Taylor, Walzer) model of healthcare system and society. While the conventional healthcare system of a liberal welfare= nation state admits only one "legitimate medical knowledge" that is exclusively authorized by the government, the model envisions a communitarian society with multiple bodies of legitimate medical knowledge that are authorized not only by the government but also by non-governmental, local or global organizations. The communities of healthcare practices are expected to focus various "contradictions" in the existing healthcare system, most of which are found within the boundaries of related social systems such as social welfare, law, economy, arts, culture, and education as well as within the boundaries of various healthcare professions. They are expected to create knowledge and practices in order to solve contradictions, and subsequently to transform larger social systems and institutions.

The political model of communitarianism has been criticized as involving the risk of "essentialism" that generates a fixed image of the community, its members, and their values and practices. A community of practice has a tendency to oppress, forcefully assimilate, or exclude minorities and newcomers, thus leading to the closure of a community and the homogenization of their knowledge. To prevent such malfunctions of the communities from occurring in their pursuit of knowledge management, the healthcare organizations need to provide recognition to and support for the "differences," i.e., the diverse and heterogeneous knowledge in the network of communities of healthcare practices by helping "political" minorities to be empowered in the network. These political minorities include patients in general, and in the communities of mutual help, they include those patients who are either inexperienced or suspicious of the physicians' services, or social minorities such as women, foreigners, and the aged. Utilizing the latest ICT, healthcare organizations need to collaborate with patients and other related organizations to construct an environment in which the "story-telling" or "narrative" of every patient is encouraged and every activity and resource of the communities is transparent for her.

## **TRACK 27**

# **How Do We Collaborate? Scrutinising the Relationship Between STS and Biomedicine**

### **Convenors:**

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**Bernhard Wieser (Inter-University Centre for Technology, Work and Culture, Graz, Austria)**

**Michael Arribas-Ayllon (ESRC Centre for Economic and Social Aspects of Genomics, Cesagen, UK)**

## **Behind the image of ELSA: Negotiating autonomy in research on psychiatric genetics**

*Arribas-Ayllon Michael (Cardiff University, UK)*

*Featherstone Katie (Cardiff University, UK)*

The term 'collaboration' is the active counterpart of the discourse on interdisciplinarity: to engage in interdisciplinary research one must collaborate. There are aspects of this discourse that are sometimes cast too politically – that collaboration enjoins new forms of accountability and creates closer relations between science and society. In this sense, collaboration is the means by which disciplinary autonomy is curtailed to produce instrumental knowledge and to reduce critique. However, there is another sense in which interdisciplinary collaboration generates new and unexpected forms of autonomy. This paper explores the temporal and relational aspects of our collaboration with scientists working in the field of psychiatric genetics. Rather than hindering this relationship, we argue that ELSA provides a framework for performing scientific accountability while at the same time providing a reason for access to social science fieldwork. We use the term frontstage and backstage to describe how the collaboration draws its strength from creating an image of accountability and from developing an ethos of trust. Without the latter, collaboration is neither possible nor desirable. But this 'strategic' relationship is not without its tensions: negotiating autonomy involves managing difference, ambivalence and misidentification. These are problems that not only arise from different epistemic cultures but from asymmetrical power relations; these are problems that are experienced first-hand when social scientists become 'insiders'.

## **Ethics as Power Process: a reflexive account of the philosophers place in ELSA research**

*Berger Wilhelm (Alpen-Adria-Universität Klagenfurt, Austria)*

The letter „E“ in ELSA refers to a specific approach in dealing with ethical aspects of modern biomedicine and genome research. According to this approach the main ethical task allegedly consisted in finding general principles to be used as guideline for research and medical action. Such ethical understanding postulates two important premises. Firstly, that the position of the philosopher is the position of an outsider who is a non-involved observer. Secondly, that ethical problems emerging in the context of genetic medicine are best dealt with by the production of appropriate ethical rules.

With this paper, I want to counter the aforementioned ethical approach. There are at least two important reasons for my criticism. At first, it can be argued that the position of an ethicist is no longer one of a neutral outsider. This is particularly true for collaborative arrangements commonly described with the acronym ELSA. Rather it is so that ethicists have themselves become actors in the field which they set out to analyse and advice. Ethicists have become actors of the biomedical ensemble to the extent to which they inform law-making and produce policy relevant documents.

There is a second reason why I oppose the mentioned ethical approach. In the biomedical context, ethical problems are prompted by specific, organisationally structured situations in which decisions are made and diagnoses are established. Deducing solutions from general principles often does not offer useful answers for those who need to cope with the problems prompted during the encounter with genetic medicine. Therefore I suggest an inductive approach. Ethics must start from what concretely happens in the given situation.

It is a crucial consequence of this conception that ethicists must reflect on their own role in the context of collaborative ELSA projects, too. Because they have become actors themselves, it has become a vital task to address the relationship of ethics and power. Those who take this proposition seriously must also reflect their own role in the context of collaborative ELSA research and discuss its implications. In such a way ethics can be thought of as a reflexive process, as an undertaking that is not deduced from readymade norms, but an activity that rests on the interdependence of ethicists and the arrangement which we call ELSA.



## **“Synergy” – and some less misleading terms to characterize interdisciplinary collaboration**

*Bønnelycke Julie (CEHA, University of Copenhagen, Denmark)*

*Jespersen Astrid Pernille (University of Copenhagen, Saxo-Institute, Department of Ethnology, Denmark)*

*Andersen Michael Christian (CEHA, University of Copenhagen, Denmark)*

CEHA (Centre for Healthy Aging) is a new research project funded with 150 million DKK over a period of 5 years from a private fund (the Danish Nordea Foundation) that especially encourages the promotion of interdisciplinary collaboration. CEHA thus focuses specifically on organizing collaboration between Hard and Soft Science; collaboration that is expected to result in synergy.

“As the pivotal point for the Centre for Healthy Aging, interdisciplinary subjects are established that tie together the separate disciplines and programmes and ensure optimal synergy-effect.”

But how is synergy understood and conceptualized in CEHA, and is the promise of synergy the only path that interdisciplinary collaboration can take? Building on the criticism of interdisciplinarity raised by Marilyn Strathern - commenting on how the “soft”, social sciences are often seen as an optional add-on, implying that they can also be subtracted when superfluous - the aim of this paper is to explore and discuss a more elaborate vocabulary on interdisciplinarity, suggesting that synergy is just one version of the scientific practices of collaboration.

Our empirical foundation comes from two interdisciplinary projects, both being part of CEHA, where ethnologists are collaborating with medical/health sciences. In one project; FINE, the ethnologist takes part in an intervention-study about the effects of physical training for metabolic health. The ethnologist brings in the social perspective by studying the challenges of getting more exercise into everyday life. Thus it is expected that with the ethnologist the work will reach a new form of completeness, as the medical and physiological results are set in a social perspective.

In another example (Neuro), we examine the ethnologist's part in an interdisciplinary project on fatigue among elderly patients suffering from apoplexy. Here the ethnologist becomes a part of the research due to the limitation of the natural sciences in explaining and measuring fatigue, and thus the ethnologist's humanistic approach represents an alternative to the natural sciences.

With this empirical foundation we introduce and explore the concepts of gift-giving by Marcel Mauss, trading zone by Peter Galison and Susan Leigh Star and James Griesemer's boundary objects as means of understanding interdisciplinary collaboration.

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## **The “collaborative momentum” in the ethnographic enterprise: Why do we do what we do?**

*Bürgi Birgit R. (Department of Social Anthropology, University of Cambridge, UK)*

The paper argues that the “collaborative momentum” is taking to test a yet supported position among ethnographic fieldworkers along the lines of “We do not know what we do when we do, what we do in the field”. Ethnographic insights, such as those Alan Macfarlane shared in a recent CUSAS seminar on film in anthropological fieldwork, echoing Ann Gold’s introductory remarks in *Fruitful Journeys*, are being examined for their prevaricating critical reflection on the social forms we enact through our research practice. Not only is this romanticised *Weltanschauung* of ethnographic fieldwork problematic in epistemological respects, it also raises ethical and practical questions on the basis of how we engage with the “Other” and “Ourselves” in the collaborative ethnographic enterprise.

Contemporary trends in the natural and social sciences indicate expansion and intensification of research collaboration between, within and across the scientific disciplines and institutional sectors. This shift towards the collaborative, reflected in national science and technology policy frameworks, and more recently, in official development assistance (ODA) policies, and perceptible in the proliferation of public-private product development partnerships (PDPs) in global health, makes the deconstruction of the comforting, but intriguing innocence and naïveté imbued in the presumption of not knowing why we do what we do, a necessity.

Unlike so often assumed, and reiterated in the outline of this session, the gatekeepers can, but need not be “our colleagues from the biosciences”. Confidentiality clauses enshrined in collaborative agreements can well be factors to keep social scientists off their bench and science work. Drawing upon my fieldwork in the Thailand Science Park, I can say that access to scientists and laboratories at the National Center for Genetic Engineering and Biotechnology (BIOTEC) has been rather straightforward. Contractual obligations, relegating to a Memorandum of Understanding (MoU) with a world-leading pharmaceutical company, however have precluded the disclosure of research materials and results. The bio-scientists’ compliance with codes of best practice in science collaboration of both, their affiliated and their partner organisation Novartis, has brought into perspective the question if the conventional line underpinning the dualistic relationship between ethnographer and informant in the fieldwork encounter can be maintained.

By means of an experimental ethnographic intervention – a collaborative initiative to mark the 2009 World Science Day for Peace and Development, embedded in the International Science and Bioethics Collaborations (ISBC) project – BIOTEC researchers were prepared to talk about their research activities. The prospect of co-organising a semi-public session has, so-to-say, become the gate opener for investigating possible negative externalities of global investment in malaria drug research and development (R&D) and access programmes that are premised upon international science collaboration. Practical, ethical and methodological considerations that have emerged during the preparatory phase of this joint outreach event are elucidated and discussed in this ethnographic and personal account. My initial research findings suggest generic assumptions of everything falling into place and making sense, at the latest when “outside again”, are no longer tenable in an increasingly collaborative ethnographic setting.

## **Doing Society and Genomics: On the Interactive Production of Convergence**

*Stegmaier Peter (Dept. of Science, Technology and Policy Studies, Institute for Governance Studies, School of Management and Governance, University of Twente, The Netherlands)*

'Doing society and genomics' embraces scholarly research and analysis as well as project collaboration, policy and polity advice, public debate, science communication, and education. It takes place as engagement with and enactment of society and genomics issues. The production of such nexus can be interpreted as 'convergence-work'. It takes part in a space of actively connecting life-science and societal issues which has been co-created by governments, funding agencies and research centres. Research centres and researchers are expected to contribute to participatory life-science governance and provide knowledge to various publics, to support inter- and transdisciplinarity, to stand for both academic robustness as well as for societal serviceability and visibility. Involved are also individuals who have a biography of crossing between life- and social sciences. This intermediary role, both on the institutional and/or personal level, has been built on existing expertise in genomics related issues, just as in collaboration that crosses domains of knowledge and practice. This paper explores key features of the way how two current society and genomics programs, the Dutch 'Center for Society and Genomics' and the British 'ESRC Genomics Network', execute top-down initiated frameworks and thereby make them their own in dual efforts of boundary- and convergence-work. The paper will elaborate on a series of empirical categories developed in order to describe the practical side of institutionalized ELSA/ELSI type of work.

## **Feminist critique of reproductive technologies: between fundamental opposition and collaborative research**

*Freitag Daniela (IFZ- Inter-University Research Centre for Technology, Work and Culture, Graz, Austria)*

New reproductive technologies are of major interest to feminist critique since the second half of the 20th century. After feminist concerns had already been articulated by social movements they also found their way to academic discourses (Nave-Herz 1997). Using a historical review of important developments in feminist studies since the 1960s, I aim to address an elementary problem of critical research: A choice is to be made whether or not to engage in collaborative research. The history of feminist critique of new reproductive technologies provides an instructive case to trace scholarly choices between fundamental opposition and incremental improvement.

I begin my historical review with the powerful social movements of women during the 1960s. Women demanded equal rights, questioned traditional role models, promoted the right to define their sexual relationships in whatever way, called for equal access to resources (job market, health care etc.), and insisted on protection against domestic violence. Most notably feminist activism fought for the legalisation of abortion. By the mid 1970s, feminist efforts have successfully established the right to decide over their own body in many Western countries (UK: 1968, USA: 1973, Austria: 1974, Germany: 1974/1976).

It is remarkable that reproductive technologies, developed in the late 1960s, have already been broadly applied in medical practice since the mid 1970s, but academic feminist critique of these technologies has started with a delay of over ten years. Only in the 1980s, the claims of the feminist movement have entered academic discourse. Now women made experiences highly affecting their own lives subject to academic scrutiny (Schwartz-Cowen 2008). At this time the implications of new reproductive technologies (IVF, surrogacy, and prenatal testing) moved to the centre of feminist critique (e.g. Gena Corea 1985).

Especially, in Germany women took a rather critical stance on biomedical technologies, fundamentally objecting the application of these technologies, prominently expressed at the “first German congress of women against new gen- and reproductive technologies” in Bonn 1985. Others have, however, focussed on the improvement of medical services in order to increase accessibility and apply them according to women’s needs.

To conclude with, I recall a more recent development. Fundamental feminist opposition can hardly be found in the field of ELSA research. This is particularly true for Germany and Austria. Feminist scholars have for the most part chosen to articulate fundamental critique from the outside without engaging in collaborative research as it is favoured by the ELSA framework. The exploration of the historical development of feminist critique of new reproductive technologies and biomedicine raises questions which are important for all researchers dealing with ethical, legal and social implications of biomedical technologies.

**Orders of worth in controversies over electronic health records**

*Garrety Karin (University of Wollongong, Wollongong, NSW, Australia)*

*McLoughlin Ian (Monash University, Melbourne, Victoria, Australia)*

*Wilson Robert: (University of Newcastle, Newcastle, UK)*

Ever since the ‘captives of controversy’ and ‘politics of SSK’ debates of the 1990s (Ashmore & Richards, 1996; Scott et al., 1990), STS researchers have been aware of their problematic positions vis-à-vis their human subjects, especially when their research addresses controversial issues. Whether we collaborate with biomedical colleagues, or adopt more distanced positions that draw on documents and/or interviews, we risk being co-opted by participants in debates, or charged with undermining the foundations upon which medical enterprises build their claims to legitimacy –objectivity, efficacy and a concern for the common good.

Our research uses a theoretical framework which, while not solving these problematic relationships, provides a novel and productive way of mediating interactions between our own knowledge projects and the interests of the people we are studying. We are in the early stages of retrospective, comparative analysis of attempts to design and implement regional and national systems for sharing electronic health records (SEHR). Although SEHR are technically feasible, attempts to implement them have been complicated by arguments over privacy, medico-legal responsibilities, workloads and a general reluctance to adopt new practices until benefits are proven. We have found the theory of conventions, developed by Boltanski and Thevenot (1999; 2006) to be a fruitful framework for making sense of the arguments and positions adopted by actors in the situation, and of the conflicts and stalemates that have plagued SEHR projects. Boltanski and Thevenot seek to understand the conventions through which people in western societies establish and maintain the legitimacy of various enterprises, and the grounds from which they mount credible critiques. From observations of ordinary arguments and readings of canonical works of political philosophy, Boltanski and Thevenot identified six ‘orders of worth’ that are commonly used to justify, evaluate and criticise claims and actions. Our work so far suggests that several orders of worth are at play in SEHR projects. The dominant justification emerges from the industrial order, and emphasises the efficiencies that can be gained from easy access to patients’ records. Against this, arguments from the civic order claim that SEHR undermine citizens’ privacy. Other orders are also relevant, such as the domestic order of traditional doctor-patient relationships (trust, dependence, authority) which are threatened by industrialisation. STS researchers are often inspired by democratic ideals from the civic order. We aim to give voice to the marginalised and those who lack resources to challenge the medical-industrial complex. A focus on conventions enables us to go beyond descriptions of ‘multiple perspectives’, by attaching them to orders of worth and then systematically probing sources of tension and possibilities for compromise. This can be done without debunking or adopting a superior moral position. The framework also provides a justification for our research – something to trade in return for access, information and funds. As a conceptual framework and mode of analysis, it allows disparate, context-bound worldviews and assumptions to be identified and described in a way that facilitates a search for future productive interaction.

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## Enterprising ethnography

*Hunice Lotte (University of Southern Denmark, Institute of Public Health, Research Unit Health, Man & Society)*

This paper is concerned with how I as a social scientist may contribute critically and constructively to a multi-disciplinary and multi-party project on telehomecare for patients suffering from chronic obstructive pulmonary disease (COPD). It draws on the emerging social science literature on the challenges of carrying out social science research in biomedical settings.

I am currently engaged as a “qualitative health researcher” in an ongoing (2008-2011) research and development project entitled: “Telehomecare, chronic patients and the integrated health care system.” The project has a focus on “user driven innovation” and employs triple interventions related to patients (home monitoring, hardware solutions), professionals (specialist training, software solutions), and the organisation of care (collaboration across health care sectors). My participation urges me to reflect upon several aspects of being part of this particular collaborative constellation. My reflections concern 1) how I am positioned and may position myself, 2) what the purpose of my participation ought to be and may entail, and 3) what agenda is possible and workable if I want to participate critically but constructively to the development of telehomecare in the context of the Danish health care system.

1) I am positioned as a qualitative health researcher amongst various kinds of health professionals, engineers, organizational researchers and private companies (co-financing the project). I was invited to co-operate with the head of the project, a social scientist/qualified nurse, on researching patients’ experiences with COPD and home monitoring. Thus, my critical social science approach was requested and is actively drawn on, for example as I am co-organizing a panel on user driven innovation and giving talks on patient perspectives in various contexts. This is a comparatively favorable position for a social scientist in an interdisciplinary project on the provision and development of a new kind of health care service. However, this position does not do away with the challenge of how to align oneself with what and who, for what purposes and to achieve what ends. 2) I was invited with dual purpose: on the one hand investigating user perspectives on the telehomecare service tested in the project, and on the other hand participating in the development of methods for involving patients in innovative processes that may qualify not only this particular telehomecare service but concepts of telehomecare in general. The dual purpose poses questions of whether and how critical research and critical participation in developmental work may be possible and productive. What does criticality and productivity entail in this particular context? 3) One part of my research agenda has developed into the study of how concepts of self management and user driven innovation frame the kind of research and practical development going on in the project. These concepts are generally used to convey an understanding of patients as active, capable and in charge of their lives. Presently, this understanding works smoothly to engage health researchers, clinicians and funding agencies in providing solutions that resonates with patients being self-supporting. However, our preliminary findings show that this understanding needs some modification when evaluated from the perspectives of the patients and their relatives. The possible consequences of bringing out this kind of knowledge needs to be considered.

**Collaboration in/for research story-making: the case of studying stem cell research and ethical scientist in South Korea**

*Hwang Seyoung (University of Sussex, UK)*

This presentation does not concern direct or instrumental collaborative contexts, but instead addresses issues related to the way in which the research is shaped through interactions between the researcher, informants and the research context. In doing so, I try to identify elements of 'collaboration' between the researcher and informants in terms of their shared sense about and critical engagement with the stories that are constructed through the research process. The aim is to consider how social scientists can develop their research aims and inquiries in ways that also matter to research subjects themselves whom they study, but at the same time by addressing tensions arising from the research process.

Using my fieldwork experience over nine months in South Korea for the study of bioethical debate and regulation in the area of stem cell research, I show the cases in which stem cell scientists that I invited for an interview became involved in the research topic by accounting for 'ethical scientist.' I particularly focus on the rhetorical styles and attitudes showed by the scientists during interviews in constructing the categories of scientist identity, which often concerns implicit negotiations between the researcher and the interviewee and makes interpretation of the meaning elusive. I also explore the contexts in which we became more self-reflective, leading to a more collaborative dialogue. Finally, I reflect on the writing process as a method of inquiry, through which I became the author of the research story in ways that consider the readership of collaborators/interviewees.



**The impact of visibility: Who wants to be a ‘research subject’ and what does this mean for conducting comparative ELSA research?**

*Naue Ursula (Life-Science-Governance Research Platform, Department of Political Science, University of Vienna, Austria)*

In this presentation, different experiences regarding the collaboration of ELSA researchers with scientists/clinicians in the field of Alzheimer’s research and clinical practice in Austria and Sweden will be discussed. Whereas Austrian scientists/clinicians were interested in becoming ‘research subjects’ and getting the opportunity to highlight diverse challenges regarding their work, Swedish scientists/medics were aware of their international visibility and their funding situation, and therefore not really interested in presenting their research findings in the context of a social-scientific project. Hence, the first part of the presentation aims at examining the impact and the effects of social-scientific research on the situation of ‘research subjects’. The second part of the presentation aims at discussing the consequences of different ways of collaboration for conducting comparative ELSA research. Although the presentation is based upon a particular bi-national comparison (Sweden, Austria) and a specific clinical research field (Alzheimer’s Disease), general conclusions may be drawn from this study. Whereas the collaboration and discussion among Austrian scientists and clinicians highlighted specific challenges and raised awareness for these, the collaborative model of Swedish scientists and clinicians reflected confidence and a very positive self-image. The Austrian example illustrates that ELSA research may ‘support’ specific research fields and reflects the intention of the initial ELSI understanding as an integral part of the scientific process. In contrast, the Swedish case suggests that ELSA research in fact can be an autonomous scientific endeavour, with social researchers on the ‘outside’ as observers rather than partners in the process. In this example, context has multi-layered meaning for comparison and for collaboration: The specific situation in countries and scientific fields seems to have a huge impact on the results of comparative ELSA research – not only in the obvious sense (practices and policies reflect and interact with different contexts), but also in the sense that different contexts shape the way we achieve results. The presentation discusses these challenges in the light of the underlying study and will question the ways we conduct comparative ELSA research.

## **Hybrid networks: Reflections on collaborating with collaborators in clinical research networks in Sri Lanka**

*Sariola Salla (International Science and Bioethics Collaborations, Department of Anthropology, University of Durham, UK)*

*Simpson Bob (International Science and Bioethics Collaborations, Department of Anthropology, University of Durham, UK)*

As part of research into international medical collaboration and bioethics Salla Sariola carried out ethnographic fieldwork within networks of researchers and doctors who were involved in clinical trials in Sri Lanka over a period of a year from 2008-2009. The study focused on two phase 2 drug trials: one an academic, publicly funded trial, and the other a pharmaceutical company funded trial.

This paper is a reflexive account of relationships between social and medical scientists and challenges the conceptualisation that these scientists are simply objects of social scientific research. Among the push factors that lead to the problematisation of that definition is the requirement (of social science funding bodies) to engage with stake-holders, end-users and research participants through collaboration, dissemination and impact. Local bodies also play a role in specifying their conditions for research access. Among the pull factors are the benefits that biomedical scientists might expect to gain when welcoming social scientists into their midst.

These factors make for a complex entanglement in the personal and professional networks of those that we were studying. For example, Bob had existing contacts within the field that Salla inherited and developed. She not only studied the research networks but was closely involved in subsidiary aspects of the work that was being carried out, such as being involved in PhD supervision. Working together with the researchers and doctors made both of us part of the networks and thus part of the topic that we were studying. As researchers, we brought a layer of expectations, possibilities, and negotiations to those networks. Conscious of this, fieldwork was an on-going process of negotiating positionality and respective interests.

The paper asks what happens when we become an additional, inseparable part of the collaborations that we are studying? What are these hybrid networks like as anthropological objects? Finally this paper discusses the questions that our presence as part of those networks might raise, namely questions about objectivity and analytical independence, when putting forward representations of the processes we described.

**Interdisciplinary Collaborations. The dynamic interplay between Global Scenarios and Habitus**

*Sleeboom-Faulkner Margaret (University of Sussex, UK)*

*Patra Prasanna K. (University of Sussex, UK)*

This presentation concerns collaborations between social scientists and life scientists. Such collaborations usually emphasise the instrumental nature of the multi-disciplinary co-operation and the surplus value of joining efforts. For instance, the study of bioethics and research regulation in the laboratory or in a life science project would lead to valuable insights into the life sciences practice and possibly even to finding ways of improving research performance, research guidelines and policies.

The emphasis on such collaborative expediency, takes for granted the research context and the aims and ulterior motives of both collaborative partners. In our presentation, we would like to illustrate this by showing how those contexts affect both access to collaborative partners and the exchanges that take place between social and life scientists in the field.

Using examples of collaboration between social and life scientists, we show how the collaboration is lopsided and dependent on the respective aims of the collaborators. Most importantly, we show how subjective associations held by life scientists lead to very different 'Global Scenarios', imagined depending on the particular background and features of the social science researcher. On the other hand, it is the social-scientifically defined 'global scenarios' in our minds that often bring us to approach certain scientists in the first place.

**Researching genetic and reproductive technologies: How to create a critically engaged path between social science and medicine?**

*Svendsen Mette N. (Department of Public Health, University of Copenhagen, Denmark)*

*Koch Lene (Department of Public Health, University of Copenhagen, Denmark)*

This paper explores the possibilities for conducting critically engaged ELSI research in the biomedical field. ELSI projects are often collaborative projects where social scientists and biomedics share funding and are supposed to act on equal terms. However, power differences often shape the relationship and pose the question of how we as social scientists handle the complexity of working in a field where biomedics are our informants and peers at the same time. Based on our experiences of researching genetic and reproductive technologies in Denmark we explore the problems involved when social scientists attempt to use biomedical peers as informants and still want to maintain an independent critical research position. We discuss how the social scientist's critique may be raised and how resistance from biomedical collaborators may qualify such critique, make it empirically embedded, and more sensitive to its possible practical and political consequences. Resistance from biomedical collaborators, however, may also reveal differences in epistemology and power that sometimes question the scope of engagement and its knowledge politics. We argue that such differences should not be seen as "problems" that can be "solved". Rather, we discuss in what ways and with which aims and consequences differences in epistemology and power may be addressed in the production of knowledge.

## **How did we come to collaborate: on the emergence of ELSI research**

*Wieser Bernhard (IFZ, Inter-University Research Centre for Technology, Work and Culture)*

The Human Genome Project (HGP) is commonly known as a paradigmatic example of a scientific research programme in which ethical, legal, and social implications (ELSI) have been made an integral part. Hence, sociological reflexion is not only dealing with genome research as a research object, but it is organisationally integrated within it and also funded by the same client (Yesley, 2008:4).

With my paper, I would like to evoke the historical circumstances in which the specific ELSI arrangement was introduced that later became a model for many national genome research programmes. For this purpose it is necessary to carefully examine incidents in the run-up to the HGP. Already in 1985 renowned scientists started to discuss the HGP (Cook-Deegan, 1994). In order to promote the enterprise to map and sequence the entire human Genome, in April 1988 the so called "Human Genome Organisation" (HUGO) was founded (McKusick, 1989). Only six month later, James Watson – co-discoverer of the DNA-structure and founding member of HUGO – was appointed to head the HGP. It was Watson who announced during a press conference on the occasion of his appointment that 3% to 5% of the HGP funding would be devoted to ELSI (Marshall, 1996). But what prompted Watson to waive approximately 100 million US\$?

It has been argued that ELSI-research was a concession to win the approval of the U.S.-American Congress to the funding of the HGP (McCain, 2002; Wexler, 2003). Taking into account how ELSI became an integral part of the HGP raises a number of fundamental questions. Borrowing from the "mode 2" vocabulary (Gibbons, 1994; Nowotny, 2001) allows me to ask, to what extent the ELSI-model contributed to the "social robustness" of genome research and biomedicine. Seen from this perspective ELSI research appears to serve rather instrumental goals such as to promote public acceptance of genome research.

Providing a historical account, I intend to address more fundamental questions regarding the possibilities and limitations of studying the ethical, legal and social aspects of genomics in such institutional arrangements. Does the integration of ELSI-research rather domesticate the critical potential of social science and philosophical analysis or, seen more optimistically, does the ELSI-model offer a chance to shape genome research in a more socially sound way? Addressing these issues, I aim to contribute to a critical reflexion of the circumstances under which collaborative ELSI research is carried out today.



## **TRACK 28**

# **The Meaning and Doing of Bodies and Gender in Medicine and Healthcare**

### **Convenors:**

**Aala Petersen (Monash University, Melbourne, Australia)**

**Samantha Regan de Bere (Peninsula College of Medicine and  
Dentistry)**

**Antje Kampf (Johannes Gutenberg-University, Mainz, Germany)**

**Rainer Brömer (Johannes Gutenberg-University, Mainz,  
Germany)**

## Con-Forming Bodies

*Ashmore Lisa (Lancaster University, UK)*

This paper discusses bodies and their relationship with Image Guided Radiotherapy (IGRT) technologies, (currently being implemented in radiotherapy departments worldwide). A cone-beam computerised tomography scan (CBCT), aiming to improve the accuracy of radiotherapy treatments, allows practitioners to verify, in 3D, patient position before the radiation beam is turned on, something which traditional verification systems cannot do. Because of this increased visualisation inside the patient's body, new proximities are established between patient, practitioner and machine.

I focus on the relationships between patient and practitioner, and patient and machine, demonstrating how, together, the machine and body con-form to produce the CBCT image and, therefore, the role of the IGRT technology. The CBCT images are created from the recursive relationship between the machine and the bodies in action with it. The patient bodies, adapting in order to produce scans which are within the reasonable limits of the machine, animate and execute the function of IGRT, re-arranging in order for the service to work, and are rendered as subjects disciplined to the demands of the machine and the practices in which it is embedded.

Analysing ethnographic fieldwork in two UK hospitals, I present some of the demands placed upon patients undergoing treatment for prostate cancer using IGRT techniques. For example, in attempts to control the position of the prostate gland, patients are asked to ensure they have an empty rectum and '*comfortably*' full bladder before each treatment. The CBCT scans are compared to an image of the patient obtained before radiotherapy treatment commences, a moment in their own bodily history, a pre-treatment, 'gold-standard' of internal anatomy positioning. The ways in which the bodies act (controlling fluid intake and toilet visits) and are acted upon (through the issue of preparation protocols), demonstrate how they strive to achieve the internal arrangement required. Because each CBCT image is compared to their own body, the responsibility (is seen to) lie with the patient, they are disciplined by comparison with earlier inscriptions of themselves. This record of the self, which patients must strive to replicate, is 'The Norm', monitored by the image and therefore filled with human and technical expectation. The IGRT qualifies and classifies the patient's body using this image and failure results in the cancellation of that day's treatment.

Using these images, practitioners explain to patients where their bodies (may) fail to meet the required 'standards'. This mediation of the relationship distances the practitioner from the patient and their bodily waste. Presenting the image to the patient reinforces the notion of con-forming the CBCT image and confronts them with techno expectations that are hard to fulfil. Issues of patients being unable to hold onto their '*comfortably*' full bladder, having to stop the scan or the treatment halfway through completion, not only causes embarrassment for the men involved but makes them doubly culpable; the body is not conforming and they are not making it conform. That the context is the highly charged one of cancer treatment, only serves to intensify the demands on these bodies.

**Here is an interesting case of... [consultation]**

*Ayres Richard (Peninsula College of Medicine and Dentistry)*

What is the purpose of a consultation between a doctor and a patient? Most current answers to this question will talk about “diagnosis and treatment” of the diseased body. The patient is viewed a machine that has a malfunction of the body, and increasingly of the mind – both viewed as entities ultimately understandable in “scientific” terms. Moreover doctors are castigated for not being “scientific” enough, for not treating each “case” according to “evidence-based” protocols. Such discourses are modern, powerful and ubiquitous. But what kinds of “science” do doctors use? How much do they need to know and from what sources? At the Peninsula Medical School in the UK, the Institute of Clinical Education “Science Hub” has challenged itself to think broadly about these questions. Drawing on a review of the literature, studies of practicing clinicians and a multidisciplinary research panel, a programme of research has been instigated. This presentation by a member of the Science Hub (and a practicing GP) will consider the ontological and epistemological underpinning of current discourses around “science” prevalent in medical education. It will suggest that some discourses are predicated on a flawed ontology that will often fail both doctor and patient. This subject therefore is not only of academic interest but has something to say about the attributes required of 21<sup>st</sup> Century doctors. Real case studies will be used that illustrate these assertions. By starting with a different view of the consultation, and of the way in which the “body” is constructed, the question of what kinds of “science” doctors need to help their patients will be considered. Under the headings of “science as doing”, “science as knowing” and “science as thinking”, a contemporary - perhaps radical view of science teaching for doctors will be presented.



**“Enlivening... despite its disgusting animality”. The rise and fall of lamb blood transfusion, Sweden in the 1870s**

*Berner Boel (Dept. of Thematic Studies, Technology and Social Change, Linköping University, Sweden)*

My contribution will discuss practices and controversies around blood transfusion from lamb to human patients in Sweden in the 1870s. The Swedish enthusiasm for this therapy was part of a more general European trend, but it soon waned in the light of negative clinical results and aggressive scientific resistance. The story is nevertheless interesting for what it tells us about local experimentation with a new medical technique, its advertised therapeutic and military value, and the professional controversy that it occasioned between practicing doctors and laboratory scientists. Of more general interest is also the boundary-work involved to distinguish or align human and animal blood, including framing lamb's blood as more *natural* blood than that from human bodies.

In today's discussions of organ or cell transplants from animals to humans (or xeno-transplantation) there is an interesting paradox. The animal, from which tissues or organs are to be taken, should be sufficiently *similar* to us for it to be medically possible for our bodies to accept the organs. At the same time, the animal should be sufficiently *dissimilar* to us for us to consider it ethically acceptable to exploit it, kill or molest it, and make it suffer for our sake. In this contradiction there is a third problem involved: how to avoid a feeling of disgust about introducing animal parts into our bodies?

The controversy surrounding the use of lamb's blood during the 1870s almost exclusively focused on the first, medical question: how similar is our blood to that of animals? What happens in our bodies when their blood is introduced? What was considered a closed scientific issue was re-opened in the late 1860s by two practicing clinicians in St. Petersburg and a small German town, claiming the success of direct lamb's blood transfusion in lieu of existing techniques with human blood. Their publications and techniques spread widely, including to Sweden, and occasioned both experimentation and a heated debate.

Interestingly, the second question about the moral acceptability of making animals suffer for our sake, was only touched upon by those involved. The third question – about the disgusting introduction of animal blood into human veins – was also quickly dismissed. Rather, the oxygen-rich blood from the lamb's artery was considered *natural blood* and thus, as one doctor phrased it, “despite its disgusting animality ... much better than human blood from the veins”. As to the patients, none seems to have expressed any reluctance towards getting animal blood in their veins, and doctors were free to enact this quite painful new therapy on gravely ill patients.

I will discuss local practices to connect human and animal bodies, and the polemics surrounding the physiological bases for transfusing animal blood. Events and debates can be seen as part of a struggle for hegemony between clinical and scientific medicine in the late 19<sup>th</sup> century, as well as an interesting early attempt to establish what is today known as evidence-based medicine.

## **Boundaries and Risk: Media Framing of Reproductive Technologies and Older Mothers**

*Campbell Patricia Ann*

Assisted reproductive technologies (ARTs) have historically been sites of heated sociotechnical controversy. However, as the technology has become more routinized, ART-conceived babies have generally become regarded as an “everyday miracle” and the risks associated with them, a private matter between a woman and her doctor. In other words, the risks surrounding ARTs are no longer newsworthy. Only when the socially, culturally, medically, and politically comfortable boundaries surrounding these technologies are challenged does a public discourse of risk emerge. One such discourse of risk surrounds the use of ARTs in what might be termed “older mothers,” particularly postmenopausal mothers. In this paper, I review the social science literature related to the risks of ARTs and the conceptualizations of “older mothers”. Next, I move to analyze the specific case of Ranjit Hayer, who gave birth to two boys at age 60, in the context of the Canadian media coverage the week following the birth, using concepts from cultural approaches to risk perception, constructivist studies of technology, and risk communication theory. I argue that risk discourses emerge when technologies and users expose and challenge the contingent stability of the sociotechnical discourses surrounding them. This leads to a public re-opening of a “closed” technology and user and a reconstruction of the risks associated with them. This case demonstrates how an apparently “settled” sociotechnical network becomes reframed in terms of risk, and how the negotiation of this risk reveals, constructs, and interweaves various boundary discourses.

## **How much computer is hidden under the skin? Reconstructing the history of patient simulators**

*Canavas Constantin (Hamburg University of Applied Sciences, Germany)*

Igor breathes, raises his thorax, moves his eyes, talks to people who surround him, sweats, urinates, goes into convulsions and other illness symptoms, begins bleeding, and eventually dies. What he can not do is work, or walk up the stairs. But can a bed-ridden man do more than Igor?

Igor is a modern patient simulator. He weighs 80 kg and looks quite real. He is one of these models which were developed during the last years for training purposes. His is supposed to reproduce functions of human physiology. On the one hand this is realised by means of his stupendous similarity to real humans – more precisely: real male humans – a fact which is most important for training students of medicine and medical care stuff. On the other hand this similarity is realised by means of a computer-based simulation programme and a special trainer, who is monitoring the simulator.

The history of the patient simulators follows two paths. One path is dominated by the simulation of physiological functions of the human body. This story begins in the 1950s with simulating wounds, and leads to the puppets for resuscitation training. The other path follows computer-based simulation of response patterns related to brain functions, blood circulation, or muscles. Such programmes include the simulation response to infections, injection of drugs, or other inputs (disturbances).

The development of simulators of the latter category up to the wireless monitored models of the recent years can be read as a history of the efforts to create meaning of human embodiment in medicine by means of computer-based modelling and simulation. This development is characterised by interactions in networks of trainers, technology developers, market actors, and lay technology users. The present study traces such interactions in the case of Igor (the German version of iSTAN). One goal is to show how the muscle-and-skin covered computer simulator supports a certain set of choices in the spectre of physiological human response patterns whereas others remain neglected. Further it can be traced how such choices frame visions of informatics in medical education (e.g. in the Physiome Project).

A further goal of the study is concerned with the interaction between the perception of the potential of simulation techniques on the one side and the stabilisation of societal values on the other. Aspects of this interaction are e.g. the masculine sex of models like Igor/„iSTAN, or the choice of the simulated physiological functions. Further interactions occur in the context of the diffusion of a novel type of medical technology devices, the public access defibrillators (PAD). In PAD applications such models are undressed and treated by lay users. It is precisely the public perception of the body of the Other (eventually a concept of lay user constructed by experts) that becomes the object of the training with the patient simulator: How to train laymen in crossing the limit of the bodily otherness and conduct operations formerly reserved to medical stuff. One strategy of this training is mainly supported by another technology embodied in the PAD itself – the decision algorithm for the defibrillation shock communicated to the lay user by the artificially speaking PAD.

## **Multiple enactments of Spinal Cord Injury disability at the onset of an earthquake: Mapping the Textual Terrain**

*Chishtie Farrukh (University of Western Ontario, USA)*

On October 8, 2005, a massive earthquake devastated northern Pakistan. An estimated 75,000 people were killed while at least 125,000 people sustained injuries. The health care system in Pakistan was overwhelmed as a result. Subh-e-Nau, a local NGO, put together a Disability Reduction and Rehabilitation Strategy and currently works with post-earthquake persons with disabilities with Spinal Cord Injury (SCI). These were identified as the most underserved population amongst the disabled. A community based rehabilitation (CBR) program (WHO et al, 2004) was initiated, focusing on this sub-population. Initiated in December 2006, this established program by Subh-e-Nau has treated 170 SCI cases in the Muzaffarabad region. While implementing rehabilitation services, the organization involves doctors from various governmental institutions for medical treatment of this population as well.

In my ongoing PhD dissertation work, this is viewed through the Actor Network Theory (ANT) lens. Relevant research questions are as follows:

- How do human and non-human actors bring together the existing medical science network in governmental institutions in relation to the CBR model implementation of countering disability in the context of SCI?
- Accounting of these multiple ontologies of SCI (Mol, 2000, 2002; Mol & Berg, 1994) and interrelated epistemologies/ontologies of actors, how does co-ordination of the CBR program and translation (Mol, 2002; Law, 2002; Law & Mol, 2002; Callon, 1987), and various modes of ordering (Law, 2002) come into its existence as a unity in a network? Here I would conduct interviews of major actors involved, including six patients under the care of the local NGO program.

While observations and interviews are still being conducted, a textual analysis of relevant policies and textbooks, (in an interpretation of texts as non-human actors) will be presented in this presentation. Drawing from one aspect of Law's definition of ANT insofar that texts are interrelated (2007), a document analysis is conducted as follows. The first levels of complexity in the mapping of this "textual terrain" are documents related to the relevant medical policy documents set out at the national scale by the Ministry of Health, Pakistan. On the end of implementation of CBR, the WHO document is studied in relation to the program policies adapted to this document by Subh-e-Nau.

Documents such as the Pakistani national medical curriculum mediate between national policy and medical teaching and are studied at the next level. Texts related to ethical guidelines by Subh-e-Nau personnel, job descriptions, are included at this level. At a final level, I incorporate analysis of textbooks directly related to medical practice and SCI.

It is found that there are minimal references to disabilities, rehabilitation sciences and spinal cord injuries in government policies and related texts. A dominant bio-medical model proliferate the texts, with the body and gender sensitivity also grasped from this lens. The adapted texts by Subh-e-Nau and its CBR network meet some of these gaps, including issues of gender inequality and also translate and enrol various available government services towards a more holistic treatment of SCI patients in the region.

## Corpus delicti? Historical perspectives on the ordeal of diagnosis

*Demaitre Luke (University of Virginia, USA)*

Diagnosis plays a significant role in “our present complaint” (Charles Rosenberg) about the depersonalization of medicine. My paper explores this role in a historical perspective, looking beyond the commonly posted turning point of the eighteenth-century “clinical gaze,” and paying special attention to glimmers of the patient experience. In a broad premise, I propose that every diagnostic method (with the notable exception of taking the patient’s pulse and history) has increasingly objectified the body. In a more focused thesis, I argue that clear manifestations of this development surfaced in the *iudicium leprosum*, the official examination of suspected leprosy patients across Europe from the thirteenth to the seventeenth century.

Certificates and other archival records make the *iudicium* appear as ‘an ordeal’—which, indeed, has become a perception of diagnosis in general. Three semantic layers in the notion of ‘ordeal’ typify the personal drama. In the most general sense, of a trying experience, the process may be anticipated with anxiety, accompanied by discomfort or pain, and undergone with helpless submission. Second, it takes on the character of a judgment (*Urteil, Oordeel*), with judicial charges and rituals, exhibits and probes, and verdicts and consequences. On the deepest level, the *iudicium* connotes the ‘trial by ordeal’, with the principle of ‘guilty until proven innocent’, acceptance of ambiguity, recourse to chance tests, and deference to a higher authority (Natural Order or Divine Justice). Each successive level finds the patient more passive, deprived of initiative, and alienated from the exhibited and examined body.

The body eclipses the person in the diagnostic techniques of the *iudicium*, from unblinking visual inspection to palpation, and to bizarre experiments on the skin and on the drawn blood. The techniques reflect interests of the time, which ranged from alchemy to autopsy and from aesthetics to social conformity. A wide-angle view also reveals affinities—as well as contrasts—in the distancing effects of diagnosis then and now. The intense *Besehung* of the *iudicium leprosum* foreshadowed the mechanical ‘seeing’ of X-rays, MRIs, and CT-scans; the detached *experimenta* anticipated objective laboratory testing; and, arguably, the probing needle pricks were harbingers of aggressive biopsies.

This paper is innovative in at least five ways. First, it concentrates on diagnosis as experienced by patients rather than from the conventional vantage point of medical theory and practice. Second, it reconstructs that experience from direct or indirect self-revelations and supposedly formulaic documents. Third, the exploration reaches beyond the boundaries of a historical narrative in order to illuminate timeless aspects of diagnosis. Fourth, the analysis applies interdisciplinary insights to the notion of ordeal (anthropology), the doctor’s role as judge (sociology), patient passivity (psychology), and the body as exhibit (iconography). And fifth, questions are raised about the relation between diagnostic procedure and subject, with the aim of stimulating debate about ethical issues such as aggressive testing, patient autonomy, and the prevalence of impersonal and fragmented laboratory results over holistic observation.

**Women as a concealed factor. Epistemological entanglement of the medical phenomenon of anorexia**

*Derra Aleksandra (Nicolas Copernicus University, Poland)*

The history of medicine seems to be a perfect place to look at the evolution of the ways the female body has been treated and conceptualized in western culture. Especially, the development of esthetic medicine, dermatology, plastic surgery sustains quite traditional view of the female subjectivity based on corporeality. Therefore, I propose to have a look at the history of *anorexia nervosa*. I use Ludwig Fleck's idea of mechanisms of development of scientific facts and the crucial notions of his psychosociology of scientific knowledge (such as a thought-style, thought collective, scientific fact etc.) in order to present the basic processes which have accompanied the development of the medical phenomenon of anorexia (the history of anorexia, and the early attempts at naming and diagnosing it). I emphasize that in order for this phenomenon to be established as a medical fact, a more common and appreciated medical thought-style had to be developed. I confront anorexia as an illness in the medical thought-style (an individual, homogenic disorder of psychological etiology has been discovered by William Gull and E. C. Lasèque) with the feminist thought-style, where social and cultural factors play a major role in understanding this phenomenon. Given the fact that 90-95% of anorexia patients are women, feminists (like Susan Bordo, Kim Chernin, Julie Hepworth, Susie Orbach and Helen Malson, naming only a few) underline that it should be treated more as a radical version of a more common affliction of our culture (with its obsession with thinness, good looks, attractiveness). They notice that as such, it cannot be cured on the individual level, for more systematic changes in the way of thinking about subjectivity, femininity and corporeality are required. It seems that there are no effective methods of healing anorexia in the medical thought-style; in contrast, the feminist view raises hopes for postulating new ways of treating this phenomenon, which gives us possibilities of new research and new ideas for eliminating it. In other words as long as we do not take cultural factors seriously, as mentioned above, we will not be able to eliminate the phenomenon of anorexia from the developed countries.

## **Influence of Vincenz Priessnitz's Hydropathy on the Perception of the Body and Bodily Practices in the 19<sup>th</sup> Century**

*Hanulik Vladan (University Pardubice, Czech Republic)*

The historical ground for analysis of this article is the rise and development of historical phenomenon of *hydropathy* - medical treatment constituted and practiced as highly popular method by non-educated healer Vincenz Priessnitz in the first middle of 19th century in Austrian Silesia. Main issue is to follow influence of this non-conventional medical therapy on the perception of body and change of bodily practices and *habitus* of patients, which through acceptance of these unorthodox medical techniques developed unique way of self-treatment and different way of *bodily being in the world* and excluded themselves partly from the field determined for educated professionals in of conventional biomedicine (Foucault).

Heuristic sources are defined by preserved archival documents from the first half of 19<sup>th</sup> century, essentially a collection of correspondence addressed to Priessnitz from his patients, biographical memoirs and also scientific as well as popular literature about *hydropathy* or hydrotherapy published in 19<sup>th</sup> century.

According to Priessnitz's theory the disease was caused by the presence of the substances in the body which were extraneous to his nature; such as allopathic and homeopathic drugs, alcohol, tobacco and spices. The cure consist in internal and external applications of ice-cold water. To facilitate this process and to endure heroic cure was necessary at first reinforce the natural power of the human body through other elements of *hydropathy* – strict diet prescribed by Vincenz Priessnitz without alcohol, tea, coffee, tobacco and spicy meal. Other element was physical movement – for example long and exhausting physical work in the open air. The water cure treatment served to cause so called “crises” – abnormal and dangerous state of physical as well as mental exhaustion, manifested by erythra, high temperatures and sweating, through which were the extraneous substances expelled out from the body.

Theoretical frame is based on the the conclusions of Merleau-Ponty's phenomenology of perception, emphasizing the role of bodily ways of knowing and sensing in the process of dealing with health and body as the key element which influenced not only differences in the view of self as an object and in the case of *hydropathy* much more also a subject of therapy, but also influential changes in *habitus* (Bourdieu) and everyday life. More specifically – the aim of the article is to analyze impact of very specific system of holistic physical therapy, which was provided by more or less exhausting watter cure treatments on the changes of self knowing and body image. We can call this process of changes as the result of radical process of *embodiment* (Csordas) in which were some of the patients able to recognize limits of their's own physical integrity and endurance and learn how to deal with the body as not just an object of therapy, but as a part of themselves.

## **Reconstructing Body Boundaries: On physical rehabilitation of lower limb amputee**

*Hoffman Michal (Hebrew University, Jerusalem, Israel)*

In this research I discuss the process in which amputation, once defined as disability, becomes a subject of institutional normalizing project. Data were collected during ethnographic observations in physiotherapy ward and later analyzed within the framework of qualitative tradition.

The findings reveal the complexity of the rehabilitation process that aims at treating the irreversible broken body boundaries by adjusting to prosthesis use. As evident body boundaries are being closed in a process during which prosthetics cease to be 'mechanical devices' and become 'artificial limbs' carrying the attributes of biological legs. Being held in a biomedical setting the process reflects Foucault's (1980) and Turner's (2001) discussion on "governmentality" – the production of the body as an object of professional practice that produces, governs and regulates it. Physiotherapists serve as agents who re-socialize amputees by educating them not only how to perform body techniques in the proper cultural manner but also how to refer to their prostheses as legs; turning a hinge into a knee and a plastic-basis into a foot.

The findings challenge the conventionality of prostheses that paradoxically impose pain and discomfort on users. The observations raise ethical issues concerning patients' welfare in a process that reproduce social perceptions of body normality according to which aesthetics exceed all other considerations in managing disability.

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## **Bodily connections. In and out of the laboratory**

*Jespersen Astrid Pernille (University of Copenhagen, Denmark)*

*Bønnelycke Julie (University of Copenhagen, Denmark)*

*Eriksen Hanne Hellerup (University of Copenhagen, Denmark)*

*The imperative of health: at once the duty of each and the objective of all (Foucault, 1994).*

Since the Eighteenth Century there has been a political concern with how to ensure the good health of 'bodies' - that is the *societal body* as a whole as well as the *individual body* (Foucault). At present one of the key arenas for this concern with the societal/individual body is overweight and obesity.

In this paper, we present selected material from our field study of a research project (FINE), which seeks to generate knowledge about the complicated interrelations between exercise and metabolic health. FINE's creation of this knowledge, we will show, entails an intricate work of linking societal and individual bodies. It is these links and transformations of bodies which are the topic of this paper.

### **Test body and societal body**

The aim of FINE is to use experimental results to specify the general exercise recommendations, and thus promote good health. The project is based on the Board of Health's general recommendation of 30 minutes of daily exercise. The recommendations are aimed at a *societal body* that represents the healthy adult Danes. These recommendations are tested in FINE on selected test subjects. The subjects are transformed to *test bodies* through intervention studies, sampling and exercise programs. Thus, the researchers create a *test body*, which is linked to the project, configured and maintained as *test bodies* through specific strategies. Parts of the *societal body* are excluded from the *test body* even though the final results are to be translated and disseminated to the *societal body*, since the results will form the basis for changing recommendations for the population as a whole.

### **Ontological choreography and strategies of attachment/detachment**

In the intervention project, the shaping and reshaping of bodies is constantly ongoing. In the experiment the participants oscillates to act as *test subject* and *test body*. The *test body* is subject to sampling and measurement, which is sought cleansed for individual factors that can be disruptive to overall validity of the test results. At the same time strategies to coach the test subjects are mobilized in order to ensure that they will complete the experiment making their test bodies available for examination. Thus, as a subject, the individual is linked to the access of the object (the body). The notion of *Ontological Choreography* (Cussins, 1996) is used to understand the movement between the two. We emphasize how this choreography is silenced in the transformation to general recommendations at the expense of the subject. We analyze the way in which test subjects are connected and disconnected to the project as strategies of *attachment* and *detachment* (Moreira, 2004), thus implementing the above mentioned transformative movement.

## **Experiences of Aging as a Cultural Construction**

*Konola Annika (University of Turku, Finland)*

This paper explores the ways in which history is attached to individual body experience. I ask how the experience of the body change due to aging is interpreted, and what kind of cultural images of aging these interpretations represent in Finnish culture. I propose that history has a remarkable role in the way in which an individual experiences her or his body and how she or he translates that experience.

In my previous study concerning the cultural construction of menstruation, my findings led to a conclusion that aging caused body changes function as milestones for the individual's history. Body changes are not only personal body experience but at the same time they are a social process as well. The individual gives a personal meaning for that experience. By interaction with social environment she or he personalizes that experience, and assesses it by comparing and reflecting her or his experience of aging body according to one's social-cultural environment.

I define body experience as individual's life course related process. As an outcome of this process she or he will become an individual attached to her or his culture, language and the surrounding world. A wider view on both the individuals' history and the social-cultural environment's history opens to us when studying historical aspects of the aging experience.

In my ongoing study I collect information of aging body experience in three ways. At the first phase I examine material of article series *Sielu ja ruumis* (Mind and Body) which has been published for past ten years in monthly supplement for main Finnish daily newspaper Helsingin Sanomat. In these articles publicly known Finnish persons tell about their relationship to own body. Text is accompanied by an artistic naked photo of given person. Analyzing pictures and texts I generate views on what kind of aging body related cultural meanings these articles present. At the second phase, based on first phase material analysis I will interview five women and five men with an aging body-based perspective. Finally at the third phase I will invite separately women and men to take part into two *Body and history* memory working groups.

In my proposed presentation I will bring up for discussion how we can create cultural history knowledge on aging by studying individual body experience, and also how we can better understand individual's body experience with this knowledge. I will elucidate this with examples from my studies of cultural construction of menstruation.

## **Value and vitality: contract surrogacy policies and practices**

*Murphy Dean (National Centre in HIV Social Research, University of New South Wales, UK)*

New reproductive and communication technologies have facilitated the expansion, fragmentation and globalisation of conception, pregnancy and childbirth. These technologies have produced new actors, some of which provide reproductive material or services for a fee. This paper examines the way in which bodies, reproductive material and information circulate, and how value is attributed and relations are created through contract surrogacy practices.

There is strong resistance to the commercialisation of reproductive practices, and a determination to maintain surrogacy and gamete donation as pure gift economies. Recent policy debates in Australian jurisdictions over surrogacy are examined in this paper as technologies that seek to determine value attached to embryos, gametes, and the body. These debates are contrasted with media accounts of surrogacy (over the same period), interviews with gay men who have become parents through surrogacy, and the promotional materials and websites of surrogacy agencies.

Several Australian jurisdictions held parliamentary inquiries and passed new bills on §surrogacy in 2008 and 2009. The Standing Committee of Attorneys General also held an inquiry into harmonising surrogacy legislation around the country. In these debates a distinction is made between altruistic and commercial surrogacy, with the latter being proscribed, and some jurisdictions also ban residents from pursuing surrogacy in other countries. In general, it is not surrogacy *per se* that is considered to be counter to public policy but rather the commercialisation of these practices.

Like debates about the donation and circulation of blood, organs and other human tissue, arguments in favour of quarantining gamete donation and surrogacy from market forces invoke the inherent dignity of the human body that would inevitably be undermined by commercialisation. This demonstrates a valuing of the body as beyond the market. Dignity and pricelessness inhere to human life and the practices associated with its reproduction.

Infertility is also enacted as a biosocial grouping around a shared identity. This form of biological citizenship, however is an economy in which gay men, lesbians, and single women in some cases have been specifically excluded.

For those who pursue parenthood through contract surrogacy—such as the gay men in this study—value is associated with the scarcity or otherwise of surrogates and egg donors and their ‘proven’ abilities. Biovalue also accrues in relation to information about family medical history and other genetic information.

Value also accumulates in the linking of two domains—reproductive and intellectual creativity—thereby emphasising the notion that the originator of things have benefits and responsibilities attached to them. In this way kinship itself accumulates value. This will be examined with reference to designations of real or natural connectedness in some instances and their denial in others.

This analysis concludes that the gift and market economies are not mutually exclusive. Also, it is possible to demonstrate that gifts and commodities are not objects but are transactions, through which value is accrued and social relations are constituted.

## **A sneaky peek into life in the womb ': 4D Bonding Scans as 'Biotourism'**

*Palmer Julie (University of Warwick, UK)*

'Bonding scans' are offered by private companies in the US and Europe for the purposes of getting 'baby's first picture' and to allow expectant-parents time to 'bond' with the baby. Women undergo a 4D scan, and the imagery is watched in real-time while it is recorded to DVD to take home and a number of still 'snapshots' are also taken and printed. Although the number of companies offering this service has grown rapidly in the UK since 2003, the practice remains controversial due to safety concerns as well as concerns about the 'proper' use of ultrasound. At the heart of these debates, is the contested 'theory of ultrasound bonding' (Taylor 2008): this is the notion that expectant-parents can form an emotional attachment to the foetus through looking at an image on the screen. I ask how we might comprehend a service that offers women and their families an identified time and space to spend time with their 'baby' and how we might understand the role of technology in enabling this. The 'studios' must partition an hour out of a whole pregnancy, creating a bounded experience with a beginning and an end, during which expectant parents experience the pregnancy *in a particular way* before taking home souvenirs of the experience. I began to think of this as a kind of 'biotourism' (Sawchuk 2000).

This paper will present observation data collected in 2006 at three UK bonding 'studios'. The focus is on the discursive practices that, despite the realism of 4D ultrasound images, are essential to making the images on the screen first socially, and then personally, meaningful. Firstly, I frame the scanning studio experience as a travel experience – both literally as a place to which people travel (sometimes considerable distances) to 'see' their baby, but also metaphorically as people have the experience of 'journeying' inside the body, 'visiting' and 'meeting' their unborn child. Secondly, the bonding scan experience has resonance with Sawchuk's description of the journey of the biotourist as pilgrimage. In the notion of pilgrimage, the technological and the sacred are connected in such a way as to redeem the scientific. I suggest that while ultrasound bonding has meaning for studio clients, within the broader cultural debates about the appropriateness of ultrasound for bonding scans, 'bonding' is positioned as the redeeming feature of non-diagnostic scanning, the quasi-medical justification for the practice

## **Novel practices of cervical cancer prevention: Screening for impurity**

*Paul Katharina T. (Erasmus University Rotterdam, The Netherlands)*

In the 1990s, medical research concluded that infection with specific strands of the Human Papilloma Virus (HPV) was a necessary agent for the development of cervical cancer, the second most common form of cancer in young women worldwide. HPV is a sexually transmitted infection; it is estimated that around 75% of sexually active persons will get in contact with the virus at some point in their lives. In 2006 and 2007 respectively, two vaccines (*Gardasil* and *Cervarix*) were approved by the United States Food and Drug Administration and the European Medicines Agency. These vaccines are intended to immunize women and young girls against several strands of the HPV, including those that cause cervical cancer (16 and 18, 31 and 33). While the vaccine has been integrated into national health care programs in many countries, the vaccine continues to trigger debate and disagreement. A large share of the disputes surrounding the vaccine concern the ethical implications of immunizing young children, particularly girls, against a sexually transmitted disease. Others base their criticisms on cost-benefit analyses, expressing doubt regarding the effectiveness of the vaccine.

In this paper, we seek to unpack these criticisms and develop an alternative framework within which we can draw attention to the discursive, bio-political, and socio-technical implications of the vaccine. In particular, we draw attention to the gendered logics that structure cervical cancer prevention and the ways in which medical research produces linkages between sexuality, contagion, cancer, lifestyle, and women's health that emerge from the study of cervical cancer, screening, and prevention mechanisms. Following a critical review of the existing literature on the subject, we introduce the concept of *governance*. In line with the interpretive tradition in policy analysis we understand governance as the complex, interactive, and informal modes in which issues, specifically those related to medical innovations, become objects of policy, and, in turn, how policy travels to practices. In the present study, we complement the governance approach with insights from medical anthropology and science studies, particularly feminist approaches, and propose to draw on document analysis and in-depth expert interviews to be analyzed in the tradition of discourse analysis and social studies of science. Such a methodological approach, we argue, makes it possible to explore the contextually contingent factors that account for the ways in which new, unstable technologies are taken up across different socio-political contexts - i.e. adoption or rejection of this particular vaccine,- such as institutional structures, socio-cultural traditions in the field of medicine producing a more or less permissive policy stance, and discursively shaped gender relations.

## **Scaling the bio/social divide: Tanner's measurement of puberty**

*Roberts Celia (Lancaster University, UK)*

Late last century, the timing of puberty became, as a 2008 anniversary issue of *Science* magazine put it, 'one of the 100 most compelling questions facing science in the next century'. Framed as an enduring scientific 'mystery', understanding the timing of puberty has risen in importance due to sharp increases in many parts of the world in the numbers of children going through puberty 'early'. At the heart of scientific and medical interest in puberty, I want to argue, lies a serious confounding of scientific and medical attempts to separate the biological from the social in accounting for and managing bodily processes and conditions. In order to make this argument, this paper describes and discusses the history of a key tool for measuring pubertal development: the Tanner Scale. The history of this tool, I suggest, encapsulates and organises a profound twentieth century concern with separating the biological and the social in order to better control the former through biomedical and pharmacological intervention. Paradoxically (although perhaps also inevitably) the history of the Tanner Scale simultaneously articulates a twentieth century scientific recognition of the human body's repeated confounding of a biological/social distinction. As I will describe, the ground-breaking longitudinal study on which the Tanner Scale was based both configured a standardised set of physical 'stages' through which children pass during development *and* scientifically established that pubertal development can be profoundly affected by social experience and is thus not simply a biological unfolding of inevitable change. Through a detailed reading of the technologies of measurement and representation produced by James Tanner and his colleague J.H. Whitehouse in their classical study, I suggest that the stories of puberty made visible through returning to their original data have much to tell us about the nature of bodies and the ways in which they become sexed over time. In the current climate of increasing concern about rising rates of early puberty, these stories demand focussed attention.

## **Bodies out of place – reflections from a failed ethnographic fieldwork**

*Sandell Kerstin (Centre for Gender Studies, Lund University, Sweden)*

This paper explores a failed fieldwork analytically and methodologically. The study is about the medical formation of/response to 'fear of childbirth' in terms of medical knowledge production and treatment and how this links to what is conceptualized as women's increasing demands for caesarean sections. The study was conducted together with Professor Diana Mulinari at Lund University.

The paper is written with and against two things that has frustrated me about writings in and on ethnography during the process of trying to write about our fieldwork and fear of childbirth – that access is made into method and that failed fieldwork is not written about.

Methodologically the paper is about using the researchers' bodies and bodily experiences, experiences of being in differently racialized, sexualized and class coded female bodies in the field. It is an effort to think about doing fieldwork in a place where we found our bodies to be out of place, in order to understand the field. It is a methodological reflection over if and how these experiences can be turned into data and what kind of analytical claims can be done from these.

We entered the field still believing in the common experiences of women, the good midwives and the woman friendly welfare state. Not entirely of course, but to some extent. Instead we confronted a field where distinctions between different women and femininities in racialized, gendered and sexualized ways were endemic and extremely divided. Woman was no longer a unifying category. Analytically the paper is an effort to articulate this through how those divisions and categorizations played themselves out on and in our differently (un)marked bodies.

## **Alcohol drinking during pregnancy: multiple bodies at risk**

*Schnegg Céline (University of Lausanne, Switzerland)*

This communication is based on my current PhD thesis research which deals with social and medical discourses and practices on alcohol drinking during pregnancy in Switzerland and France. Combining theoretical and methodological contributions from gender studies and social studies of medicine, this research aims to relate the story of alcohol as a teratogenic substance and a risk factor for every woman of child-bearing age. Different worlds are then taken into account: researches in teratology, toxicology, addictology and epidemiology, gynecology, pediatric and alcohol treatment units, public health services, media and mothers' associations. This communication focuses particularly on different medical discourses about alcohol consumption during pregnancy. Indeed, my purpose is to highlight the variety of bodies (fetal body, pregnant body, maternal body and even societal body) produced by health professionals (midwives, gynecologists, public health specialists) when they talk about "maternal drinking" and the many associated connotations those bodies embody (body at risk or not, normal or pathological body, etc.).

The effects of alcohol drinking during pregnancy were first identified in Seattle (USA) in the seventies by some pediatricians observing children of chronic alcoholic mothers: all of them had a similar pattern of craniofacial defects, growth deficiency and development delay, what the researchers called Fetal Alcohol Syndrome (FAS). During the following thirty years, researchers tried to determine a safe alcohol threshold dose. Nowadays, even if the effects of a minimal alcohol consumption are still controversial in the scientific literature, the public health messages in a majority of European and American countries are all the same, supported by the World Health Organization: temperance during pregnancy. As a result, FAS is now viewed as the far end of a spectrum of damages due to prenatal exposition to alcohol, including hyperactivity and behavioral disorders and any consumption, any woman and any fetus is thought of as being at risk.

How do the different health professionals talk about maternal drinking and put the different bodies at play? For instance, when they talk about maternal drinking, the midwives I interviewed insist on the fetal body at risk. The FAS body, suffering, deformed and handicapped is "used" by them to moralize and make the pregnant women (most of them being poor, marginalized and drug-addicted) aware of their responsibilities as mothers. But in regards to addiction, fetal and pregnant bodies have divergent interests. For the gynecologists, the focus clearly has to be put on the pregnant woman's body. However, there is no opposition between the fetal and the maternal bodies in those discourses, inasmuch as the gynecologists, as medical professionals, define their job as screening any alcohol drinking to protect the fetus, and consequently reducing congenital deficiencies. For the public health workers, FAS is hardly more than the tip of the iceberg. Due to the rise of female alcohol drinking linked with women emancipation, all the women of child-bearing age are thought as potential bodies at risk. From that last point of view, the whole spectrum of fetal alcohol disorders has to be considered, because "maternal drinking" puts the societal body itself at risk, the risk of "human being degeneration" (hyperactive children, academic failures, juvenile delinquency).



## **Fighting fat: the construction of audiences for health education**

*Setälä Vienna (University of Helsinki, Finland)*

*Väliaverronen Esa (University of Helsinki, Finland)*

Diet, fitness and healthy living have become popular topics of media coverage and public health campaigns. Stories about the health hazards of fat draw heavily on scientific knowledge, the expertise of scientists and medical doctors, and increasingly on new 'field experts' such as nutrition consultants and personal health trainers.

However the fight against fat has been ongoing for decades. In this study our focus is on the shifting agendas, styles and audiences of health education over the past half a century. Our data consist of three Finnish cases of health education from 1965, 1982 and 2007. The first two cases are television campaigns on the channels of the public service broadcaster YLE. The third and last case comes from Finland's biggest daily newspaper, Helsingin Sanomat, which in 2007 launched a high visibility campaign called The Fat Rebellion. All these cases are grounded in Finnish public health policy and represent shifting focuses and paradigms in health education.

Dating back to the post-war period when Finnish society was in the midst of significant structural change, the first case focuses on the consumption patterns of the expanding middle class. The second piece of health education illustrates an attempt to reduce the incidence of cardiovascular disease in rural communities. The third campaign is a continuation of prevailing health culture and its preoccupation with slimness, and highlights the growing concern that excessive fat is jeopardizing the competitiveness of the national economy.

This paper aims to analyse the styles of health education and the actors involved in health education as well as their relations. Further, it explores the construction of audiences and the built-in conceptions of science communication in these different cases. Who are the presumed target groups for health education? Who has the power to define what is 'health' or 'good life'? What has changed and what has not changed over the past five decades?

Our results reveal some constant patterns in representations of a healthy life, but conceptions of science communication and built-in notions of the relations between science, society and experts have clearly shifted over time.

## **Organs without Bodies. What if Transplantation Medicine was a Culture of Interests?**

*Solhdju Katrin (Zentrum für Literatur und Kulturforschung, Berlin, Germany)*

In my paper I would like to test the following proposition: If organs are *interested beings* the practices dealing with them such as transplantation medicine should be considered as *cultures of interest*!

We usually think of interest as the function of a human subject that consciously directs its attention towards something. The etymology of interest, however, primarily suggests another understanding: an interest is first of all everything that is „being in-between’ (*inter-esse*). Being interested thus simply describes a state of in-between-ness. In another sense interest can also designate processes of connecting or linking things together that were separated before thus describing a very general activity. According to both versions interests can be attributed to human and non-human actors (Latour) alike. ‘Surviving Organs’ – that for scientific reasons are kept alive outside of the organism in complex apparatuses simulating an organ’s exterior (interstices) and interior (rhythms, pressure etc.) milieu – perform vitality as an *interested* activity; their vitality happens in-between their concrete materiality and their milieu. Consequently in order to reconstruct the interstices and temporalities of an organ sufficiently well for its survival to succeed, researchers have to find out what is of importance from the point of view of the organ itself, or to put it differently they have to start caring about what an organ is *interested* in. Thus instead of projecting interests into organs render it necessary to enter into interested, reciprocal relationships with them.

In recent years transplantation medicine has been largely investigated with respect to its (un)ethical implications. Sociology and philosophy of science have looked at both sides involved in all transplantations: organ givers and organ receivers. In a tradition of critical thought transplantation medicine has been conceived of as a practice that centrally ‘commodifies bodies’ (Scherper-Hughes) thereby re-enacting hierarchies of class, race, and gender: donors remain mostly invisible while recipients are conceived of as cherished patients whose hybrid bodies virtually perform contemporary medicine’s remarkable success. Similarly the cultural and ethical conditions of brain death have been extensively discussed (e.g. Margaret Lock) and critically evaluated.

The organs themselves, however, their modes of existence, their history as medical and physiological objects, and the kinds of bodies enacted through them stunningly have never played a crucial role within discussions concerning organ transplantation. In my paper I would like to suggest that focusing on the material entities that are pre-eminent for the practices in question – ‘surviving’ and that is *interested* organs – and the practices that enable their existence opens up new ways of thinking. For example conceptualizing-transplantation medicine as a *culture of interests* also entails consequences for medical ethics. Such ethics, however, would not start with *a priori* principles from outside of the concrete realm of a practice but rather become articulate through the concrete and complex process of organ-transplantation in as far as it reconfigures multiple interests on the non-human and eventually also on the human level.

## **Conceptions of Gender, Sexuality and Body in the Cancer Awareness Campaigns in Turkey**

*Terzioğlu Ayşecan (Koc University, Turkey)*

In accord with the increasing cancer rates in Turkey, cancer became a more visible illness, and several cancer awareness campaigns have been organized. From the billboards in subway stations to TV advertisements, from internet pages to the pages of daily newspapers, people are constantly exposed to those campaigns in their everyday lives. Organized by the Ministry of Health, major drug companies or hospitals, those campaigns often aim at changing the existing conceptions of health and illness, and challenging the taboo characteristics of cancer and cancer patients in Turkish society. They address the stigmatization and marginalization of cancer patients in a critical way, by creating a new language and using an indeterminate “we”, instead of “us and them”. They also overlook the hierarchical relations in the medical realm, and, with an idealistic perspective, emphasize a constant cooperation between lay people and medical staff both for healthy and sick people. My talk focuses on how body, sexuality, gender roles and identity are conceptualized in three different recent cancer awareness campaigns. Through content and thematic analysis, it will explore which existing or changing social conceptions of body, sexuality and gender those campaigns address at, negotiate with and try to reconceptualize. The talk will also include the preparation process of those campaigns, with a focus on how the issues of body, sexuality and gender are discussed during that process, what kind of an audience is targeted and how those campaigns are received in general. This part will be based on the interviews with the people who designed and implemented those campaigns. Finally, the talk will have a theoretical discussion on the global and national relevance of such campaigns, and relate those campaigns to the concepts of biological citizenship and biosocial subject.

## Meaning and Doing Corpses

*Thompson Lana (Florida Atlantic University, USA)*

In her *Powers of Horror*, Kristeva describes the corpse as the utmost of abjection, as death infecting life, as what one permanently thrusts aside in order to live. Yet western culture seems to be obsessed with corpses and rather than thrust aside, keeps bodies in as many genres as possible. For example, *Bodies, the Exhibition* and *Body Worlds* (an exhibition of skinned, plastinated/ preserved corpses) despite the original rejection by municipalities to host the displays, drew more visitors than predicted. The prevalence of the murder mystery as a genre of literature, films such as *The Three Burials of Melquiades Estrada*, and the popularity of TV shows where corpses are found, inspected with a variety of high tech technological devices in scenes framed with brilliant bluish light and autopsied validates this premise. The funeral industry thrives from the traffic of the dead. Directors for the service prepare a corpse with make-up, styled hair, clothing and mementos, posed in an expensive box and displayed for the living to view.

Why has the corpse moved from the displayed body in the Paris morgues of the eighteenth and early nineteenth centuries to the forbidden body of the later nineteenth and twentieth centuries? And what kind of hybridization has allowed for the exhibition of the corpse in so many venues? What changes enabled the spectacle of Werner von Hagen's *Body Worlds*? This paper will address the rise of biological science and how the advances of medical science (e.g. blood transfusions, organ transplants, tissue harvests and biomechanical devices) required corpses for its development.

Concomitant with reanimating the aging or damaged body, corpses are studied while they change from death to dust. A number of body farms now are available for students of forensic science where willed bodies are put in a variety of environments and documented as they undergo decomposition. In addition, dead crash test dummies, and heads on pedestals to test gunshot entry and exit wounds and blood splatter put an additional requirement for unburied bodies. A third use for body parts requires healthy, intact arms, legs, hips, knees or heads for physicians to learn new laser techniques or how to prepare for prostheses.

How will the corpse survive in the future? What new technologies and forms of display will evolve from their current use?

## Negotiating autism

*Valentine Kylie (University of New South Wales, UK)*

This paper explores the making of 'autism' across several distinct, interconnected networks: clinical assessment and treatment; disability and income support policy; and education. Once understood as rare, autism is now understood as a heterogeneous disorder affecting large and growing numbers of people. These understandings are produced through alliances and contests over the meanings of the bodies and behaviours of children diagnosed with autism. Although it shares much with other health movements, autism advocacy is unusual in that its most vocal advocates are not patients, but parents of patients. This is due to the nature of the disorder, which affects very young children, and manifests in an impaired ability to communicate and relate to others. Autism is thought to have a genetic basis, but its manifestations are intensely social and relational: early signs are often a failure to speak, make eye contact and seek comfort from parents. Although some parent groups advocate for the search for a 'cure', autism is more commonly described as a lifelong neurological disability whose symptoms can be modified by behavioural interventions.

Because of its uncertain biological source, and because it involves children's behaviour and family relationships, autism is controversial. The recent dramatic increase in the prevalence of autism is especially controversial. One explanation is that children diagnosed with autism are being inappropriately pathologised, that there is nothing 'wrong' with them and that their impairments are best understood in social, rather than clinical, terms. However, analysis of the daily interactions of parents and children with diagnosing clinicians, allied health workers, and educationalists reveals that the social and clinical are not so neatly distinguished from each other. As Annemarie Mol (1999: 85) writes, 'it is not only the representations of reality in information circulating as words and images that have become contestable, but also the very material shaping of reality in diagnosis, interventions and research practices'. The contemporary recognition of autism as a biological condition best modified by behavioural interventions is shaped by, and shapes in turn, clinical assessment tools, intervention modalities, educational environments, and biomedical treatments.

This paper is based on an empirical qualitative project conducted in 2008-9 in three states in Australia. It will argue that the emphasis of parental choice and agency in the therapeutic management of autism is a social and clinical phenomenon.

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## Understanding the meaning and doing of early stage Alzheimer's Disease: the role of uncertainties

van der Laan Anna Laura (University Twente, The Netherlands)

Alzheimer's Disease (AD) is a disease with a very rich cultural history, in which various scientific and popular discourses play a role (Ballenger 2006). This history has shown that AD is much more than a biomedical category. It is a complex disease that has been, and is, *enacted* in plenty of ways. Moser (2008) describes this in a clear way, by exploring the *matter*ing of AD in a number of locations: an international Alzheimer's patients' movement; a medical textbook, laboratory science, daily care practice, parliamentary politics, general practice... etc.

Still, in medicine, the biomedical gaze at AD prevails. With medicine's goal mainly directed to one direction, i.e. towards evidence based diagnostics and treatment, it is not surprising that the biomedical discourse on AD gets most attention. However this medical-scientific focus on the AD field, while implying an unspoken promise that it delivers *certain*ties, leaves other views of AD marginalized. This approach ignores the fact that AD is enacted in various ways. The scientific research into AD is aiming at the possibilities of diagnosing early stages of AD. This has led to new, ambiguous and *uncertain* diagnostic categories such as Mild Cognitive Impairment (MCI). Consequently, the ways in which AD is being enacted have increased even more.

In this presentation we will analyze the multiplicity of Alzheimer Diseases in different practices, on the basis of Annemarie Mol's *Body Multiple* (2002). We focus especially on early stages of AD. By doing observations and interviews, we study early AD in medical practices, nursing practices, research practices and practices of patient organizations. We will show how the *meaning* of early AD differs from practice to practice and how this is related to the ways early AD is *done*. Also, we will address the question of how these different, often even conflicting, practices co-exist.

We suggest that considering how the meaning and doing of early AD *reflect different types of uncertainties*, helps us better understand the different practices of AD. In our analysis we will explore the role of *uncertainties* involved in the different ways of *meaning and doing* of early AD in various practices and their co-existence. We will show how in different practices, *different kinds of uncertainties* play a role. These uncertainties are crucial in relation to meaning of doing of AD.

We will conclude our presentation by discussing the value and limits of focusing on *uncertainties* in analyzing the *meaning and doing* of early AD.

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## **Phenomenological Roots of “Doing Gender” Theory: Medical Sociology, Embodiment, and Hormones**

*Wilcox Sarah (Sarah Lawrence College, USA)*

How can we study embodiment as simultaneously physical and cultural? How, for example, do hormones figure into our cultural understanding of gender and into individual embodiment and self-identity, particularly at times of hormonal change, such as puberty, oophorectomy, or taking hormones as part of aligning the physical body with gender identity? “Doing gender” theorists in sociology would emphasize how conceptions of hormones naturalize dichotomous gender identities, while medical sociologists have turned to phenomenological theories of embodiment to “bring the body back in.” This theoretical opposition has been posed in recent qualitative interview studies of women who have had hysterectomies and of transgender men. These studies address the doing and meaning of bodies in medicine through analysis of narrative accounts of hormonal change and embodiment, but the authors’ analyses have been constrained by theoretical perspectives that pose phenomenology as a solution to the problem of the absence of the body from social constructionism. In contrast, I argue that “doing gender” theory developed from a broader social constructionist tradition within sociology and anthropology that arose from phenomenological theories of consciousness and intersubjectivity. In this paper I explore these phenomenological roots of the “doing gender” perspective and consider how these theorists view the body and embodiment. Drawing from recent interview studies that consider hormonal change and embodiment, I argue against opposing phenomenology and social constructionism, and for taking a more reflexive methodological approach in order to understand embodied experience as a form of perception that is both cultural and physical.

## **Gender issues in living organ donation. Medical anthropological and ethical perspectives**

*Wöhlke Sabine (Dept. of Medical Ethics and History of Medicine, University Medical Center Goettingen, Germany)*

*Background:* Organ donation, especially living organ donation, has a high societal relevance in Germany. Although the number of living organ transplants has increased between 1990 and 2008 from 40 to 587. Statistic figures show that women donate kidneys more frequently than men, but fewer women than men receive organs. Quantitative studies confirm this gender difference with regard to family members: among parents, mothers donate more often than fathers; among siblings, sisters more often than brothers.

*Problem:* The available quantitative studies have a deficit in questioning possible reasons and motives for this gender difference. The behavioral difference between man and women in giving living body parts is not well understood.

*Aim:* My investigation aims at the qualitative, cultural and ethical analysis of possible causes of the gender disparity in living organ donation.

*Method:* I conducted and analyzed six focus group discussions and 25 semi-structure interviews (2008-2009) with affected people in the context of living kidney donation in Germany. The sample consists of a broad spectrum of kidney donors and recipients with different kinds of social and biological relationships.

*Results:* My findings indicate that the attitudes and motives for giving and receiving organs are often related to quite traditional roles and expectations. These roles and expectations are often dependent on gender, age and education. The analysis centered around three issues which I want to present and discuss:

### *(a) The process of decision making*

In general, the process of decision making is influenced by traditional family roles. In parent-to-children donations, the 'mother is often seen as the 'only' person who might be a potential donor, and donating their organs spontaneously. In contrast, in spouse-to-spouse donations, men tend to offer their organs rather easily and quickly, while the affected wives often hesitate to take the husband's organ, because they fear a serious change in the partnership.

### *(b) Motivations for a living organ donation*

Most interestingly and often neglected in the ethical and legal debate of organ transplantation, are motives of motherhood for donations. Mothers more often feel guilty for the physical impairment of their children and conceptualize the donation as act of 'compensation'. In contrast, fathers justify their donation to a child with emotional affection and a close bond. Furthermore, Mothers justify the donation of the organ and the expected well-being of the ill child with having more time afterwards for other family members, while fathers are weighing the chances and risks of the donation with regard to their job.

### *(c) The role of body conceptions for giving an organ*

The female body of a donor was associated with the womb and interpreted as a reproductive body. The male body was perceived as a fragmented body consisting of different parts that can be exchanged and differentiated. Moreover, women often referred to the body with regard to natural, social and holistic images while men also referred to social images but also abstract, technical conceptions.





## **TRACK 29**

# **Technology, Innovation and Images of Health and Aging**

### **Convenors:**

**Alexander Peine (Utrecht University, The Netherlands)**

**Alex Faulkner (King's College London, UK)**

**Birgit Jaeger (Roskilde University, Denmark)**

**Ellen Moors (Utrecht University, The Netherlands)**

## **Sultans of Thing. Culture, Nature and the clinical View**

*Bieling Tom (Design Research Lab, Deutsche Telekom Laboratories, TU Berlin, Germany)*

According to Gilles Deleuze and Felix Guattari, becoming disabled is not to be understood as an “evolution through origin and heritage”, neither in a sense of individual impairment, nor as a result of societal structures. It rather appears through “alliances of human and non-human, social and non-social acteurs, objects and processes” (Schillmeier, 2009, 91; according to Deleuze/Guattari 1992, 325)

Schillmeier describes, how empirical research in STS emphasizes the complex event-character of disabling and enabling realities in everyday practice. Disability, understood as “dis/abling practices” underlines the situational links and connections of human and non-human actors, processes and practices (Waldschmidt/Schneider, 2009, 91, according to: Schillmeier 2005; Law/Moser 1999; Struhlkamp 2004).

While Anderberg (2005, 4) claims that “technology and design can [...] be seen as mediators of disability”, Jönsson (2005) sees “artefacts as being imprinted with the goals, visions, and thoughts of their constructors. [...] No neutral carriers of information”. Technology and its artefacts thus influence on the individual. They “affect how we relate to things and people [...] and how we perceive the world. [...] From a socio-cultural perspective, we learn and develop by using cognitive resources that are incorporated in the artefacts as information, procedures and routines. Our way of thinking is guided and coloured by the intellectual and physical tools we use”. (Säljö, 2000; in: Anderberg 2005)

The correlation of body and space in this context is described by Freund (2001), who claims that spatial organisation constructs bodies and offers bodily possibilities and constraints: “The body is not simply a culturally constructed representation nor is it physically shaped like clay by social force, but it is experienced and ‘lived-in’ differently in various socio-material environments and material cultures (e.g. technologies)” (Freund, 2001; in: Anderberg 2005).

We can therefore assume, that disability occurs not least through influence by design and culture (e.g. built environment). As Anderberg (2005, 5) states: “The body and the various technical artefacts around us make up a system that enables or disables us to perform desired actions”.

How does this influence an understanding of and active contributions within or amongst our disciplinary fields?

In our paper we will discuss how explorative and speculative design approaches and views on artefacts as dis/ablers can influence common understandings and definitions of a general design research potential. We will further discuss how the performativity of the object in the context of the “parliament of things” might enrich the discourse (not only amongst STS and Design Research) concerning ‘the political of artefacts’.

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## **Images of ageing and stakeholder engagement in emerging diagnostics for Alzheimer's Disease**

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Alzheimer's disease is associated with ageing. Many elderly people experiencing loss of cognitive functioning start wondering whether this signals the onset of this dreaded disease. Although such worries are often unfounded, the boundary between 'normal, ageing related cognitive decline' and 'Alzheimer's disease' is not clear at all and has been varying historically. Technology development is an important driver in shifting this boundary. As Ballenger (2006) has shown, the definition of Alzheimer's disease in the past century has co-evolved with the technologies available for diagnosing and treating the disease, as well as with the medical and social scientific approaches dominant in scientific research. These technological and scientific developments have been guided by images of 'normal' and 'diseased' ageing, but also changed them. Thus, novel technologies for diagnosing Alzheimer may also impact the way society views and deals with ageing. However, this 'soft' type of impact (difficult to delineate, let alone to quantify) is hardly acknowledged in the more traditional technology assessments of novel technologies related to Alzheimer's disease.

We will argue how to include such 'soft impacts' in the ethical and social assessment of emerging novel forms of diagnostics for Alzheimer's disease. In cooperation with the Dutch LeARN-project (a Dutch consortium of researchers, clinicians and medical technology enterprises that currently develops new tools for AD diagnostics), we investigate how such innovations could proceed in a responsible way. One of our main questions is how the proposed technological developments may affect current views of Alzheimer's and ageing, and how these in turn may impact future society and culture.

We will focus here on two steps to answer this question: conceptual analysis and stakeholder engagement. Conceptual analysis of the ideas underlying the technological developments may show how the diagnosis produced will redraw the boundary between Alzheimer's disease and normal ageing. A question that is specifically interesting here is how these developments will affect the balance between biologically and socially oriented approaches of ageing.

In addition, a broad set of stakeholders (patients, families, medical professionals, medical industry, policy, insurance) will be engaged, to enable deliberation on the potential future impact of the technological developments on society and culture and to formulate criteria for responsible innovation in this specific context. To include potential impact on views of ageing in these deliberations, vignettes or scenarios might be written, depicting possible futures of ageing.

Finally, we will discuss the value and limits of this combination of conceptual analysis, stakeholder engagement and scenario exercises for exploring the potential soft impacts of emerging technologies on society and culture.

## **Safe and Warm: How the cold became dangerous in the UK**

*Brown Sam (Lancaster University, UK)*

This paper considers the social and technological routes through which being 'cold' is formulated as being particularly 'dangerous' to older people in care homes. Using a combination of historical material, along with contemporary ethnographic research conducted in residential care homes, I show how specific thermal environments are configured and how they are deemed to be normal, necessary or dangerous. Along the way, I highlight tensions and contradictions surrounding conventional biomedical interpretations of appropriate thermal conditions, and show how such conditions are complex outcomes of infrastructures – heating and cooling systems; clothing; conventions and temporal routines.

Staff who work in the care homes I studied often report that older residents are particularly susceptible to the effects of the 'cold': they frequently complain of 'draughts' and 'chills'. This is so despite the fact that arrays of heating technologies (including radiators, windows, clothing etc.) are arranged to produce indoor temperatures that are consistently 'very high', from the carers' point of view.

The fact that the same thermal environment is experienced differently by staff (who describe it as being very hot) and residents (who find it chilly) might be explained through the lens of biomedicine, which identifies an increased sensitivity to the cold as a potentially dangerous facet of the aging body (DoH, 2008). However, the biomedical explanation provides a partial account of what is actually occurring. Fox *et al* (1973) found that elderly participants reported feeling cool even when their body temperature remained the same as others around them. These data challenge the view that feeling cold was purely the result of a low body temperature and instead seem to support the proposition that cold is, in part, socially constructed.

This paper examines the discursive origins and development of the notion that elderly bodies need to be kept warm, considers the persistence of these ideas in medical and gerontological discourse, and shows how they are reproduced through the design and use of an array of ordinary technologies. I conclude by arguing that this emphasis on the dangers of cold serves to disguise other risks, including those of overheating.

## **Online Lifebooks depicting lived lives to foster personalized images of one's own aging**

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*Simone Carla (University of Milano-Bicocca, Italy)*

Although age and aging are natural conditions related to biological processes, their meanings are socially and culturally constructed. Professionals, reformers, politicians, public agencies and mass media have all a role in defining age groups, social classes, market segments and in shaping the related expectations, wants and needs. In the late nineteenth century, as a result of the shift from a rural to an industrial economy, professionals and reformers began to relate aging to questions about the limits of usefulness, efficiency and productivity on the job (Hareven, 1995). At the same time, marketers involved in the growing capitalist industrialization found idealizing youth and the consumption of ever renovated goods more profitable than exalting the notorious frugality of elderly people (Featherstone et al. 1995). These drivers contributed in shifting the perception of being aged, which once was mainly seen as the consequence of being capable (and "fit" enough) to have survived so far, as a condition of either impending or manifest dependence and deterioration. Then, not later than thirty years ago, marketers began the hard job of changing this negative image and began presenting mature adults as still able to enjoy an active and satisfying life, potentially full of amusing goods, facilities and services<sup>10</sup> in the sometime subtly surreptitious aim to provide elderly people with new opportunities to perceive new wants to satisfy, and to become willing to spend their money to satisfy those wants/needs.

Nowadays, ICT-based services and tools are shaped by the society's needs and wants<sup>11</sup>, but also the opposite holds true to some extent (McLuhan, 1964, Chandler, 2008). We take the case of ICT design for the elderly as an example of how technology is shaped to closely resembles how a society sees elderly people and that, in turn, contributes in consolidating a specific image of aging. On the one hand, aging is seen as an irreversible process that is likely to include infirmity, dependence, incapability and disability. Correspondingly, ICTs are seen as flexible, tailorable assistive means, as well as means by which to convey or coordinate more or less traditional medical and care-related services in novel and more pervasive ways. On the other hand, an increasing average age would also mean more time to consume new services (if people were willing to); consequently, ICT can be seen as a new frontier to develop new services for the elderly market segment, or just to adapt the services that are continuously conceived for the 30-65 year-old segment. In either cases, designing for the elderly is usually declined according the dominant image and then seen as a way to address the peculiar needs of people that, irrespectively of their actual/social/psychological age, are either disabled, physically/cognitively impaired, weak/disheartened, tech-unsavvy, or wary/reluctant toward new technologies (cf. Ballabio et al. 1999).

The point on ICT for the elderly that we propose here is different. We envision a simple "convivial"<sup>12</sup> technology that, on one hand, could revamp the image of the elderly as an experienced person who is able to link up different generations and bridge the nowadays

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10 In other words, marketers have begun recognizing that the over-50 market segment holds more than half of the discretionary income in western countries, and more than third of the country's personal wealth and savings. See K.A. Sawchuk (1995) *From Gloom to Boom: Age, Identity and Target Market* in M. Featherstone, A. Wernick (Eds.). *Images of Aging: Cultural Representations of Later Life*. Routledge.

11 Determining if marketers give what consumers want or, rather, consumers want what marketers give them is out of topic here.

12 "Convivial tools are those which give each person who uses them the greatest opportunity to enrich the environment with the fruits of his or her vision." in Ivan Illich: *Tools for Conviviality*. 2nd chapter. Harper and Row 1973

culture with that in which she grew up<sup>13</sup>; and, on the other hand, help elderly people rid themselves of fabricated images of aging and establish their own, according to their “story”. To these aims, we are studying the feasibility of an online *Lifebook*, that is a digital scrapbook<sup>14</sup> that grandparents could build (with the help of their grandchildren, although not necessarily) by digitizing personal pictures and scraps and by posting related comments and memoirs. Such a virtual Lifebook, to some extent, would resemble a blog-like platform, where items are inserted around an explicit metaphor of life-long timeline and where authors would be facilitated in relating pivotal personal events (e.g., a job promotion, a move, a trip, parenthood) with social and historical ones (e.g., wikipedia entries, newspaper frontpages), readers can comment materials, ask questions and interact with the author.

With this proof of concept, we adopt the research point that reminiscence activities (i.e., recollecting and narrativizing personal memories) can be a key factor in stimulating the social health and ongoing sense of wellbeing of elders (Lin et al. 2003). Yet, there is something more than just providing elderly people with the opportunity to create virtual and solipsistic diaries of the “good old times”. In fact, such a lifebook would foster opportunities for inter-generational interaction, and would contribute in improving the cultural ties between members of the same family and community. It would also help creating or corroborating social networks that are conceived not around the elderly as a needy person - i.e., a patient - but rather as a family hub who can bestow, in virtue of her experiences, advices or “lived life” resources to the younger for their own life’s difficulties. In doing so, “aged lives”, thus reformulated and considered retrospectively, could help the younger reappropriate the value of aging and help the elderly keep themselves being “present” in the lives of descendants, much alike ancestors could survive their physical death in the traditional cultures of the past.

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13 This image is close to that of the okina, the venerated old person who can exhibit a sort of divine-inspired maturity and wise mental outlook since he has transcended the passions of youth and the efforts of a life career in a detached and consolidated vision of life. Cf. S. Wada (1995) The status and image of the elderly in Japan: understanding the paternalistic ideology. In M. Featherstone, A. Wernick (Eds.). *Images of Aging: Cultural Representations of Later Life*. Routledge.

14 Similar prototypes have been proposed in the context of UbiComp applications (e.g., Quigley et al. 2004, West et al. 2007), but there the accent was put in the deployment of innovative interfaces (like digital pen and invisible devices), rather than in the potential for social interaction that applications like these can achieve if properly designed.

## **Early diagnostics of Alzheimer's disease in the Netherlands: Between uncertainty and promise**

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Dutch society is aging and with the rising number of aging persons, the prevalence of Alzheimer's disease (AD) is becoming an increasingly important phenomenon. Scientific and clinical effort, as well as public funding is being invested in research on AD. During the last decade various instruments, such as imaging techniques (MRI, PET, CT), and the chemical analysis of Cerebral Spine Fluid (CSF) have been developed further, with the aim to make more reliable and earlier diagnosis of AD possible.

Note the paradoxical consequence of the efforts of early diagnostics: while the aim of the development of the imaging and analysis instruments is to reduce the uncertainty of a person's health status concerning AD, it will unavoidably introduce new technical, social and moral uncertainties at the same time. The development of diagnostic techniques raises a variety of questions. For example: Will the improvement of these instruments indeed lead to the earlier and more reliable diagnosis? What is the value of being diagnosed with AD for a patient, when treatment is lacking? How do insurance companies respond when a person is diagnosed with AD? Would it change our view on aging?

In this paper we will analyze the paradoxical tension between, on the one hand, the promises and efforts of early diagnostics of AD, and, on the other hand, the technical, social and moral uncertainties that emerge in the same movement. We will follow three steps. First, we will provide a systematic overview of the current world of Alzheimer's in the Netherlands, including stakeholders, their interests and the most important issues in their interactions, especially concerning the efforts to realize early diagnosis of AD. This overview is based on desk research, historical analysis, site visits and interviews. Secondly, we will investigate the nature and range of technical, social and moral uncertainties that emerge. This is an interdisciplinary endeavor, since different classifications of uncertainties are developed in the literature of Science, Technology Studies, Ethics, Philosophy of Technology, and in specialized literature on Alzheimer's disease and its diagnostics. In the third step, we will investigate the strategies of stakeholders to deal with this set of technical, social and moral uncertainties. We have located the uncertainties involved in the innovation trajectories of promising early diagnostics and traced how stakeholders cope with these uncertainties, by (i) reducing, (ii) amplifying or (iii) reframing them. We conclude that during the last decade both the nature and intensity of uncertainties have shifted under the pressure of new promising techniques.



**Usership of regenerative therapies: age, ageing and anti-ageing in the science and technology of knee cartilage repair**

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The paper discusses how the 'usership' (Faulkner, 2009) of one particular emerging regenerative medical technology is being constructed, and embedded in emerging sociomedical practices. Knee joints are one of the points of the human body susceptible to handicapping damage from debilitating disease, over-use, excessive weight-bearing and the strains of athletic activity. The articular cartilage (allowing the smooth rotation of the knee joint) is especially prone to damage. Unlike bone, cartilage does not repair itself. Wear and damage to joints frequently results in osteoarthritis, one of the most common medical conditions worldwide, and associated in much expert and nonexpert commentary with old age. Apart from medication for pain control, prosthetic knee joint replacement is a widely used orthopaedic treatment (though not as successful as the equivalent hip prosthesis). In this context, there is a major international scientific effort to find regenerative approaches to knee cartilage repair. These range from the more surgical to the more cell-based, including tissue-engineered and stem cell-based approaches. This effort can be seen in an emerging range of research activity and the increasing availability and promotion of proprietary innovative techniques – for example, patients 'with degenerative diseases' may be offered access to 'promising' stem cell treatments, and several variations of 'articular chondrocyte (cartilage cell) implantation' (ACI) are already in use. The usership of these technologies is being supported by a variety of claims, implying a range of differently positioned users and thus market sectors. The paper, first, undertakes an exploratory mapping of a range of exemplars of the contemporary techno-scientific research being undertaken internationally, identifying key actors in the cartilage-related academic and commercial scientific and clinical fields. Second, usership and market-building are analysed through the agenda-setting claims, path-shaping expectations, and the developing discursive linkages between scientific enterprise and prospective or emerging users of these technologies. Examples of institutional aspects of users' organisation and links to producers are examined. Particular attention is paid to the varying framings of different societal constituencies as users or implied users, and the 'need' for these technologies, such as: private and public therapy providers; 'ageing populations'; working/leisure populations; quality of life; 'unmet medical need'; osteoarthritis sufferers; 'premature ageing'; and sports players. Evidence of *élite* participation and enrolment in this field is contrasted with prevailing focus in STS on analysis of grassroots groupings and citizen science. The paper draws on textual content analysis of scientific journals and conferences in fields including orthopaedics, rehabilitation, regenerative medicine and sports medicine, on accounts of professional and industry activity, and on data on linkages between stakeholders in this emerging zone.

## **AAL Technology: Striking a Balance Between Technology Push and User Pull**

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Ambient Assisted Living or AAL refers to concepts, products and services that combine and enhance new technologies and the social environment of a person to increase quality of life at all ages. While AAL related research and development have received large amounts of public and industry funding in recent years, market acceptance is still low. Primary and secondary users are reluctant to incorporate AAL into their daily (work) lives, even though benefits for them can realistically be expected. It is proposed that one reason for this reluctance may be a lack of user-centredness on behalf of the AAL developers. This may be rooted in blurred visions of potential users and the social environments AAL will be implemented to. This aspect needs further research to focus technology and policy development on those persons who could benefit from AAL to meet their needs.

The purpose of this study is to analyse the perception key actors in research, development and funding of Ambient Assisted Living technologies have of the users. Consequences of these conceptualisations of health and aging will be presented.

With a focus on Germany, current European AAL research and development initiatives are analysed. Both funding objectives as well as project reality are scrutinised as reflected in published calls, reports, presentations, websites, flyers etc. The analysis concentrates on verbal and non-verbal depictions of potential users of AAL and employs a qualitative methodology. This is supplemented with focus groups on the use of assistive technology in Flanders with homogenous groups of industry and R&D representatives. The results will be contrasted with current empirical knowledge from the literature about the diversity of the European populations and especially the diversity of old age.

Results indicate that images in AAL research, development and funding range from “healthy ageing” individuals to frail elderly, from “young old” to the “oldest old” and from informal carers to health professionals. At the same time the scope of AAL is implicitly narrowed down to relatively functionally independent older persons, to those from a more privileged socio-economic background and with a certain level of education. What is more, next to designing technological solutions, the social aspect of the environments and also the users receive inadequate attention. This is both true for primary users and secondary user. The concept of quality of life that stands behind AAL developments is in many cases also very narrow. Focus group results showed a divergence in views on AAL between R&D representatives (public and private) and potential users ranging from disabled, to elderly and chronically ill people: The priorities in needs, and focus of research did not overlap. In addition it was felt by all sorts of users that AAL development is not demand driven. A more comprehensive matrix is suggested to conceptualise potential users and uses of AAL that encompasses more than the current largely stereotypical images and allows for a more “personalized AAL” approach.

## **Health Technology as Authority and Empowerment - Studying dialogue and affect between a healthy user and a health technology**

*Eriksen Hanne Hellerup (Faculty of Humanities, University of Copenhagen, Denmark)*

In this paper, I want to consider the concepts of authority and empowerment when it comes to the use of health technologies. The aim is to assess how technology affects human (health) perception and behavior from two different viewpoints.

When writing the project description for my current research project I met people of different ages who in various ways were affected by the health technologies, they had included into their lives. One was a 54-year-old man weighing some 20 kilos too much. He had recently bought a new heart rate monitor wanting to take up running as means of exercise, and told me about it. When telling his story, he underlined that the watch – based upon the data he had entered into its program – had *told* him, that his was very fit. Another person, this time a woman of 65 years, cut short our (evening) conversation because she had to walk additionally 300 steps that day to fulfill her daily exercise of 10.000 steps. She based her decision, she told me, on the information she got from the pedometer attached to her shorts. These are two images of elderly people dealing with the use of health technologies. They are also examples of health technologies as technologies (non-human) which both *receive* information *from* and *give* information *to* the user (human). Either as data one types or enters directly into the technology (as with the example of the heart rate monitor above) or as data the technology registers itself, when one moves around (as with the example of the pedometer) or engages with the technology in other ways.

In the paper, I will argue that there is a *dialogue* between the user and the technology. I will explore how the technology *speaks to* the user – and how the user – or in some cases the user's body – *speaks back* to the technology. Following, my paper is a critical discussion of how it is possible to adopt the concepts of *authority* and *empowerment* within a framework of Science-Technology-Studies (STS) when studying the use of health technologies in the life of a healthy, elderly user. Thus, I argue that a *dialogue* between the user and the technology entails that the technology embodies the concepts of *authority* and *empowerment*.

Furthermore, I argue that the two different positions (or roles) of the technology are both competing and complementary when the technology is engaged into a *dialogue* with the user, thus creating different pathways of innovation. What is of special interest is the potential clash between the two positions in the translation processes. In addition, the theoretical discussion leads to an understanding of the two positions as embodied by the technology both when the dialogue takes place and when the technology is detached from the user.

## **Health technology development and use: from practice bound imaginations to evolving impacts**

*Hyysalo Sampsa (University of Helsinki, Finland)*

How development and use of new technology relate? How can users contribute to innovation? This presentation addresses these questions on the basis of a recent volume (Hyysalo, 2010) that follows in-detail three case studies on health care and elderly care innovations over several product launches. It examines the emergence of inventive ideas about future technology and uses, how these are developed into products and embedded in health care practices, and how the form and impact of these technologies then evolves through several rounds of design and deployment across different types of organisations.

The innovation projects range from an attempt at breakthrough innovation in clinical testing equipment, to user-led innovation in database programs for diabetes care to developer driven project for new monitoring and alarm system for the elderly.

These studies reveal a blind spot in extant research on development-use relations. The majority of studies have examined shorter 'episodes': moments within particular design projects, implementation processes, usability evaluations and human-machine interactions. Studies with longer time-frame have resorted to a relatively coarse 'grain-size' of analysis and hence lost sight of *how* the interchange is actually *done*. As a result there are few social science, information systems or management texts which comprehensively or adequately address:

how different moments, sites and modes of shaping new technology shape the evolution of new technology;

the detailed mechanisms of learning, interaction and domination between different actors and technology during these drawn out processes; and

the relationship of technology projects and the professional practices and social imaginations that are associated in technology development, evaluation and usage.

The "biographies of technologies and practices" approach to new technology advanced in this presentation addresses these shortcomings and offers us new insight to core empirical and theoretical questions about how where development projects gain their images and representations of future use and users, how usage is actually designed, how users' requests and modifications affect designs and what kind of learning takes place between developers and users in different phases of innovation—all crucial to our critically evaluate as well as to advance new health technology, and innovation more generally.

## **From the evolution of human longevity to robotics**

*Kayako Ishii (Osaka University, Japan)*

At present, Japan has the world's longest average life expectancy. When a sign of demographic aging was warned in the middle of the 1970s, the population of people who would have certain difficulties in living a normal life in 2020, i.e., those who would be elderly, disabled, or caring for them, was estimated and development of welfare equipment was promoted as a means to cope with the advent of the aging society. New ideas in engineering able to meet individual needs were sought in order that it can meet requirements of individual humans. Through medico-engineering collaboration, the development of computerized prosthetics, nursing equipment, welfare robots ("guide dog" robots, etc.) and artificial neurons was promoted. The preparation of environments that enable the most effective and comfortable use of these technologies and human power is now being promoted.

In recent decades, one of main objectives of state-of-arts robotics is providing supports for elderly people and their caregivers. Possible applications of actual robots in general society are eliciting arguments including question on the concept of 'humanness,' 'self-other relationships' and 'embodiment'.

There have been changes in the way the health of elderly people is viewed as well. Elderly people suffering from dementia came to be treated as suffering from mental disorders rather than simply being dismissed as "senile". Researchers in field-medicine for community-based geriatric interventions pointed out that percentage of elderly participants who chose dementia as the least-wanted disease state has decreased in a decade. The English term 'disease' implies a concept of the scientific mechanism of cause and effect. In social context, it is considered important to reduce subjectively perceived 'illness' and to ameliorate quality of life of the elderly and their care-givers as well. It is necessary to regard the patients as dwellers of communities and to overlook the ecological system including their cultural and familial backgrounds, histories and natural environments.

Even in the group of mammals living relatively long to grow old, the length of post-reproductive survival in human is exceptionally long. In Life-History theory it is proposed that, instead of help for older members of the population, help from the elderly accounts for the age structures of human societies by raising the reproductivity of their children and the survivability of their grandchildren. When we prepare for an aging society with this "natural strategy" in mind, it is worth considering approaches based on the inter-personal, trans-generational and social interactions. It is also important to elucidate main factors, which have contributed to the augmentation of human longevity during the evolution. Those should be also closely related to technologies and innovation in the future.

## **Driven to the “Independent” Life: After the alliance between ICT and the elderly care**

*Kawatoko Yasuko (Daito Bunka University, Japan)*

The slogan of supporting old people’s “independent life” and “watching over elderly” is filled with at the scene of elderly care projects and related ITC businesses in Japan. One electric kettle company has developed a hot line service using an electric kettle built –in a wireless. A record of the state of an old person living alone using a kettle (on and off of the power, the supply of hot water, and keeping warm) is digested and sent to a phone or a personal computer of his/her relatives (mainly sons & daughters) twice a day. The similar kinds of products with which they let old person’s relatives know whether the old person living alone is safe or not are put on the market. However, the recent report says that the share of those products and services are for lack of sufficient demand. This result reveals that both developers’ and users’ views on “elderly independent life” and “watching over elderly” could be too superficial to grasp what the old people actually need.

In this paper I take some artifacts and media around elderly care, and describe how they are used or not used by the old people, based on the ethnography of the participatory observation and interviews. It explores that “aging” is embedded in the way of socio-technical configuration of people, artifacts, and institutions including politics, and “a decline in one’s capacities going with aging” is made visible or organized with regard to the setting of interaction between old people and artifacts. The old people’ ways of using artifacts or not using them may conversely tell us whether designers and developers of the artifacts or the care-systems could reach the actual state of old people’ difficulties or not.

I also argue that what is “independent” life for the elderly, and under what kind of socio-technical arrangements it can be performed.

**Intimations of (Im)mortality: how aging scientists debate the relation between the normal, the natural and the pathological**

*Latimer Joanna (Cardiff University, UK)*

In *Being & Time* the prospect of death is for Heidegger the touchstone of human creativity. The proposed paper explores how possibilities for immortality are debated in aging science discourse. The paper draws on a collaborative project with life scientists at Cardiff on the biology of normal human ageing and its contributory role in the development of those diseases associated with later life funded by the New Dynamics of Ageing programme. While the *general* ethical, social and cultural dimensions of ageing science and medicine have been being discussed and explored (e.g. Binstock et al 2006; Davis 2004; Vincent et al 2008) what has emerged in the current study is that there are also debates within the scientific and medical community over the possibilities, and proper objectives, of ageing science and medicine (e.g. de Grey 2003; Select Committee on Science and Technology Sixth Report 2006;) with radical claims for 'no limits' to longevity (e.g. De Grey et al 2002a and 2002b) and the promotion of rejuvenatory anti-ageing therapies (e.g. Rose 2007). The paper examines these debates and discourses around the normal, the natural and the pathological for how and at what moments scientists justify, or don't, intervening in ageing, including dying itself. The aim is to reflect upon the significance of these debates for understanding the contemporary attitude to becoming old, and to time itself.

## **Images of Health and Ageing: Constructing the Socio-Materiality of Technological Innovation in e-Healthcare**

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This paper builds on and extends prior research on the 'negotiability' of technological innovation, through which non-linear and more complex models of innovation are explored, in particular those which see appropriation of technologies in use as key elements of successful innovation over and above simple reference to linear models of technological imperative and market demand (Williams et al., 2005). In particular, this paper seeks to cast some further light on the dynamics and complexity between technological innovation and use in the context of the development of e-enabled care services for the ageing. We explore the 'situated entanglement' of both endogenous and exogenous (techno-economic and the social) conditions embedded in the 'actuality' and the emergent nature of technological innovation in an e-healthcare project. Drawing upon Orlikowski's (2007) work on technological performativity and human agency, we point towards a new set of understandings within which technological innovation is framed as a social system/process (which encompasses a broad range of phenomena including knowledge practices, learning, power, politics, leadership, conflict resolution, and competency development) that are materially constructed and performed. In so doing, we develop the concept of the 'construction of the (socio) material' to make sense of the processes that shape and eventually constitute the planning and management of technological innovation and the various mechanisms of 'sociotechnical' ordering and organizing employed by socially relevant (organizational) actors.

The empirical backdrop to this discussion is provided by exploring the contingencies and socio-political particularities surrounding a European Union funded project – OLDES (Older People's E-services at Home) – concerning the development of a technology platform to support the delivery of e-enabled health and social services to older people living at home. Demographic ageing is an increasing reality of the population around the world. The ageing of the European Union's population is considered as one of the main challenges that the member states will have to face in the years to come (European Commission, 2005). The Internet and related digital technologies have created much interest in the future provision of health and social services to older people through a variety of virtual means (European Commission, 2004, 2005, 2006, 2007; Foresight, 2000; Kings College, 2004; Colmer, 2007). However, the track record of attempts to design, develop and adopt such technological innovations suggests that many have been driven by simplistic notions of technology push or have assumed that a market will emerge for assistive technologies which will simply enable the configuration for the use of older people of a largely existing set of technological



capabilities (May et al, 2001; Blythe et al., 2005; Dewsbury et al., 2002; Whitney and Keith, 2006; Colmer, 2007; Powell, 2009).

In the OLDES project we have found that a constant tension exists between the need to stabilise technological systems and artefacts on the one hand and the desire to engage and involve users in the co-production of innovative service models and architectures on the other. The tensions between the need to control and produce stability on the one hand, and the inherent uncertainty of context and process on the other, have resulted in multiple difficulties in representing the desired socio-material outcome of the project.

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## **Caring and ageing: the mediation of technology**

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Attention to dependent people has turned into one of the major problems of ageing western societies. Policy makers are worried by future scenarios where it is envisaged a lack of provision of long-term care for an increasing population of elderly people who are no longer capable of taking care of themselves.

In order to provide a societal answer to this 'lack of care', technology appears as a very important actor in most of the proposed solutions. Telecare, smart houses and other technological solutions are becoming part of the landscape of caring. Changes in the everyday life of affected people are object of study and controversies are common coin when conclusions have to be drawn. People easily appear distributed along a continuum that places in one pole those who are totally against such technological solutions and, in the other, those who are the most enthusiastic with them. This is, actually, a common scenario when assessing the effects of technoscientific innovations in everyday life.

Nevertheless, due to its essentially relational character, some voices have arisen to underline the specific threaten that machines and devices suppose for authentic care delivering. This is certainly a very interesting fear, because it tells us about a deeply rooted belief in our western societies; to talk about the social is to talk only about human beings and their mutual relationships. Now, it is difficult to understand our social world if we exclude from our explanations all our non-human companions. As Michel Serres has clearly explained, social sciences have been wrong when they have tried to explain society in terms of a *social contract*, which would only bound nude human beings, and they have insisted in merely paying attention to language, writing and logics. In spite of not having been taken into account, things, devices and utensils have always been there, with an important role in the constitution of human collectivities.

If we share such approach, then it is clear that makes no sense to pretend that technology can interfere with care and, even, undermine it. But this does not mean that technology is a neutral aspect in the equation of care. As it is well known in STS, it makes no sense to state that technology is good or bad, but it is equally nonsensical to pretend it is a neutral affair whose effects only depend on the intentions of human actors that use it.

The aim of our contribution is to present the point of view of carers and cared people in such an issue. How do they think on care? What's the role attributed to apparatuses in such practice? These and other similar questions are to be answered from the analysis of several focus groups conducted in Spain with telecare users and their relatives.

## **At home with telecare: technology in(dependence) and ageing**

*Mort Maggie (Lancaster University, UK)*

In recent years images of independence and active ageing have come to characterise a successful old age in Western societies. Staying in 'your own home', or what is termed ageing-in-place, is promoted as the ideal future for older people. Telecare technologies are aimed at helping frail older people stay at home, reducing or delaying the requirement for residential care. In technical and policy discourses, such remote care systems are often described as 'solutions' to the 'problems' of demographic ageing, shrinking health and social care budgets and shortage of 'carers', underpinned by claims that telecare will enable a reduction in overall care costs. In this way, 'independence' is the strongly normative vision which becomes realisable through a range of devices. Unarguably it seems, 'home (often) alone' is where older people wish to be, and is where independence or 'active ageing' can be supported. But while 'independent living' has been a hard won achievement disability rights movement, much of the discourse of independent living has become unproblematically transposed to older people/ageing populations. Home telecare systems are typically linked through a home hub to a monitoring centre that responds to alarms and coordinates emergency or co-present care if required. But what kind of home is the telehome? What forms of independence are on offer and how are these achieved in practice? Many forms of labour are undertaken in the various sites of telecare practice and are explored in this paper. For example what sort of care is provided through telecare monitoring centres? What kind of work is involved in installing a telecare system and how is this valued and understood as part of care provision? And how do 'users' of telecare (older people and carers) interact with such systems? If independence is the goal of these systems, what are its implied or absent dependencies? The paper draws on emerging findings from ethnographic research for the EC FP7 Science in Society Programme project EFORTT - Ethical Frameworks for Telecare Technologies for older people at home.

## Eldercare 2.0

*Munksgaard Marianne Eilsoe (The Danish School of Education, Aarhus University, Denmark)*

The Danish eldercare is changing. However, the question is how the eldercare will change or how it is innovated? This must be considered an important question as we have to be ahead of time in order to educate the workforce in eldercare and fulfil the future needs of the elderly. The Danish eldercare has been criticised for a lack of quality. On that background many development projects have emerged in Danish eldercare with the purpose to innovate eldercare into the future.

### OBJECTIVE

The Ph.D. project, *The Willingness to Social Order in Eldercare*, is examining tendencies in Danish eldercare by questioning where eldercare comes from (the past) and where it is headed to (the future). The tendencies are examined in a contemporary diagnostic perspective.

### METHODS

To give voice to these tendencies a constructed case named *Eldercare 2.0* has been developed. *Eldercare 2.0* is a case based on two methodology approaches: 1) A social-analytic (philosophical/ historical) analysis of ideas, criticism, tendencies, narratives, media cases and policies of eldercare and 2) An ethnographic study of present development projects in Danish eldercare.

### RESULTS

In *Eldercare 2.0*, the focus on technology and user-driven innovation is resulting in a much more sophisticated and individualized self care concept where the elderly not only want to participate and contribute to their own care, they want to develop, plan, and control the care as well. Thus, this also creates conflicts in the relation to the care workers. The eldercare face a radically changing process which not yet have but is about to play a decisive role in eldercare.

### CONCLUSIONS

*Eldercare 2.0* is thought as the movement from care of *supposed fragile elderly people* to a focus on care for the elderly's development process. This is a fundamental different approach to eldercare which problematizes the modernisation of eldercare.

**“Older people want to live at home”, an analysis of a representation coalition around a dominant image of older people**

*Neven Louis (Science, Technology and Policy Studies, University of Twente, The Netherlands)*

The development of (care) technologies for elders is often accompanied by a specific discourse, which consists of several related statements like populations are ageing, the cost of care is increasing and there is a shortage of staff to care for elders. A central claim in this discourse is that elders prefer to live in their own homes as long as possible. Elders living at home is also seen as a more cost effective way to care for elders and as a way of combating the growing shortage of places in retirement and care homes. Elders living at home is thus positioned as a win-win situation which can be made possible with the help of specific technologies.

This paper analyzes the role of the ‘elders want to live at home’ user representation in the development, introduction and use of an ambient intelligent monitoring system for elders with dementia or other severe illnesses. This monitoring system was designed with the specific intention to allow elders to live in their homes safely despite their illnesses. This paper will show that the actors involved in the design and use of the monitoring system – such as the designers, the care institution, the care workers, the elders themselves and their children – all attached different meanings and goals to the monitoring system. Despite these multiple interpretations, all actors agreed on the idea that elders want to live at home and that this wish can be fulfilled by introducing new technologies. Thus the actors formed what can be called a representation coalition around the idea of elders wanting to live at home. This coalition was further strengthened by the ideographical properties of the representation of elders as wanting to live at home. This representation is easily recognized as a good thing and it is hard to argue against it.

However, even though all actors are united around this representation of elders, it does not follow that the introduction of the technology leaves the everyday live practices of elders unchanged. This paper will thus proceed to analyze how the practices of elders changed when the system was introduced. It will be shown that what the home actually *is*, is reconfigured on a physical, virtual and emotional level as a result of the introduction of the system. The elders did get to stay at home, but it was not the same home. However, such reconfigurations do not receive much attention. The representation coalition and the ideographical connotations of elders living at home combine to present elders living at home as the ideal situation which is not up for discussion.

In conclusion, it will be argued that it is important to consider these reconfigurations because they have an influence on how the home and the use of technology is experienced. This will become increasingly important as in the future the homes of elders will likely be equipped with more and more technology and as living at home until death might no longer be the preferred option, but the only option.

**“Do you know your number?”: The dynamic interplay of measurement technologies, asymptomatic conditions and preventive medication in relation to older adults in Denmark**

*Oxlund Bjarke (University of Copenhagen, Denmark)*

The introduction of a wide range of measurement technologies during the 20<sup>th</sup> century has meant that a number of asymptomatic conditions have come to be regarded as folk diseases based on abstracted numerical values. High blood pressure, high levels of cholesterol and pre-diabetes are now among the most widely medicated conditions in people over 50 years due to narrowing definitions of normality and widening definitions of pathology. This paper specifically asks how these asymptomatic conditions are translated into aging diseases by people aged 50-70 through the use of measurement technologies. Based on ethnographic fieldwork in the Danish municipality of Vordingborg, the paper sets out to explore the images that elderly Danes have of their own bodies in an era where numerical thresholds have become both publicly authorized and commonly popularized as the objective truth about health. It is argued that the relation between measurement technologies and decisions about preventive medication have instigated new understandings of health and aging.

## Contested Vulnerabilities in the Performativity of Age and Technology

Reed Darren (University of York, UK)

Contemporary approaches to technology design for older users are dominated by a set of discursive repertoires centred on 'assistance' and 'inclusion'. These repertoires are implicated in the construction of scripted objects (Akrich, 1992) and identities and bodies (Butler, 1990) and premised upon a distinctive formulation of capability, confidence and agency that roots future technology development in language of the vulnerable user. Yet at the same time, these institutionalized discourses stand in contrast to the ways that technology is intertwined with identity in the experience talk of older people. Here technology serves many purposes, is co-opted and appropriated. Far from serving to denote vulnerability, it is more likely to project active manipulation and control, even for those with physical impairment. What falls out from this comparison is the contested nature and siting of vulnerability.

Interestingly, it is precisely the lobby who wish to support older people and engage them in use of these tools whose repertoires position them most firmly as vulnerable. This paper draws on the extensive experience of the authors as practitioners within the areas of human computer interaction, interaction design and participatory design, in combination with an analysis of technology literature, and the analysis of biographical materials collected as part of various activities, to show how these repertoires influence the performativity of ageing. Specifically, we draw on three studies. The first is a collaboration between a number of older people's groups and a research project exploring workshop techniques for tackling marginalisation from digital design discussions. The second is an extended interview of a Second Life user who turned to the domain in retirement. The third is an analysis of materials in use to engage older people as informants in the design of interactive systems and tools. By centring the analysis on Harré's notion of 'positioning' (Harré & van Langenhove, 1999; Sabat & Harré, 1995) and the conversation analytic conception of 'membership categorization devices' (Nikander, 2002), the authors speak to the inscription of meaning involved in current technology - age relations and work toward understanding such discourses as actants in the actor-network. Such a reading brings a more sophisticated notion of 'vulnerability' as a network effect, a matter of distributed agency circulating through human and non-human entities (Latour, 2005).

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## Visual Culture of Alzheimer's Disease--Genealogies of Care

*Selberg Scott (New York University, USA)*

The profound resurgence in the study of ethics within the academy—but also across discourses of nation building, media reform, healthcare, and religious rhetorics of responsibility and right—all ground ethical considerations as a fundamental concern of contemporary political study in visual and media culture. My current work on the visual culture of Alzheimer's disease is an interdisciplinary intervention that proposes cognitive ethics as a helpful problematic. I argue there is a developing need within the United States for cognitive ability as a function of national identity, but I do not go so far as to claim this as an exclusive or necessarily dominant ethical category. Rather, I'm trying to speak toward a kind of complex situation that increasingly helps to shape the way that Alzheimer's might become meaningful in daily lives—for those diagnosed with the disease, for caregivers, and for those of us trying to understand its relationship to cultural production, mobility, and participation. Importantly, this model will not simply act as a polemic against the centrality of the cognitive imperative, rather it will attempt to describe the diversity of the ways in which this imperative has historically informed daily health and wealth in this country. Alzheimer's reveals these ethics as foundational not just to pathological personhood, but also to structures of information economies, somatic citizenship, and interpersonal exchange.

In particular, this paper will explore these cognitive ethics through a visually oriented genealogy of the early development of the disease as evidenced by the United States' National Library of Medicine. This involves searching for ways in which visuality has been understood since 1906 as central to the conceptualization and rationalization of the disease, its representation, and its related cause, cure, diagnoses, and therapies. Consequently, I will investigate the way in which visuality and cognition have come to inform each other within national narratives of productivity, kinship, and mental and physical health. I am interested here in understanding exactly how the mutual articulation of visual culture and Alzheimer's disease competes or aligns with other U.S. national bodies.

Ultimately, I want to argue that the regime of cognitive ethics is a symptom of a kind of modernity, a developing contemporary problematic that can be situated in a direct relationship to both the sociocultural and scientific productions of the disease. At root, cognitive ethics describes a political economy of cognitive labor and embodied value in an information economy and an increasingly hypermediated system of interpersonal exchange. Here cognitive labor manages to produce affectively bound communities and partnerships in developing visual imaginaries. Also, cognitive ethics encompasses both the technologies and cultural rationalities that enable specific transformations in the constitution and potential of self, personhood, and citizenship in a national context, what I refer to as the "cognitive imperative." More directly then, this can be understood as a helpful correlative to recent developments in neo-Foucauldian bioethics (Nikolas Rose's "somatic ethics," Giorgio Agamben's appropriations of bios and zoe), whereby care of the self exists in a direct relationship with culturally oriented, developing political subjectivity.



## **Images of depression in the elderly: the role of innovative technologies in revealing or combating social and biological degeneration**

*Smart Andrew (Bath Spa University, UK)*

Depression is the most common mental health problem for the elderly. It has a variety of social and/or biological causes, some of which specifically pertain to aging. This paper will consider images commonly used on health websites to represent different aging-related factors in depression, and their associated techno-scientific facets. It highlights a narrative of 'degeneration' - both social and biological - that is implicated in depression in the elderly, and the role of innovative technologies in revealing or combating deterioration. Degenerative biological factors include the decline of brain structure and function, pictorially represented by innovative technologies such as fMRI scanning. The resulting imagery of aging is classically scientific: objectified and disembodied brains compared in cross section or 3D. These are technologically mediated, often luridly coloured, representations of degeneration; of tissue shrinkage and reduced synaptic activity. A close corollary of this framing of mental health as biological decline is restorative pharmacological solutions (such as SSRIs that, proponents claim, can help to restore a 'normal' chemical balance). Alongside this biological framing of depression (and often interwoven with it) is a narrative of social degeneration: the breakdown of kinship bonds, friendship networks and community ties that threaten self-identity and self-worth. The images of aging are artistic renditions of sad, pensive and introspective individuals; they usually involve lone subjects, often framed against windows, views or public spaces. It is possible to interpret meanings of loneliness and social isolation in these representations; they seem to imply that the subject is spectator who is watching the world go by, perhaps a world in which they once an active participant. The social degeneration framing of mental health has matching communicative solutions, such as professionalised 'talking therapies' and public health recommendations to maintain social and familial relationships. The latter can be seen as embodied in the promotion of contemporary ICTs such as Skype, presented by its proponents as a means for sustaining or regenerating kinship in geographically separated families. As a final point of reflection it will be noted that the intersection of social and biological degeneration and the extent to which they can (or should) be considered 'natural' are points of contest. This, it will be suggested, is because the concomitant health and social care solutions involve the mobilisation of somewhat different socio-technical networks.

### **Capturing reflective users in quality improvement instruments in elderly care**

*van Loon Esther (Institute of Health Policy & Management, Erasmus University, Rotterdam The Netherlands)*

The care for elderly in most of the western world poses a challenge for the near future. With an aging population and a decline in health professionals working in the sector, the pressure to improve the quality of care is high. Instruments to support professionals are among the innovations that help to guarantee and manage quality by making intangible aspects of health care processes visible. In complex environments, like elderly care, where professionals need to balance between organizational and care-related choices on a daily basis, such instruments need to be able to adapt to these complexities. The risk is that instruments will be used too rigidly as prescriptive ways of how work should be performed, without remaining critical of the specific individual situation. The work of Callon and Suchman is used to contrast these ways in which reflection is included in work processes. Whereas Callon describes how writing and (re)writing devices, prescribing tasks to be performed in detail, creates non-reflective users, Suchman shows how invisible work of filing documents in law firms does require for unforeseen reflection and inside knowledge. A focus on how space for reflectivity is being included in instruments is thus crucial to understand how instruments can prevent instrumentalized use and can better match the realities of everyday practice in healthcare. This tension was exactly the focus for improvement agents responsible for the implementation of the Care Living Treatment Plan, an instrument aimed to transform elderly care organizations from being oriented on the system of care, into organizations that take a client-centered approach. Wishes of clients were to become the central element in organizing care and the instrument is a way to realize this organizational change.

I followed this instrument from situated development to use. Participant observations of group sessions within and between organizations and interviews with national project leaders, trainers and members of various health care organizations were carried out to answer the question how reflection is being included in the instrument and how this affects the use and users.

The cases described in this paper show how boundaries are created in searching for uniformity in instrument development versus articulating space for local characteristics, as well as tensions that occur between following wishes of clients and professional know how. This paper suggests that attention for the users and their boundaries of reflective space needs reconsideration in instrument development.



## **TRACK 30**

# **The New Politics of Risk: The Performing of Regulation in a Comparative Perspective**

### **Convenors:**

**David Demortain (London School of Economics, UK)**

**Brian MacGillivray (Cambridge University, UK)**

**Erika Mansnerus (Cambridge University, UK)**

**Comparative Analysis of the Emergence and Implementation of Risk Management Strategies in EU and US Pharmaceutical Regulation (1995-2010)**

*Abraham John (University of Sussex, UK)*

*Davis Courtney (University of Sussex, UK)*

During the last 10-15 years, the EU and US drug regulatory agencies have developed policies involving risk management strategies as a substitute for withdrawing pharmaceuticals from the market. The rationale for this is that subgroups of patient populations may continue to have ready access to the drugs if not withdrawn. However, a necessary question arising from risk management strategies is whether the regulatory interventions contained within them are capable of preventing and/or adequately mitigating the risks to public health attendant upon leaving the drug on the market. Drawing on documentary research and primary field-work interviews in the US and across Europe, this paper examines the evolution and implementation of risk management as a new form of regulatory science in general, and as risk-benefit analysis of pharmaceuticals, in particular. It is argued that the emergence of risk management within pharmaceutical regulation cannot be properly understood by reference to its official rationale. Rather, it needs to be understood in the context of wider neo-liberal political influences on pharmaceutical regulation, including the interests of the pharmaceutical industry, patient activism often linked to pharmaceutical companies, and the weakening of adversarial regulatory interventions, especially in the US.

## **Infrastructure Technologies and Risk: The Case of Electricity Supply and Energy Market Control Rooms**

*Silvast Antti (University of Helsinki, Finland)*

The topic of my paper is infrastructure technologies and risk. In the last 30 years, social scientific research has covered various aspects of risks: for example, their public acceptability, their cultural interpretations, their genealogy and their role in the welfare state and the contemporary society. At the same time, relatively few social scientists have analyzed risk close to the material and practical basis of operating technologies. The research question of the paper is: How does risk figure in the day-to-day management of electricity supply? The paper is grounded on empirical material gathered from electricity technicians. These technicians work in the electricity supply and energy market control rooms of an electricity company in a Finnish town. Methodologically, the research relied on interviews and participant observations. As its main result, the analysis illustrates how infrastructure risks are both managed and made in action. The technicians emphasize that their actions are entangled to various kinds of elements: to computational planning ahead and to economic considerations, but also to situational awareness, rules of thumb, experiential skills, working habits, team work, knowledge of the local electricity distribution area and ideals about secure service to customers. Another aspect of risk management is created by the complex and interconnected character of infrastructure technologies. Electricity blackouts may have repercussions in many other infrastructures such as buildings and customers' household equipment. On the other hand, the risks of electricity supply and energy markets can be sparked by risks of other infrastructures such as telecommunications, district heating, building sites, maintenance and computers, in some cases also by household infrastructures. This places exceptional demands on the workers' abilities to act with respects the turbulent behaviors of diverse technological systems. While analogical findings have been done in organizational research before, they have only rarely been addressed from the perspective of risk. The paper argues that results also fruitful for guiding further research of current debates about risk governance and expertise, large-scale technological systems and economic agency.

## **Governing ex-post drug risk surveillance: linking different epistemic cultures**

*Boon Wouter (University of Utrecht, The Netherlands)*

*Moors Ellen (University of Utrecht, The Netherlands)*

*Meijer Albert (University of Utrecht, The Netherlands)*

The need for fast drug innovation and the public demand for risk-free drugs create a dilemma for regulatory authorities: rapid market access conflicts with uncertainty about benefit/risk profiles of new drugs. When drugs are approved, risk is monitored and regulated through pharmacovigilance activities, such as spontaneous reporting. These efforts are additional to the ex-ante risk regulation that is performed in the context of clinical trials. Pharmacovigilance becomes increasingly important when, in order to stimulate innovation, ex-ante risk regulation is relaxed, e.g. through earlier, conditionally approving new drugs.

The aim of this paper is to increase the understanding of pharmacovigilance governance arrangements in the light of an increasing array of different stakeholders that are involved. STS literature learns us that involvement of actors coming from multiple backgrounds can be beneficial to make risk regulation more effective and legitimised. At the same time, distinct epistemic communities – or cultures – need to be aligned to have an impact.

To understand these multi-actor governance constellations in risk regulation we draw on two theoretical strands. Firstly, the conceptualisation of post-marketing surveillance and risk assessment as a crucial element in the process of innovation is based upon theories in the field of science and technology studies that stress the involvement of multiple stakeholders in technological development. Secondly, ideas about new forms of regulation are adapted from the growing field of governance studies.

The empirical emphasis of this study is on the governance of pharmacovigilance in conditionally-approved medicines. Results from two case studies are presented that come from the qualitative analysis of the governance of pharmacovigilance, based on interviews and extensive desk research, complemented with the results of expert workshops. The case studies are about conditional approvals in the fields of HIV/AIDS and pandemic influenza.

In the context of the two case studies different patterns of interaction, exchange of information, power relations, network rules, role perceptions, incentives, and interests were observed. This leads to the identification of modes of governance of pharmacovigilance for the two disease areas that, for example, differ in the way users are involved in risk definition and decision-making. Special attention is paid to aligning four epistemic cultures, i.e. those of medical professionals (physicians, pharmacists), industry, regulators, and patients (through experiential knowledge).

Ex-post risk evaluation becomes more prominent in favour of ex-ante risk profiling, which means an increasing involvement of different types of actors and knowledge backgrounds. This paper explores new and innovative modes of risk governance which takes these distinct epistemic cultures into account, differing over disease areas.

**“Noisy summer”: the Sciences of Pesticides Risk Assessment and the fragmentation of objectivity**

*Dedieu François (INRA, France)*

*Barbier Marc (IFRIS, France)*

For a decade, public controversies about pesticides use for agricultural purpose have been rising concomitantly to a kind of public trial of industrial system of food provision in France (Veillerette 2002; Veillerette, Nicolino 2007), though pesticide have had a real effect for the blossoming of the “French green fuel” and have been used from the 1930’s without any contest (Jas, 2007). In order to respond to public health risk and environmental risk, European Union had recently confirmed a turn in the regulation of the expertise of active substances and of the sustainable use of pesticide. This turn starting in the early 2000, has accompanied a shift in the public attention towards risk in food an environment, which is much anchored today in the EU parliament. Both at the European level and the national level, authorities have the obligation to watch towards the practices of pesticide uses from the laboratory to the fork, one could say. In France, this European regulatory framework has been enforced but largely kept at a distance from the national agenda, which has been set with the “Grenelle de l’Environnement” (a national participatory political agreement on a set of goals for environmental policy).

Here is a trading zone in the regime of risk regulation of pesticide, which is particularly difficult to understand. There are many types of risk assessments with their specific bounds of scientific knowledge, specific regulatory approaches and specific arenas of actors (farmers’ health, biodiversity, environmental health, water protection, consumer protection), whereas pesticides appear to be the issue in public controversies and consumers’ claims. Their assessment in terms of potential or effective risk seems to be “pixelised” in many fields of practices of knowing about them. Causes and consequences of potential or already assessed harmful effects are thus spread and dissolved in discussion about the multiplicity of causes and the multiplicity of consequences.

Thanks to a set of interviews with regulators, scientists, pesticide lobbyists, farmers representatives; thanks to the participation observation of a collective scientific expertise process recently issued (Ecophyto R&D) and thanks to a comparative approach of National Action Plan for the sustainable use of pesticides in Europe, this communication proposes to characterise and discuss the framing of this singular configuration of “pixelised” risk assessment. Following Barthe (2002) we would like to depict and analyse how some matters of issues with pesticides are made affordable in different areas of expertise about their effects and origins. Our purpose is not to afford for “swings and swaps” with pesticides in public health policy, instead we would like to shed light on this strange configuration of a profusion of scientific knowledge and *dispositifs* of expertise, while the cause and consequence of the existence of those risks are kept separated except in the noisy realm of public claims.

Based on seminal work in the field of STS about boundary work and practices at the frontiers of scientific practices or because of inner dynamics of scientific production (Fujimura, 1987; Jasanof, 1990; Bowker et Star, 1999; Galison, 1999), the discussion of our materials would

like also to pay attention to the fields of practices (Gherardi, 2007) that ground the production of knowledge in organisational settings. The risk regulation regime shows different areas of national governance associating specific type of risk to a National risk agency (food risk, environmental risk and occupational risk). Though EU regulation directives are in favour of a bureaucratization of expertise promoting regulatory sciences (ecotoxicology and environmental sciences, cancer epidemiology), our communication explores also the negotiation of objectivity in relation to the ways of being of pesticides risk in relation to these areas of risk assessment practices.



**The genericness of risk: exploring the trans-domain application of risk assessment**

*Demortain David (London School of Economics, UK)*

The paper studies the standardisation of risk assessment. It looks at the apparent “diffusion” of the framework for risk analysis of the US National Research Council (NRC 1983), from the domain of chemical safety and cancer risks, to microbiological and genetically modified food safety. The paper questions whether this should be analysed as a simple re-labelling of existing practices of safety evaluation that existed prior to the model of risk analysis in these different “zones” (Galison 1996 and 1997) or to the actual generalisation of certain practices of risk assessment. It argues that both of these dynamics take place at the same time and engender one another. The model is seized by specialists to re-label and re-legitimise their practices, but also leads to the identification of the limits of these practices. It eventually turns these into the producers of generic risk assessment practices. The paper thus argues that risk assessment is a language that turns zones into “hubs” that evolve together.

## **Toxic culture: when, how, why and where we are going?**

*de Oliveira Lúcia Fernandes (University of Coimbra, Portugal)*

Science and technology bring much benefit to human beings, but also pollution and diseases. The chemical industry is a central actor in this process and is behind all industrial production sectors.

The production and consumption paradigm guides most of public policy development. It promoted a "toxic culture" and neglected the quality of life of local communities and the uncertainties in long term predictions of health and environmental damages. In the consumption society, human beings and environmental health are not in the centre of decision-making processes. For example, plastic bags largely used are very dangerous for the rivers and ocean life. Technology for making biodegradable bags is available, but expensive, thus plastic bags continue in the market. Because chemical policies differ very much from country to country, we still consume sodium cyclamate, that was banned in the USA, because there were some associations with bladder cancer. Some pesticides are produced in the EU and exported to Brazil, as their use is not allowed in the EU. Only 1,5 to 3% of the chemicals in the market has tests about their possible impact in cancerous diseases. Local and global chemical regulations are deficient.

The growth in scale and complexity of chemical processes, after second world war was enormous. Gas storage has grown from 10 to 150 m<sup>3</sup>. Consumer goods became petroleum based whereas in the past, they were carbohydrate based. Paints were made of soybean and soaps from vegetable oils. New chemical substances were invented, like chloride gas, that allow to produce other kinds of goods. This process was very rapid mostly in the last 50 years, generating a lack of control on the consequences of this change. A production-destruction dialectic arose where the improvements of life quality cost environment and health damages for many. Some important chemical accidents happened in the seventies and eighties, like Seveso, Bhopal San Juan de Ixhuatepec and Vila Socó, and the Minamata Bay contamination are examples of the consequence of this lack of control. Some researches conclude that the growth in the number of cancer cases in industrial countries is associated with chemical use and exposition.

Some technological optimism still claims that S&T can solve the problems that created. Complexity, uncertainties and vulnerabilities are usually neglected in decision-making processes that are risk centered and simplify the problems' complexities. This paper discuss my new research project, about the way the toxic culture is structured and work. I will introduce some results of my PhD thesis, that analyses two contaminated environments produced by toxic culture, to connect the theoretical discussion to practice.

## **Expertise in crisis: The role of volcanologists in framing policy advice on Montserrat**

*Donovan Amy (University of Cambridge, UK)*

The volcanic eruption on Montserrat, British West Indies, commenced on 18<sup>th</sup> July 1995. Overnight, the island became dependent on scientific advice from volcanologists, many of whom had not been involved in policymaking before. Montserrat's capital city was evacuated in 1996 and destroyed in 1997. Two thirds of the population have left the island, and the remaining third have relocated to the north: the volcano still controls the southern two thirds of the 17-by-8-km island. Particular characteristics of the eruption, including lengthy "quiet" periods between extrusive phases, have challenged volcanologists to develop improved geophysical and geochemical models for the behaviour of the volcano and promoted far-reaching scientific discussions. At the same time, the scientists involved in managing the activity have developed statistical methodologies for probabilistic forecasting of activity, most notably the pioneering use of calibrated expert elicitation models. Much of this was in response to the demands of policy advisors.

This paper will discuss some of the challenges faced by scientists in the early years of the eruption, and the progressive establishment of dialogue between the volcanological community, the local authorities and the public. Five months of participant observation at the Montserrat Volcano Observatory (MVO), which was established shortly after the eruption began, and interviews with key stakeholders, as well as questionnaire data collected from a global volcanological survey will be used to illustrate the use of scientific knowledge and methods in creating policy on Montserrat. In particular, the probabilistic methods will be discussed in the social context. The pressure on individual scientists during this eruption has been intense, as has their desire to have a positive impact on a frightened population. During the process, and given a small population, they have become well known, both as the source of protection, and, on occasion, of advice that has led to apparently unnecessary evacuations. The nature of volcanic risk, in combination with the relative youth of volcanological models and knowledge, is such that very high levels of uncertainty are involved in predictions and forecasts, and there is often very little warning of high-impact events. The experts involved on Montserrat have framed the scientific discourse in a unique set of methods, which betray both their own anxieties and the perceived needs of the Montserratian population. Simultaneously, those methods are highly subjective and liable to be impacted by the experts' own understanding of the scientific questions and their interpretation of the likely popular responses. The role of subjective probabilistic models in volcanology is still controversial for many empirical scientists, and the Montserratian case study is a useful and provocative example of adaptation by scientists under social (and volcanic) pressure, and also reveals the challenges of communicating uncertainty within this part of the scientific community and beyond it. It offers a unique insight both into the epistemology of volcanology, and the wider discourse of scientific approaches to risk policy formation.

**In what (other) world do we want to live together? Proof, precaution, participation.  
From political epistemologies to experimentations of the State**

*Dratwa Jim (European Commission, Facultés universitaires Saint-Louis, Brussels, Belgium)*

This contribution builds on three politico-administrative entities, three modes of articulation of knowledge and action, three devices of experimentation of the State: the precautionary principle, impact assessment and public consultation. All three, scrutinized in their emergence and in their accomplishment in the field of the European Union institutions, bring together the question of the political (with regard to its others, to the 'non-political', to the public, as well as to the 'technical') and the question of the consequences of public intervention.

At five key moments in this experimentation of the State, difficulties encountered by John Dewey and more recent STS scholarship are mobilized, which complicate and reorient the inquiry. "*Comment faire ses preuves?*" Such is the overarching question which this paper aims to open. That is, what are the requisites to grant viability to political fictions/projects/initiatives/cosmograms/visions/imaginaries/mobilisations? How much or what evidence is needed to sustain them? Can the *making* of science and of decisions be accomplished so as to establish their credibility among the diverse audiences, constituencies, or remote participants of the world? Can the new regulatory state (or supra-state, or international organizations) hold/claim a monopoly on the legitimate use of epistemology? How do different groups of people – within or as professions, institutions, nations – discriminate between knowledge claims. How do they establish the validity of knowledge claims, as well as *the way to establish* the validity of knowledge claims. And then how can such different choices about (the means to decide) truth or '*political epistemologies*' coexist?

'Risk', not merely as a discourse but as a deeply institutionalized scheme to handle any and every *thing* as a *risk* (to be granted a particular problematization and ontology; to be assessed and managed and communicated in particular ways), plays the role of such a political epistemology – a monopolistic one, at that – organizing the "living together" and the "deciding together" at the international level. I have documented how the *precautionary principle* has been plied by its proponent on the international scene as a rival to *risk analysis* in that regard, and will explore its development and implications in the present paper. In different ways too, *impact assessment* and *public consultation* (as composed at the European Commission and beyond) comprise other forms of idiosyncratic identities and imagined communities. They offer another articulation of knowledge and action, and indeed alternative proposals in terms of political epistemology.

## **Research Ethics Committees in the regulation of risk in biomedical research**

*Hedgecoe Adam (University of Sussex, UK)*

*Courtney Davis (University of Sussex, UK)*

Anticipatory ethical review of biomedical research – performed in the UK by Research Ethics Committees (RECs) – has the aim, amongst other things, of ensuring that clinical trials and other kinds of research carried out on humans are as low risk as possible. Yet at the same time, as the disastrous phase I trial of the drug TGN1412 in March 2006 showed, there is an underlying acknowledgment that medical research is inherently risky, and that people can get harmed, even in clinical trials carried out to the highest standards and in the best possible faith. This paper draws on an historical/ethnographic study of Research Ethics Committees in the UK to explore RECs' "informal logics of risk" (to borrow a phrase from Tom Horlick Jones), how members of these committees think about and discuss the risks of biomedical research, why some research is viewed as more risky than other, and the role of informed consent in transferring risk-taking to research subjects. This paper draws on historical material from the UK National Archives, observations carried out at UK RECs and interviews with REC members, including members of the Brent REC which approved the TGN1412 trial.

## Doing health risks: cardiovascular risk assessment and the politics of personal responsibility

*Jauho Mikko (Finland National Consumer Research Centre, Finland)*

Personal responsibility is a central theme in contemporary discussions on health and welfare policy. It is often viewed as a correlate of a more general societal development, where growing individualization and consumerism come to play a role in the realm of health care. Expanding personal accountability is also an explicit health policy objective in current post-welfarist societies, which introduce market mechanisms into health service provision. However, many critical voices have raised fears that the accentuation of individual responsibility leads to the erosion of collective responsibility and dismantling of social measures of welfare, as well as to increasing inequality in health and health care and blaming the victim.

The paper grounds these often sweeping assertions to an empirical case and looks at the techniques by which responsible subjects are made in a concrete context: cardiovascular risk assessment practices. Health risks are a salient locus for studying responsibility, since they are by definition potential future harms that can be influenced by action in the now. I argue for a more localised and material approach to responsibility, which concentrates on the various contexts and technologies where scientific knowledge is transformed into individual conduct – where, in Paul Rabinow's terms, *logos* becomes *ethos*.

The techniques of risk and responsibility are analysed in two settings. Firstly, there is a historical description of how cardiovascular risk factors were defined and a generalised awareness of personal health risks was established in Finland. I show how risk assessment came to favour individual risk factors at the cost of social factors. In addition, the risk factors were conceived in such a way that preventive measures had to target the whole population instead of specific risk group(s), combinations of all relevant risk factors instead of single factors, and virtually all values of a factor instead of only those above (or below) a certain limit. As a result, basically every individual had to be mobilised to the task of cardiovascular risk management. This section of the paper is based on textual analysis of material concerning the establishment of cardiovascular risk factors (scientific papers, project reports, policy statements etc.).

Secondly, I analyse present practices of cardiovascular risk assessment, which frame the individual as responsible of his/her health and well-being. Here the focus is on how the medical and epidemiological knowledge on risk is converted into recommendations concerning individual behaviour in physical examinations and health education carried out in the health care system. In this section, I look at the existing 'best practices' in the diagnosis, prevention and treatment of cardiovascular problems (the Current Care guidelines published by the Finnish medical association).

Hence the paper discusses the 'doing' of health risks and responsibility on two levels. The first level is the formation of cardiovascular risk concepts in epidemiological research and intervention projects. The second one is the creation of subjects-at-risk, with responsibility vis-à-vis their personal risk profiles in risk assessment practices. These levels are of course intimately connected, since the latter builds upon results from the former.

## **Uncertainty and standards of proof – Comparative and transnational analysis of risk governance**

*Joly Pierre-Benoit (INRA/SenS and IFRIS, France)*

This paper adopts a comparative and transnational analysis to deal with the issue of standards of proofs in risk governance. Drawing on previous research on credibility (Shapin), objectivity (Porter, Daston), acceptable evidence and civic epistemologies (Jasanoff) I analyse the differences in the production and use of knowledge in Europe and in the US. Despite growing interactions, international transfers, and forces which produce convergence, we observe lasting –and even increasing- differences. In the US, according to a long tradition related to the reference to quantitative analysis, regulatory agencies usually construct what I propose to call an “axiomatic objectivity”. The Europe is in a transitional regime; we claim that “pluralistic objectivity” is the key reference. Differences in the conception of objectivity – and hence standards of proofs- may be explained by the type of boundary work, differences in the understanding of separation between risk assessment and risk management, differences in the types of professionals who assess risks and, moreover, differences in the structure of the field of expertise. We also claim that experts not only define the properties of objects but also engage into the definition of categories and of the essence of the entities at stake (epistemic ontology). Importantly these elements which characterize practices of the experts at work reflect the political order of the respective areas

Lasting differences do not mean that systems are immutable. At the contrary, since the 70's, we observe drastic changes in risk governance. We thus have to go beyond the analysis of “national styles of regulation” produced in the 80's, which focused on international differences. It is therefore important to explicitly deal with the characterisation of political order and the changes which occurred since the 70's. We explore different key dimensions, namely the production of legitimacy, the issue of subsidiarity, and the importance granted to the rights of the citizens. This analysis is illustrated through three cases: GMO's, animal cloning, nuclear wastes.

## Heuristics and precautionary risk regulation

*MacGillivray Brian H. (University of Cambridge, UK)*

A substantial body of psychological research suggests that lay perceptions of risk are rooted more in intuitive heuristics (e.g. affect, availability) than in reason. Although some argue that these heuristics are efficient and reasonably accurate tools for judgment and choice, the focus of the risk regulation literature has been on the systematic errors that arise from their application. The concern is that these “erroneous” risk perceptions may be replicated in law, policy and regulation, through democratic governments responding to the (mis)fears of the citizenry. This has led to an influential school of thought that prescribes a relatively technocratic approach to regulating risk, wherein expert agencies evaluate risks and options for their regulation via risk and cost-benefit analysis. These methodologies are intended to screen out the malign influence of heuristics from regulation. The principle is that government can do much better than rely on rules of thumb.

Based on a study of industrial chemicals regulation, I argue that the role heuristics play in shaping risk regulation is more subtle and pervasive than advocates of technocracy suggest. In short, heuristics pervade all forms and stages of regulation, from the production of regulatory science through to judicial review of regulatory decisions. Moreover, heuristics are not only intuitive tools residing within the subconsciouses of lay-persons. Instead, many heuristics are deliberative, used in institutional and social contexts, and constructed and negotiated. To illustrate, epidemiologists apply a heuristic to help determine whether a chemical causes a disease, requiring study results to meet a minimum strength of association between chemical exposure and harm (power) as well as a threshold of statistical significance. Similarly, regulatory agencies use heuristics to fill in “black boxes” in their risk assessment processes, e.g. using conservative rules of thumb to extrapolate from the findings of animal experiments to derive safe levels of human exposure to chemicals. As a final example, courts employ heuristics when reviewing the rationality of regulatory decisions on risk, e.g. under the Chevron doctrine, US courts defer to an agency’s reading of its governing statute where that statute is considered ambiguous and the agency’s interpretation passes a test of “reasonableness.”

I provide a classification scheme for regulatory heuristics, those used: to guide the collection of data on risk objects (search heuristics); to define what counts as valid evidence (gatekeeping heuristics); to extrapolate beyond data-sets (extrapolation heuristics); and to test between competing hypotheses (hypothesis-testing heuristics). I present basic principles for “validating” individual heuristics, paying particular attention to the contexts in which they are applied (e.g. Do they have theoretical and empirical justifications? Are their limits of application specified? Do they generate clear, testable predictions?). I then discuss the strengths and weaknesses of heuristics compared to alternative modes of inference and choice, such as unconstrained professional judgment and conventional rationality. I end by arguing that heuristics, far from being a malign influence to be avoided, offer a way of bridging the gap between the precautionary principle and concrete practices of risk and policy evaluation.



## **Governance of public health risks through vaccinations**

*Mansnerus Erika (Cambridge University, UK)*

Vaccinations form a major group of preventive actions in public health. By vaccinating a majority of population, the transmission of an infection is stopped and a potential outbreak of life-threatening disease is prevented. Even though the targeted infection can be relatively harmless, it may have fatal consequences to particular subgroups in the population. To prevent transmission of endemic infections, we need a continuous uptake of vaccinations, whereas, at the time of a pandemic outbreak, an immediate mass campaign is required. This study explores how governance of risk from infectious diseases emerges and is maintained through preventive actions - vaccinations. I will argue that the perception of risk varies across the different groups who manage, recommend or are expected to follow particular vaccination strategies. What counts as a population-level risk for a public health official, may not be regarded as equally threatening on an individual level. So, this observation suggests that there are multiple interpretations of public health risks related to infectious diseases.

Epidemiological modelling functions as a form of 'risk calculation'. These calculations help direct and design preventive actions towards the health outcomes of populations. The interest is to analyse how modelling becomes a part of the 'knowledge regimes', within which government acts on the perceived public health risks. Estimates from modelling exemplify the population level reasoning, whereas these estimates may remain incapable of communicating the individual level risks of a particular infection. The main research questions informing this study are: How do various actors – public health officials, epidemiologists, and lay individuals - perceive risks? How does governance of risk emerge through the different preventive acts, such as, protocols, and recommendations to vaccinate? What is the role of technologies of calculation in the governance of risks from infectious diseases?

The study compares two vaccination programmes in the UK: the prevention of endemic rubella outbreaks by implementing the MMR triple vaccine as a part of a mass vaccination scheme in 1987 and the pandemic (H1N1)v vaccinations targeted to the risk groups in 2009.

**Dangerous bodies, bodies in danger or questioning how (de)humanized birth can be: An analysis of the relation between expert and lay knowledge in Portuguese birth politics**

*Mendes Isabel Margarida (Nursing School of Coimbra, Portugal)*

*Matos Ana Raquel (Centre for Social Studies, University of Coimbra, Portugal)*

*Costa Susana (Centre for Social Studies, University of Coimbra, Portugal)*

This paper aims at analysing and discussing two central questions related to maternal and child health public policies, specifically birth humanization and public participation on decision making processes, focusing the latter on the recent controversial decision of closing Maternity Wards in Portugal.

The main goal is to discuss the theoretical conception of “co-production of knowledge” as well as “collective experiments” through the analysis of the two case studies. The authors are particularly aware of the relation between expert and lay knowledge and the connection between the political sphere of decision and citizens participation.

Tacking stock on the two aforementioned case studies, the authors will focus on the “birth demedicalization” concept and purpose an integrated approach for those two health public policies perspectives. They will put this forward by questioning, first, the existing relation between lay and expert knowledge and, second, the scope of the (re)definition of those kinds of policies. This study was mostly supported by qualitative analysis, namely documental analysis of government reports on health, legislation on the matter, and interviews made to key informants of the processes.

In Portugal, at the moment, one can find two different trends. On one hand, there is a clear increase of the number of associations, health professionals and interested lay people that defend birth demedicalization, either in the hospital or in alternative contexts. On the other hand, there is a controversy started by the Portuguese Government, in 2006, and motivated by the closure of a significant number of maternity wards all over the country, which is limiting the women access to a medicalized birth.

While expert and lay people are arguing about “where” and “how” women should give birth, in a medicalized or demedicalized way, the Portuguese government is acting based exclusively in an expert knowledge report, arguing for the promotion of equal access to obstetric medical care, although highly contested by the population.

Concerning the case study on maternity wards closure, the main conclusions were the following: citizens want to be heard and are increasingly fighting in order to participate in the scope of political decision making processes; Portuguese experts are aware of the relevance of citizens participation and recommend it to the political sphere; Portuguese government, despite the popular protests and the expert recommendations, insist in an autistic way to govern.

Regarding the increase of humanized birth in Portuguese society, supported by the argument of the risks associated with the excessive medical intervention, this work tries to understand the possible connection between the increasing number of women given birth at home with the recent health measures of the Portuguese government.

## **Calculating the Consumer: Ignorance and Expiration in Food Risk Management**

*Milne Richard (University of Sheffield, UK)*

In the EU all packaged perishable food products must carry a risk indicator in the form of 'use-by' or expiry date labelling. This sets a date beyond which it is illegal to sell foods and unsafe to consume them. Date labels are an important source of information for consumers in making food choice (FSA Citizen's Forum 2010). However in the UK institutional concerns have arisen about the ability of consumers to effectively manage their exposure to risk, describing them as both risk-prone hoarders of perished foods and risk-averse wasters of safe foods. Either way, the consumer is problematised as the 'weak link' in food safety and ignorant of the appropriate approach to food. This paper reports the preliminary results of a study into consumer 'ignorance' and the construction of expiry dates. Starting from consumer uses of date-labelling in everyday life, it works backwards through the food chain, examining how dates are calculated, standardised and regulated.

Supporting institutional concerns about consumer risk management, quantitative studies for the UK Food Standards Agency (FSA 2009) have suggested that consumers are confused and unable to understand the variety of different date labels on packaging (use-by, best-before, display until). However, consumer 'ignorance' is not so simply understood, but may arise from the situation of consumers (cf Michael 1996); the positioning of food safety concerns among myriad other considerations, such as quality, cost and provenance (Draper and Green 2002); and the active challenging and deconstruction of risk calculations (Shaw 2004). The first part of the paper therefore explores the production of ignorance through focus group research with members of the public.

The second half of the paper reports on developing work 'following the risk' denoted by use-by labelling through the food chain, examining how the risks of perishable foods are constructed at a range of scales, from consumer to regulator to manufacturer to food scientist. It draws on a series of interviews with actors at each stage, examining how models of consumer behaviour and responsibility for risk management are incorporated into the calculations that crystallise in a date label.

## **Different logics, different timing: the struggles between politics, economy and science in the risk regulation of GMOs**

*Motta Renata (Freie Universität Berlin, Germany)*

The starting point of this work are the specific characteristics of politics, science and economy in dealing with risk. The theoretical background includes risk sociology (Beck, Bonss, Japp, Krücken, Luhmann) and the theories of social differentiation from Luhmann and Bourdieu. This study explores situations of struggle for autonomy and heteronomy in the interactions among these spheres of social life in defining health and environmental policy for genetically modified foods (GMOs).

Because there are different policies for these products and they are marketed internationally, the decision in one country affects the other, setting up global relationships of risk definition. These are analyzed empirically in the commercial dispute at the World Trade Organization in which the United States, Canada and Argentina challenged the European policy related to GMOs (Panel Report *European Communities - Measures affecting the approval and marketing of biotech products*).

One of the main findings is that the progressive differentiation of politics, economy and science increase the production of risks in their relationships, including that of interference in their autonomy. According to the Track's proposal, the empirical material exemplifies the existence of different risk regulatory cultures between the EC and the three American countries and thus enables a comparative analysis of the role of science. In both contexts, science plays an important role in defining the risk. However, in the American countries, it is more effective as an ideology in legitimating the dangers posed by technological advances. Economy has hegemony in dictating risk policy and gives science a central role. The perspective of simple modernity (Beck) prevails as well as the emphasis on the advantages in deciding to apply biotechnology (Luhmann). In Europe, besides the industrial society, a risk society emerges, forming a reflexive modernity, which challenges the privileged status of science in the division of labor in defining risk. Politics counters the hegemonic pretensions of the economy, by imposing a health policy, both referring to science.

The paper concludes with a discussion about the discrepancy of times: economics and science are deeply coupled and proceed fast in the research and development of GMOs; consequently, they create a demand to politics to decide on the safety of these products. This turns to be a political risk, since politics is pressured in time to decide whereas it depends on scientific knowledge about the health and environmental risks posed by the new technology. Science, for its turn, advances in its own pace, and the knowledge of risks is not part of its agenda nor can be delivered at the time needed by the political actors. This problematic relationship between politics, economy and science illustrates the need to think of a new risk regulation governance. Risk policy-makers should not appeal to scientific evaluations only when irritated by the economic interests to market products – and rely on a scientific evaluation based on data generated by applicant industries. Public health and environmental agencies should get closer to the scientific field and be pro-active by investing more in new research agendas.

## **A way of doing other things: flood risk as event**

*Munk Anders Kristian (Technical University of Denmark, Denmark)*

Reflecting on fieldwork carried out in the UK insurance sector, the paper explores the role played by various types of actuarial and hydrological expertise in the performance of flooding as a matter of sustained public concern. In doing so, the question is raised: what analytical status to give the concept of *risk* when accounting for the epistemic doings involved in bringing yet unrealised future floods to bear on the present? As an object of exchange transacted on the insurance market, and as a measurable/measure circulating the public domain and permeating management and mitigation efforts, flood risk offers itself readily as a thing worked out; a tangible target to trace through the myriad translations that make it possible. Thus invested with a particular ontology of the object, and seen in the light of the controversies unfolding around it, flood risk might be fruitfully understood as being 'multiple' (Mol 2002) or 'virtual' (Loon 2002); a less than settled entity resulting in a diversity of co-existing concretisations and causing disputes over its character to flourish. The approach seems particularly useful when dealing with the rapidly evolving field of flood modelling (which involves a variety of technical expertise deployed to equally varied ends), the changing complexity of the flood problem (which implicates issues spanning from land use to climate change), and the shifting tensions between technical assessment and vernacular understanding native to the local management of flooding (situations in which the vital making-absents by which experts claim knowledge become painfully present). Nevertheless: what limitations does that kind of ontology of the object impose on our ability to account for the relationship between risk and controversy?

Contrary to most other European countries the provision of flood insurance in the UK is left to the market and organised via an agreement under which insurers pledge to provide cover in areas protected by the Government to a standard of 1:75 years (the average return period between floods). What should be taken into account when mapping out this 1:75 year flood zone is subject to debates constantly revitalised by flood events with changing characteristics as well as new ways of modelling and anticipating floods which have yet to take place. How should we understand the knowledge claims hardwired into these debates through the involvement of actuarial and hydrological expertise? The paper will argue that a reorientation of flood risk away from a status as the (multiple) object of these claims towards a status as an event in which a diverse variety of other things (maps, futures, frequencies, anxieties, publics, geographies, things which are not necessarily very well understood as risk per se) are brought into being, will enable a more productive concept of controversy. In the terminology of Isabelle Stengers (e.g. 1997) to risk is to create the possibility of bringing new things to life – the risking of floods seems to be constantly exciting such creativities.

## **Climate Change Mitigation in the Himalayas: IPCC Expertise and Science Policy**

*Rampini Costanza, (Environmental Studies Department, University of California, Santa Cruz, USA)*

The Himalayas contain the largest area of glacial ice outside the polar regions. These glaciers are the natural source of the largest rivers in Asia, which provide freshwater for hundreds of millions of people downstream. Current findings show that warmer temperatures caused by anthropogenic climate change are accelerating the deglaciation of the Himalayan region, with cascading effects for the region's ecology and livelihoods. As the region's stakeholders take steps to address the risks of Himalayan deglaciation while striving to satisfy the demands of their growing economies, their capacity to address the climate crisis will depend upon comprehensive scientific understanding of the threat of the melting glaciers and the ability to mobilize science for effective public policy.

Controversies regarding the Fourth Assessment Report by the Intergovernmental Panel on Climate Change (IPCC) have raised numerous questions over the role of the scientific community in helping to resolve the threats of climate change in the Himalayas. Yet, by bringing together scientists from the various regions stakeholders, the IPCC is a unique platform for tackling transnational environmental problems. The purpose of this article is to address the fundamental question: what is the capacity of the IPCC scientific community to address the impacts associated with climate change in the Himalayas?

I draw upon the disciplines of Science and Technology Studies (STS) and the interdisciplinary research on vulnerability and resilience to understand and document the successes and failures of the IPCC scientific community in terms of two key concepts: 1) Scientific expertise with the capacity to be adaptive, pragmatic, and problem solving is key in addressing the impacts of climate change on the uniquely diverse Himalayan freshwater ecosystems 2) The ability of the scientific communities to collaborate pragmatically amongst themselves and with policy makers in a national and international arena, and against the backdrop of the need of the region to grow economically is crucial for the resolution of the crisis.

A social study of the IPCC based on STS framework and theories will contribute to assessing the capacities and limitations of this transnational scientific community in addressing the impacts of climate change in the uniquely diverse region of the Himalayas. This paper will serve as a stepping stone for the sharing of expert knowledge on climate change among scientists and policymakers by pointing to the challenges that play out at the heart of this key scientific institution.

**Evaluating the effectiveness of the ethical role of scientific societies: Preliminary data on a current empirical research**

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One of the main roles of scientific societies is to foster an ethic climate (Frankel, 2000; Iutovich *et al.*, 2003). This role assumes an internal dimension, when scientific societies promote the regulation of responsible conduct of research, for instance through the creation of an ethical code; and it may assume an external dimension, such as when scientific societies are consulted on risk issues, or provide educational materials for the general public. Still, little is known about this ethical role (Levine and Iutovich, 2003). Studies have addressed it by focusing especially on natural sciences and adopting a normative approach. The available literature stresses that, despite the existence of ethic mechanisms, ethic activity has a lack of rigorous assessment methods to determine its effectiveness (Iverson *et al.*, 2003).

We intend to contribute to the knowledge of the effectiveness of the ethical role of scientific societies, on the one hand, by considering all scientific domains, and, on the other hand, by focusing on the handling of risks.

In this paper we will contribute to the field by presenting preliminary data from on-going research on Portuguese scientific societies. We will select case studies from different scientific disciplines in order to analyze their ethical position and performance through interviews with their representatives and documental analysis.

We will not only collect information on the existence of an ethical code, or of an ethical committee, but we will also analyze their practices and constraints. In fact, we assume that scientific societies' ethical role is also shaped by contextual factors. In this sense, issues such as the international affiliations of scientific societies may be important to understand scientific societies' initiatives, and the prevalence of the law enforcement in some ethical violations may explain the lack of sanctions by scientific societies.

## **Different levels of uncertainty in Carbon Capture and Storage technologies**

*Riesch Hauke (Judge Business School, University of Cambridge, UK)*

*Reiner David (Judge Business School, University of Cambridge, UK)*

There are several different risks associated with Carbon Capture and Storage (CCS) that influence people's perceptions of the technology. In this paper we will argue that being clear about the object of uncertainty helps researchers chart a clearer map of the public reactions to the potential risks of CCS. We will use Spiegelhalter and Riesch's classification: uncertainty over the outcome, uncertainty over the parameters, uncertainty over which modelling assumptions to adopt, and the uncertainty about things we have not tried to put into our model and perhaps have not even thought of. Each of these levels of uncertainty can be denied, measured, informally acknowledged, thought of but glossed over, or not even considered. Many risk communication strategies have focussed on the uncertainties within a model or at most the uncertainties over a list of models, but have left untouched questions involving trust in the experts and the underlying science. We will argue that while all types of uncertainty are present, they are not all equally relevant in every situation, and that risk communication strategies need to pay attention to the type of uncertainty they focus on and the level of acknowledgement that is appropriate in the circumstances.



## **Emotions, ethics and risk politics**

*Roeser Sabine (Delft University of Technology, The Netherlands)*

In this paper I will develop the first outlines for a philosophical framework on how to include moral emotions in risk politics.

Risks arising from technologies can trigger emotions, including fear and indignation, which often leads to conflicts between experts and laypeople. Emotions are generally rejected and met with suspicion in political debates about risk (Sunstein 2005). They are seen as irrational states that should at most be taken into account for instrumental reasons in order to create support for a position. Such an approach is based on a deficient conception of emotions (Kahan 2008). We need emotions in order to be practically rational (Damasio 1994, Nussbaum 2001, Roberts 2003).

The predominant approaches in risk regulation are based on quantitative approaches. However, we also need to include ethical considerations such as justice, fairness and autonomy (Slovic 2000, Shrader-Frechette 1991, Asveld and Roeser 2009). Emotions such as sympathy are needed to reveal these ethical considerations (Roeser 2006).

A procedural, deliberative approach to risk politics is most suitable in order to take into account all possibly important ethical considerations (Shrader-Frechette 1991, Jaeger et al. 2001). However, these accounts presuppose a rational ideal of political deliberation. Various scholars have recently argued for a more important role of emotions in politics in general (Marcus 2002, Hall 2005, Kingston and Ferry 2007). These ideas can be extended to risk politics. Risk politics should include the moral emotions of the public, politicians, and also experts. Emotions should not be neglected or seen as 'givens' that cannot be investigated any further, but they should be seen as triggers for discussion. The arguments, reasons and considerations that are revealed by or lie behind emotional responses to technological risks and benefits have to be taken seriously. I will develop a political philosophy that replaces the current, rational ideal by an emotional ideal of deliberation about risk.



## **TRACK 31**

# **Practicing Public Engagement in Controversial Science and Technology**

### **Convenors:**

**Nik Brown (University of York, UK)**

**Edna Einsiedel (University of Calgary, Canada)**

**Erich Griessler (Institute for Advanced Studies, Vienna,  
Austria)**

**Susanne Lundin (University of Lund, Sweden)**

## **Public views on regenerative medicine in Europe**

*Allansdottir Agnes (University of Siena, Italy)*

*Hampel Juergen (University of Stuttgart, Germany)*

This paper presents an empirical analysis of public views on regenerative medicine in Europe. It is based on an analysis of the series of Eurobarometer surveys on public views on biotechnology and emerging technologies from 1996 through to the newest wave of results that will be released into the public domain in the summer of 2010. On the one hand the paper sketches how the narrative over regenerative medicine unfolded amongst the European public over time. On the other hand particular attention is paid to the hopes and uncertainties of the public towards stem cell research, xenografting, gene therapy and the prospects of human enhancement by exploring the role of ethical positions, religion, political values and visions of science across the diverse cultural zones of Europe as indicated by the newest results.

## **How participatory is your participation? ICT, e-participation and opportunities for PTA**

*Amistani Federica (University of Udine, Italy)*

The widespread diffusion of information and communication technologies opens up new scenarios for stakeholder participation in the decision-making procedures about science and technology issues. The non-dialogical, open-ended and non-localised public arena created by the Internet (Thompson, 1995) offers in this sense new possibilities to access or promote information about concerns, opportunities and actions related to specific technologies or scientific facts.

Despite these promising possibilities and the existence of some PTA experiences relying on ICT, a comprehensive framework is lacking to explore and assess the implications of ICT for participatory exercises of technology assessment. This paper is a contribution to this effort. Relying on the work of Rowe and Frewer (2005), this analysis focuses on the direction of the information flows in public participation experiences. According to the typology defined by these two authors, three levels of participation can be distinguished (public communication, public consultation, and public participation) depending on the nature and flow of information between exercise sponsors and participants and actual participation entails dialogue and a two-way information exchange (Rowe and Frewer 2000).

As both experiences of and literature on the use of ICT in PTA exercises are only at an initial stage of development, the paper relies on the existing literature on e-participation to discuss how ICT change the direction and the relevance of information flows in these public engagement experiences. Then, following these analysis and the interpretive framework proposed by Rowe and Frewer, the paper will discuss whether and to what extent ICT may contribute to that “dialogue and two-way information exchange” and make public engagement exercises actually interactive and participatory.

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**Time, timing and narrative at the interface between science, policy and citizenship – a xenotransplantation case study**

*Beynon Jones Siân (York University, UK)*

*Brown Nik (York University, UK)*

This paper contributes to the critical assessment of the governance of the biosciences by tracking the temporal relationships between xenotransplantation science, policy-making and public consultation from the 1980s to the present. The focus on temporality has of late been central to empirical critiques of the science-culture interface in theoretical reflection on the time frames and tenses of political process. Drawing on secondary gray literature, our analysis is primarily concerned with the European policy process. However, in order to situate this data in relation to global developments, we address the role of relevant supra-national organisations and also consider XTP policy in three non-European comparator countries. Additionally, we provide a bibliometric analysis which illustrates the dynamics of scientific and media coverage of XTP across this time period. Using this body of data we reveal a clear and significant pattern whereby attempts at deliberative public consultation post-date policy, which in turn lags behind clinical and scientific activity. Basic XTP research and clinical activity occurs in the late 1980s and early 1990s, long before expert-based policy-making and regulatory activity, which begins in the mid 1990s and peaks at the end of this decade. This is followed in the early and mid 2000s by a number of deliberative public consultative events but these, on the whole, are marginal to policy-making. The very fact that regulatory and policy activity peaks some considerable time before wider stakeholder engagement illustrates a striking temporal disjuncture between deliberative consultation and policy. Based on our analysis we suggest that the timing of consultative activities places important, and hitherto neglected, structural constraints upon their potential to facilitate democratic input into policy-making.

## Democracy Theory and Citizen Participation

*Biegelbauer Peter (Copenhagen Business School, Denmark)*

*Hansen Janus (IHS, Austria)*

Forms and means of citizen participation have greatly changed since the 1950s and the 1960s. While election turnouts have been falling, grassroots activities of citizens have been rising and we are just beginning to get a first glimpse of the impact of social networks on the Internet. The demands for democratic participation/inclusion has also spread to new domains, such as the governance of science and technology, which has traditionally been the domain of experts.

As a consequence of these developments, democracy theory has seen the rise of new concerns and the development of new schools of theory. Participatory and deliberative democracy theory has a different focus of analysis than elite and liberal democracy theory. Moreover they have included the construction of, e.g., instruments of citizen participation in their curriculum.

In this paper we ask two sets of interrelated questions: 1) What can we learn from democracy theory for the analysis and evaluation of Participatory Technology Assessment as a form of participatory decision-making? Are universal sets of evaluation criteria for different forms of PTA preferable to different sets of criteria for different forms of PTA? Drawing from the experience of the CIT-PART cases, what set(s) of criteria can we advance?

2) And what can we learn from the way in which PTAs have been rationalised, constructed and carried out in the CIT-PART cases for the development of democracy theory? Can and should democracy theory play a more active role in the performance of real life PTAs – and if so, how?

## **Paradoxes of Lay Participation in Technology Controversies**

*Bogner Alexander*

My contribution deals in a broad way with forms of lay participation in on-going technology controversies. In particular, I analyse the extent to which these different forms of participatory practices foster inclusion (or, rather, exclusion).

I will start from the observation that advocating lay participation has been an on-going trend in technology policy. With its implementation a varied methodological canon for participatory technology assessment has developed, involving persons usually not involved in such assessment procedures. One of the most influential and highly disputed procedures is the citizens' conference. The aim of my contribution is to shed new light on this well-known procedure trying to contextualise it within the contemporary panorama of technology controversies and, in this way, to determine different types of lay citizens' participation related to their specific forms and importance for political decision-making and the public debate.

The main thesis is that lay participation typically materialises in the form of a laboratory experiment in present technology contexts. In other words, lay participation as currently organised by professional participation experts under controlled conditions rarely is linked to public controversies, the pursuit towards political participation or individual concerns. This form of participation is not realized as a protest expressing real demands made "from below", but rather as an experiment which is frequently set up as a research project.

I show empirically that in practice, this laboratory participation leads to paradoxical effects: An experimental community consisting of laypeople and those conducting the experiment is brought into existence in the participatory process, and this community sees itself as charged with the task of demonstrating that the method can work. However, successfully carrying out the experiment results in a systematic disappointment of the hope for gains in rationality typically attached to lay participation. In conclusion, the empirical findings are connected with recent sociological debates about a new and risky mode of knowledge production ("society as a laboratory"). In this perspective a further paradox becomes apparent: a knowledge production using the whole of society as a laboratory corresponds to a practice of participation that retracts itself from society into the laboratory.

My considerations are mainly based on empirical research on lay participation events in Germany and Austria in the framework of various research projects funded by the Federal Ministries of Education and Research of Germany and Austria.

## **Democratizing technology: Is participatory assessment the answer to STS agnosticism?**

*Campbell Patricia (Calgary University, Canada)*

Facilitated by the constructivist challenge to scientific knowledge and technology, the “participatory” turn in science and technology studies has been manifested through calls for increased participation of non-scientific opinion on ethical, social, and legal issues. One prominent area of research in this field is the participatory assessment of technology, based on the premise that laypersons/citizens should be given a more meaningful and direct role in the deliberations surrounding science and technological design. The concept has been embraced by many STS scholars and critics alike as a response to a perceived lack of normative analysis or “agnosticism” found in the primarily descriptive goal of the *de facto* STS approach, the ethnographic case study. Based on a literature review, this paper argues that the practice of participatory assessment, particularly in the form of citizen engagements, is a problematic solution for both the perceived democratic deficit in technology and the perceived normative deficit in STS research. First, the practice of participatory assessment has been shown to be problematic within its own formulation of democracy. Lay viewpoints and participation may be constrained by technical expertise and technological discursive framing. Calls to participate might challenge citizens’ right to hold aloof. Citizens themselves may perceive participation and democratic involvement in ways different from those emphasized in academic discourse. A lack of impact on decision-making might call into question the efficacy and democratic value of the intervention, both in terms of results and participants’ perceptions. Finally, participatory processes may undermine representative democracy further and create even less transparent engagements with science and technology policy. While the suggestion is not that participatory analysis is entirely ineffective, particularly if reworked to address some of these issues, it may be difficult for it to deliver on its promise of democratization of technology. In considering individual participation, it seems important (and perhaps more fruitful) to continue attend to how citizens engage with technology on their own accord, based on their own conceptions of participation. This analysis also suggests that normativity reduced to increased citizen participation as an end in itself offers weak explanatory utility within STS research. Some theorists suggest a shift to ensure multiple forms of expertise be included in assessing technologies. Furthermore, it may be necessary to search for a deeper understanding of the politics of technology. Perhaps it is possible to create a more nuanced notion of democracy with greater explanatory potential beyond the design context, one that recognizes possibilities for various forms of political action and intervention (both expert and lay, individual and collective, user and nonuser) at various sociotechnical articulations: What kinds of interventions are possible and when? In regard to technology, a move toward a non-essentializing, soft determinism might allow us to ask whether the type of technology has implications for the range of possible interventions and their locations, either in the design phase, the hands of users, and/or otherwise. In other words, do particular types of technologies display differing degrees of openness or interpretive flexibility?



**Practising or to be the object of a practice? Citizens engagement in controversial technoscience between structured arenas and citizens committee**

*Cibin Roberto (University of Padua, Italy)*

The current discussion inside the literature about citizens participatory practices on technoscientific decisions concerning the building of infrastructure with high impact on the environment, puts the focus mainly on those participatory processes planned by institutional sponsors. By this way there is no consideration for all that range of “spontaneous” participation where citizens, often gathered in committees, try to use their voice to influence decisions on policies that affect them directly, as the building of radio antennas or transport infrastructure: as is well-known also in these cases it's possible to assist to a debate between expert and lay knowledges, to a co-production of situated knowledge, to the social construction of the technoscientific object at stake.

One of the main reasons that brought to institutionalize and to structure citizens participatory processes is the need to try to remove “up stream” the protest of these committees, or to try to channel it “down stream” in decision-making processes. The spontaneous participation gave the inspiration to construct structured deliberative arenas, but there has never been a comparison with the dynamics proposed by studies on social movements and on citizens committees to analyse the functioning of these participatory exercises.

The aim of this presentation is to highlight the lacks in the efforts to engage citizens in complex decisions so far, underlining how these participatory processes risk in a lot of cases to be a mere legitimation of already taken decisions. We will try to underline how in these arenas there is still present that border dividing the “experts” from the “lay”, represented by scientific knowledge, whereby it's not possible a co-construction of the technoscientific object. The mainstream looks to participatory processes effectiveness merely as a transfer of informations from pole to pole, without considering the importance of the kind of frame enabled by participants (or proposed by sponsors), or if there would be (and what) between participants a collective identity definition. Scholars underline the value of a deliberative model with the moderation of a professional facilitator, guarantee of a neutral process, without considering that also in social movement organizations, who usually present their decisional processes as free from manipulation, sometimes there is the influence of charismatic leaders and the creation of oligarchies in the decision making processes.

It's not possible to promote a citizens participatory practice to decision making processes trying to isolate only the “cognitive” aspect of this practice, leaving aside the interpretation actors have of these processes, the interactions taking place inside them, the emotions that they stir up. The comparison with the collective actions undertaken by citizens committees can give us a picture of those processes of “legitimate peripheral participation” through which citizens debate among themselves and with experts to learn each other's world-views useful to their aim. Where it's not given the opportunity to participate, but it's possible to learn the practice of participation.

**Accounting for cultures and political contexts in the governance of controversial technologies: the case of xenotransplantation**

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*Jones Mavis (University of Calgary, Canada)*

*Brierley Meaghan (University of Calgary, Canada)*

*Griessler Erich (Institute for Advanced Studies, Vienna, Austria)*

*Pichelstorfer Anna (Institute for Advanced Studies, Vienna, Austria)*

There is growing recognition that public participation on policy-making around controversial technologies cannot be investigated solely as a universal set of model practices. Rather, successes and shortcomings of public consultation in technology assessment need to be understood within the different cultural and contextual environments in which it is undertaken. This paper explores practices of public consultation as part of participatory technology assessment (PTA) in xenotransplantation policy and regulation. Xenotransplantation is the use of animal cells, tissues and organs for human transplants, a procedure whose efficacy is built on the successful development of a genetically engineered pig as source animal. Specifically, it explores the implications for PTA in xenotransplantation across four dimensions: its location within a societal problem defined as an organ transplantation challenge; the role of public consultation and participation within each political culture and political context; the scientific-economic imperatives that underlie technological choices; and the cultural environment around animal research. Our analysis, drawing from interviews and documentary research, takes a comparative approach to illuminate dimensional features by contrasting them across several countries –Canada, the UK, and the U.S. Our conclusions will address the implications of these findings for PTA applications in knowledge-intensive policy issues. The experiences in these countries with PTA and with the development of xenotransplantation over the last decade and a half helps to illuminate both the trajectory of participatory technology assessment and lessons learned as well as the social context of innovation.

## **Foresight as a Tool for Public Engagement in Controversial Science and Technology Development?**

*Giesecke Susanne (Austrian Institute of Technology)*

The age of “Reflexive Modernity” (Beck) describes the transition from a dogmatic, science-based society trusting the knowledge of scientific experts to a “post-modern” society where the blessings of science and technology are questioned and where experts’ opinions are challenged by other experts’ opinion. At the same time, new emerging technologies are getting more and more complex and civil society is demanding to participate in the shaping of the future. Several approaches have been brought to the fore during the last three decades. Participatory Technology Assessment, Constructive Technology Assessment, Real-time Technology Assessment and others have dealt with issues on how to let citizens better participate in the shaping of modern technologies, innovations and products. They have generated valuable insights into the co-evolution of society and technology. Whereas these approaches are mostly dedicated to technologies that are already artifacts, the approach of foresight gives a chance to ask ourselves: What technologies do we want and how can we shape them in the most feasible and preferable way? Several thousand foresights have been conducted since the turn of the century in Europe and many have been financed by the European Commission. The modern normative approach of foresight explicitly stands for civil society participation. However, of those more than 2000 foresights, for example, that are mapped in the European Foresight Monitoring ([www.efmn.eu](http://www.efmn.eu)) database, it remains quite opaque

1. What the actual participatory input is, and
2. What the actual impact of this approach is.

Both are questions, all participatory approaches especially in the field of science and technology have to deal with.

This paper sets out to present the findings from a qualitative research project that investigates those two questions for a set of case studies on completed foresight activities which used participatory elements. The majority of foresights in Europe on the future of specific or general science and technology development were commissioned by policy makers. It is stunning to see the commitment on civil society integration on the one hand on the actual implementation of results on the other hand. In fact, though civil society participation is often declared, it is questionable how this term is actually defined. In most foresights specialized experts are participating rather than the broad civil society. It can be argued however, that they are representing the society as well. In quite a number of cases, representatives from NGO and similar organisations are involved. Concerning the actual outcome of the foresight activities, it can be said that only under certain circumstances are policy recommendations implemented. Interestingly, those that have minimized the participation factor are closer to implementation than others. Those foresights that tried to maximize the participation factor have a different quality of impact. One possibility to explain this phenomenon is taking a closer look at the institution that commissioned the foresight and its – sometimes hidden – agenda. Results of foresight activities are more likely to be embraced by the commissioning institutions when they fit into the existing structures and agenda, and do not involve a radical turn, even if this implies irrational policy action: From the point of view of the institution in focus it seems logical and sustaining.

We believe that this neo-institutionalist explanation may give valuable hindsight to the some of the questions posed for track 31 and we will discuss parallels of foresight approaches with other tools of public engagement in future science and technology developments.

**Practice means, it is the customary procedure“: Political Practices and the Introduction of (Participatory) Technology Assessment in Austria**

*Grießler Erich (Institute for Advanced Studies, Vienna, Austria)*

Whether participatory Technology Assessment (PTA) is being introduced into a specific country depends on a number of factors such as the quality of the PTA process itself; whether its institutional location connects well with actual political decision-making; whether PTA fits into the country specific overall practices of policy-making, and, last but not least, how the public defines its role in decision-making in a specific policy area and technology.

In this contribution I will focus on political practices of decision-making in Austria in general and law-making in particular and how they influenced the introduction of technology assessment (TA) and PTA in this country so far. I will look at the ways of decision-making in ministries and parliament and the different political practices of ministers, bureaucrats, and members of parliament. To exemplify these political practices I will use a case study approach and analyze the decision-making processes which lead to the regulation of research on human embryonic stem cell research, pre-implantation genetic diagnosis and genetic analysis on humans in Austria. In addition I will analyze the role TA and PTA played in the regulation of these technological areas. I will argue that TA and PTA in particular are marginally institutionalized in Austria so far because they get into conflict with political practices of and basic normative assumptions about decision-making in Austrian politics.

### **(Re)-discovering publics and socio-technical imaginaries**

*Gunnarsdóttir Kristrún (Lancaster University, UK)*

This paper reports on the progress of an EU-FP7 project titled “Transdisciplinary approach to the Emerging Challenges of NOvel technologies: Lifeworld and Imaginaries in Foresight and Ethics” or TECHNOLIFE. One of the key objectives of this project is to capture the socio-technical imaginaries of persons in a range of occupations and roles that intercept and interact with emerging controversial technologies. These are geographical information systems for civilian use, body modification and enhancement, and the use of biometrics in border control. In this paper, we explain our choice of participants, the media representations used to kick-start deliberations, and how the deliberations were devised to explore what the future might look like. Among the questions we set out with is how to avoid common conceptions of ‘public vs. experts’ which tend to trivialise the social and cultural imaginaries of scientists and engineers, or they miss the occupational and other capacities in which persons (publics) operate and articulate their views. The technology domains we are looking at are uncertain insofar as goes their future development in the hands of those who envision, commission and maintain them, or those who are supported, affected or inflicted by them. There are considerable uncertainties with respect to access, operation, interception and interaction at one or another stage, who is responsible, liable, a target, a subject, and so on. In light of these uncertainties, one of the aims of the deliberations devised by project partners is to identify new issues and emerging new publics, although we project onto the emerging technologies well known issues with bearing on persons’ right to privacy, justice, freedom from harm, freedom of choice, equality, and the like. We take a look at existing attempts to experiment with public deliberations and public awareness, for example, where participation has been considerably broadened or designs of procedures do not follow conventional focus-group, survey and other assessment formats but, rather, seek the support of media representations, programming and the creative industries. We consider public deliberations to be ethical acts and we look at our own project in light of these experiments as well as in light of the demands of standardised assessments for the purposes of informing policy. Finally, we contemplate the role of STS and ELSA research in collaborations that deliberately, and experimentally, create new types of venues or spheres for the voices of persons in order to capture their projections of future lifeworlds with new and emerging technologies.

### **Assessing the impacts of PTAs - exploring new roads in comparative analysis**

*Hansen Janus (IHS, Austria)*

*Allansdottir Agnes (University of Siena, Italy)*

*Loeber Anne (VIU, Amsterdam, The Netherlands)*

*Versteeg Wytske (VIU, Amsterdam, The Netherlands)*

This paper proposes an innovative approach to research on public engagement with science and technology through the application of Qualitative Comparative Analysis (QCA) to the material collected from case studies on the debates about and the regulation of xenotransplantation (XTP) in eight different countries. QCA is a methodology developed to draw inferences from small-N samples by examining the importance of factor configurations by means of set theory and boolean logic and is highly appropriate for the challenges posed by cross national comparison of qualitative material. In this paper we apply QCA to analyse the 'impacts' of public engagement processes. We understand impacts of participatory technology assessments (PTA) in three different ways, namely as effects on policy making, and in particular on concrete policy decisions, as the closing of legitimacy gaps, and thirdly as influencing broader socio-cultural discourses. We set out to explore empirically which configurations of factors can be shown to influence these three levels of governance dynamics across our cases. The paper aims to make a substantial contribution to the literature on public engagement and policy making as surprisingly little systematic, cross-national comparative research exists on the impacts of participatory policy-analytic arrangements such as PTA.

**Getting a voice: public inclusion and exclusion practices around science and technology**

*Hansson Kristofer (Lund University, Sweden)*

*Lundin Susanne (Lund University, Sweden)*

The focus of this abstract is on how institutions and policymakers conceive the “public” and how these conceptions/discourses shape or influence politicians, experts and policy-makers’ decisions and relations to the public. The abstract includes a discussion on studies of how politicians, experts and policy-makers write and talk about the “public” regarding the complexity of controversial technologies. How do social and cultural conceptions/discourses of the “public” shape or influence politicians, experts and policy-makers’ decisions and relations to the public? Using a cultural analysis we take a special interest in how these conceptions and relations might generate control over the democratic process. The discussion around xenotransplantation technologies in the 90<sup>s</sup> in Sweden is used as a case. We ask whether this position of control over the process of policy-making came about as a result of a perceived “lack of understanding” as to the complexity of xenotransplantation technologies on behalf of the public. If so, could the public voice be at peril? What factors affect the process, which voices are heard or included and which voices are silenced and excluded? In what ways are these factors able to create/channel public engagement? We highlight the questions of how discourses and relations change using interviews and media text analysis marking the role of the scientists, politicians, patients and public activists. What impact do these relations produce in the policy-making process?

## Intercultural participation? How to consider “Ethnicity“ in public engagement

*Katz Christine (University of Lüneburg, Germany)*

In most of the European countries immigration is occurring since decades, which leads to an increasing intercultural mixture of the national population<sup>15</sup>. For instance in Germany: about 20% of the population has a migration background meanwhile.

Up to now neither the scientific and public discourse on sustainable development nor research on issues, referring to it have integrated the possible effects of “ethnicity” on the realization of the concept sustainable development extensively. There is a lack of profound knowledge about the attitudes or every day acting of (im-)migrants<sup>16</sup> towards nature and its management, about their interests, risk awareness and demands regarding environmental and sustainability issues (Katz/ Kontzi 2009). Research on the actual situation of intercultural<sup>17</sup> participation in natural management processes or participatory TA is missing as well as on the needed preconditions for an appropriate “intercultural empowerment” of public engagement. Additionally the percentage of immigrants engaged in environmentally relevant activities as volunteers or as employees, e.g. in organisations of the ecological movement or institutions dealing with environmental or sustainability affairs is very low (ibidem, Kopf 2008).

On one hand the existing data indicate that cultural socialisation and nature relation are linked (e.g. Buijs et al. 2009, Krömker 2004, Renn/ Rohrmann 2000). On the other hand ethnicity is nothing fixed which can be easily analysed or “allocated” to people or a societal group. It is a construction which evolves if certain similarities are supposed pointing at a shared origin or at believing in the derivation from a single source. The assumption already is sufficient to feel and get associated to an ethnic collective.

exclusion and the construction of “the other”, of “being involved” in procedures of “doing nature relations” is scrutinized. Data of an explorative study on environmental organisations in Germany and their activities or problems with “acting intercultural” are introduced. Qualitative data on the conditions to and obstacles for an adequate consideration of intercultural aspects, e.g. the existing mental images and ideas about migrants’ interests and public engagement in nature (management) and sustainability issues by environmental actors are presented and reflected.

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<sup>15</sup> The idea of the existence of homogeneity inside of cultural barriers is a construction. As nature culture is a permanently changing historical result of differently intensive processes of adoption and separation.

<sup>16</sup> “Migrants” are not even in some way a homogeneous “group” of people. The various forms of experienced migration and cultural backgrounds as well as the various geographical regions, people are coming from, already interdict unifications.

<sup>17</sup> Interculturality is based on a respectful and non hierarchical relation between people who belong to various cultural groups. It means reflection of our own inevitable ethnocentrism by interpreting strange cultural practices.



**'We want medicine, not ideology'. Public engagement with controversial technology in a 'new' EU country: the case of in vitro fertilisation in Poland**

*Kirejczyk Marta (University of Twente, The Netherlands)*

Much of the debate, research and practices of public engagement in policy-making on controversial science and technology have been focused on the so called 'old' EU countries. Hardly any attention is being paid to the question to what extent and in what form citizens of the 'new' EU countries are (becoming) engaged with this type of issues. In order to start redressing the balance I examine forms of citizens' participation in an ongoing controversy on the regulation of in vitro fertilisation in Poland, a country where public involvement in policy-making on science and technology is not perceived as a policy problem, where ethics committees at all levels are still to be instituted and where Participatory Technology Assessment arrangements remain unexplored.

IVF is practiced in Poland for more than twenty years but to date there is no specific regulation of this practice. The issue became topical at the end of 2007 when the minister of health announced her intention to reimburse the costs of the treatment by the National Health Fund. The announcement and the subsequent publication of the report by the Advisory Expert Committee proposing a highly restrictive regulation of IVF prompted an intense debate and political struggle between the Catholic Church's hierarchy and lay catholic pro-life groups on one hand and a secular coalition of sometimes ad hoc organised groups of scientist, ethicists, women's and patients' organisations on the other. This configuration of the adversaries is not specific to Poland; it had been seen before in the 'old' EU countries. Still some aspects make this case worthwhile to consider.

Any attempt to regulate IVF and related technologies and any analysis of the regulatory processes has to take account of the specific position of the Catholic Church in Poland. Since the beginning of the transition, the Church exerts a powerful influence on public and political life by virtue of its organisational infrastructure, institutionalised relations with the state, strong representation in political life and the ability to impose its values regarding human embryo, procreation and family in public discourse. In the discussed case, the extremely conservative stance of the Church regarding IVF together with direct political intervention and the use of offensive rhetoric, contributed to an effective self-organisation of secular actors. The coalition of these actors led by the women's reproductive health organization drafted a professional, liberal law regulating IVF practice. The pro-life movement responded with a law proposal banning IVF. Both citizens' initiatives, exploiting different pathways, in short time succeeded in placing their draft regulations on the parliamentary agenda.

In the paper I argue that an ideologically volatile political landscape and an idiosyncratic legislative system created room for the rise of novel, bottom-up forms of de facto public involvement. I assess to what extent the citizens' initiatives impacted the actual policy-making and I contend that for many actors this regulatory struggle serves as a proxy for the struggle about the shape of democracy in transition.

## **New interaction initiatives, old patterns of positioning and argumentation**

*Krabbenborg Lotte (Groningen University, The Netherlands)*

The new 'responsible development and innovation' discourse which accompanies the development of nanotechnology offers opportunities at our cultural, collective level to search for and experiment with new forms of interaction, decision-making, collaborations and accountability in order to deal properly with the challenges posed by new and emerging technologies in the 21<sup>st</sup> century. By studying the proceedings of organized interactions between nanotechnology developers and civil society organizations (CSOs) I will show that the opportunities at the collective level are not fully utilized. I will argue that this trend is not so much caused by disinterest or unwillingness of actors, but by the fact that our cultural repertoire and political and ethical framework to discuss and steer new technologies is too limited to exploit these new opportunities.

By qualitative research methods I studied the process of four organized (long-term) interactions between nanotechnology developers and CSOs in order to gain a better understanding of how participants position themselves and each other and how they interpret the 'responsible development' discourse. The anthropological and normative notions concerning the role of interactions and public spaces within a technological culture developed by Arendt (1958, 1963) and Dewey (1927, 1930) are used to analyze these empirical findings and to deduce a normative framework to obtain more productive interactions in the future.

To fulfill the opportunities at our collective level it is necessary that current positions and repertoires are challenged and revised. This should occur at an institutional level because this determines what an actor can do, independent of their own convictions and learning processes. By a multilevel analysis of the partnership between chemical industry DuPont and CSO Environmental Defense Fund I will show how positions and repertoires can be challenged and revised.

## **Managing Radioactive Wastes in Modern Societies. A Comparative Perspective**

*Kuppler Sophie (ITAS, USA)*

*Hocke Peter (ITAS, USA)*

Unused leftovers of modern society's daily activities are regarded as waste or (in recent time) resource. Along with the ongoing definition of what is waste, new institutional arrangements have emerged to deal with the risks involved and can be interpreted as a sign of the emergence of a new risk culture (Keller 2000).

The leftovers of nuclear energy production are mostly defined as waste. Over the past decades, national and international institutional arrangements have emerged that are solely occupied with defining and dealing with those high-level radioactive wastes. Their aim is to find the best way to protect current and future generations from the devastating effects a failure in management could have. Those institutional arrangements seem though to mainly focus on dealing with technical uncertainties. The intrinsically linked social side of the problem has long been neglected, resulting in a considerable knowledge-gap.

The public dissent about and protest against the construction of final repositories taking place in many countries can be seen as an effect of the negligence of the social side of the problem. This resistance should not generally be interpreted as a refusal to acknowledge the need for a final repository – it is rather a sign of resistance against the classical approach of “decide – announce – defend” in which decisions are taken behind closed doors. The dependency on expert judgement and thus the need to trust the experts involved in decision-making in a question that has immediate impact upon the “Lebenswelt” (Habermas) leads to a sense of risk among those affected. It further leads to an interest in evidence, which means information that allows ownership of the final decision taken (Wynne 1996) by uncovering inherent values (Andersson 2008). This challenging of apparent truths in radioactive waste management has manifested itself in the public claiming decisions taken by the government as illegitimate and in the establishment of considerable counter-expertise.

Nowadays, many of the countries searching for a final repository site are trying to bring the social side of the problem into the institutional arrangements by institutionalizing participatory processes. This is also true for Germany and Switzerland - the two case-studies used as empirical basis for the analysis done at ITAS. This paper will show the conceptual frame of the research and present observations regarding implemented deliberative processes with participatory elements in official decision-making. The integration of participatory processes into nuclear politics could lead to a new group of actors being accepted to the ‘inner circle’ of decision preparation and could increase transparency. The actual effects of these processes are as yet unclear.

The following questions will be addressed in this paper:

How can the nuclear waste problem in general and the use of public participation in particular be framed within the discussion on modern “knowledge society”?

Are there changes in the institutional arrangements that are influenced by the attempts to integrate the social side of the problem into the technically oriented concepts of radioactive waste management?

What societal effects can be observed in the two countries?

## **Using Interdisciplinary and Intercultural Communication to Accommodate Social Dynamics in Technology Development**

*Longo Bernadette (University of Minnesota, USA)*

A call for citizen participation in technology development is necessarily a call for an interdisciplinary discussion of those technologies. The individuals engaged in that discussion will each bring a unique combination of life experiences and disciplinary expertise to the collective enterprise. Thus, democratic legitimacy in technology development is built on a foundation of differing perspectives, background knowledge, expectations, and values. How can social and power dynamics be accommodated within this cacophony of voices?

This paper will present three cases illustrating how scientific and technical communication participate in and reflect power dynamics among social groups engaged in participatory technology development. By analyzing communication and language use in these specific cases, we will touch on issues that can be found in other participatory design situations.

The first case to be presented will involve the development of a text messaging system in collaboration with partners at the University of Minnesota and with the Pact NGO in the Katanga Province, Democratic Republic of Congo. This case will highlight social and power dynamics involved in this participatory design project and analyze how an intercultural communication analysis can illustrate those larger social dynamics. The presenter is an associate professor of technical communication and one of the collaborators in this project, along with engineers at the University of Minnesota, our Pact colleagues, and a documentary film maker who has been following this project since July 2009.

The second case will illustrate how communication instruction about scientific and technical issues in a post-graduate course with PhD students from different scientific disciplines can help to prepare citizens to participate in social discussions of technology development involving a range of participants' background and expertise. This case will highlight how social and power dynamics can be negotiated within a classroom setting and with teacher mediation to model similar discussions in a public venue. The presenter is a trained biologist and freelance in communication of science who has taught communication courses in scientific research and intercultural dialogue courses with students from around the world working together in the course. Her experience can point out how some communication issues arising in this global, interdisciplinary venue parallel social issues arising in civic discussions.

The third case will employ an eco-linguistic approach to explore the application of linguistics to ecological subjects, such as sustainable development. This case will highlight the nexus of language, politics, and economics as it applies to civic discussions of sustainable development and ecological issues. In the process of her doctoral research on this topic, the presenter was a student in the course taught by the panel's second presenter. Her perspective as both a student of interdisciplinary technical communication and an eco-linguistic researcher position her to embody some of the social and power issues explored in the panel's three cases.

**If citizens have a voice, why insisting on Deafness? Protest movements' analysis as an attempt to broaden the concept of participation**

*Matos Ana Raquel (Portugal)*

This paper focuses on the relation between Knowledge and public policies and between governance and participation. It draws on the theoretical approaches based on the relevance of expert knowledge and the value of non-expert knowledge in decision making processes, contributing to renewed designs of “citizenship”, “epistemology” and “democracy” concepts. We, thus, try to include in the long list of arguments raised on these matters the need to a more inclusive debate in relation to new forms of civic participation such as those based in popular protest movements.

The starting point of this analysis is a particular controversial decision made by the Portuguese Government in March 2006. Based in an experts' report previously requested by the Government, the Portuguese Health Minister determined a reform of the maternal health system and ordered the closure of 23 of the 50 maternity wards functioning at that time. The taken decision caused intense popular protests in several of the affected places, during the 2 subsequent years.

Based on a qualitative methodology (on the analysis of news published in 3 national newspapers, between March 2006 and December 2007, on interviews made to privileged informants of this process, on document analysis and on participant observation), this paper will analyse how protest movements can enlarge the theoretical conception of “participation” and influence the decision making processes. Although neglected when compared to institutionalized forms of public participation, protest movements are the most common form of public involvement.

The study of the referred controversy allowed the identification of the different actors involved; the various range of arguments presented by them; the definition of the geographical intensity of protest actions triggered; and the evaluation of the participatory capability of those protest movements as well as the analysis of the inequality trends favoured by this political decision.

The study puts in evidence some remarkable findings: popular protests, despite being very dynamic and organised, never acquired a national dimension and didn't influence or revert the Government decision; although citizens express the need to revert the decision, they are especially aware of their exclusion from the non participated political decision making process, the main reason why they integrate the protests; although seeking the reduction of inequalities, the measure showed the potential to deepen them; and, finally, despite the protests' capability to demonstrate in the public arena “what is wrong”, they can indeed count as participation procedures, specially because of their shown potential to anticipate new controversies and, then, to anticipate other decisions and its consequences.

### **Can collaborative researches be ecologies of knowledge and practices?**

*Neves da Costa Daniel (University of Coimbra, Portugal)*

*Nunes João Arriscado (University of Coimbra, Portugal)*

The STS literature concerning the governance of science in the European knowledge society has pointed out the merits and gains of a shift from a model of Public Understanding of Science to a model of dialogue and public participation in science in the co-production of public knowledge. Experiences of collaborative and community-based research have sought to promote the production of a more democratic scientific knowledge that meets the needs of local communities and affected groups. Of these, Science Shops have revealed the potentialities of these modes of research and how they emerge as technologies for producing and circulating a more democratic science.

Retrieving Paulo Freire's proposals of a dialogic pedagogy (2005), this presentation will seek to examine forms of collaborative research such as Science Shops as privileged spaces of co-learning practices, where distinct groups and modes of knowledge meet, through a communicative praxis and a dialogue between different knowledges and practices in a process of inquiry (Dewey:1927). Thus, through their mutual engagement in a collective process of questioning of an undetermined situation of controversy, it will be examined how novel ethno-epistemic assemblages (Irwin and Michael: 2003) are constructed in and through the search for possible solutions that will stabilize and close the controversy. Special attention will be paid to the process of articulation of the entities brought by the actors to the inquiry situation and to how they produce different and sometimes conflicting active and passive associations (Fleck: 1986).

This will be done taking into account the possibility of these processes of mutual learning and co-production of knowledge give shape to ecologies of knowledges and practices (Santos: 2006; Nunes: 2008, 2010), based on the recognition that every knowledge is partial and produces a certain kind of ignorance, and that the social implications and consequences of science and technology production are more important than the current fashionable focus on innovation tend to acknowledge.

We thus seek to reflect on the potential of Science Shops and other forms of community-based and collaborative research to constitute technologies of humility (Jasanoff: 2005), allowing for the emergence of a more democratic and effective public knowledge that takes into account the ethical, moral and cultural concerns and needs of citizens and develops a more robust scientific citizenship.

**Engaging publics about nanotechnologies: exploring the views of scientists, policymakers and regulators**

*Petersen Alan (Monash University, Melbourne, Australia)*

*Seear Alan (Monash University, Melbourne, Australia)*

Recent growing interest in nanotechnologies has been the catalyst for many debates about how best to 'engage' publics in the early phase of technology development. In the UK and some other countries, early or 'upstream' engagement has come to dominate many science communication/dialogue efforts, which is seen to displace the so-called deficit model of public understanding that has long dominated science communication. However, Brian Wynne and others have questioned whether the practice matches the rhetoric. In particular, critical scholars question the extent to which existing engagement strategies help overcome the democratic deficit that has led to publics' exclusion from the process of science and technology production. Many engagement efforts arguably reinstate rather than challenge power relations and reinforce a 'top-down' view of science communication. Our paper begins from the premise that if science communication is to involve a genuine two-way dialogue, it should include an in-depth examination and interrogation of the views and assumptions of the key actors in the production of science and technology knowledge. Drawing on data from interviews with Australian scientists, science policymakers and regulators with experience in the field of nanotechnologies, the paper examines the established frameworks that underlie science communication efforts, and how these may help or hinder the democratisation of science and technology.

**What *is* public engagement with human genetics and what is it *for*? Differentiating between policy practice and 'social movement'**

*Plows Alexandra (Wales Institute of Social and Economic Research, Data and Methods, Bangor University, UK)*

Focusing on qualitative research in the UK between 2003-2007 amongst a variety of different publics engaging with human genetic technologies, this paper addresses the issue of what 'public engagement' *is* and what it is *for*. Providing typologies, examples and accompanying rationales of engagement, the paper differentiates between definitions of public engagement as a type of *policy practice*, and public engagement as '*social movement*', where publics frame issues on their own terms, generally outside the policy sphere. Thus as well as being a policy tool, public engagement can also be understood in terms of network relationships between individuals and groups, occurring in many different circumstances and taking many forms. Public engagement as social movement is shown to be extremely 'hybrid', consisting of multiple publics who interact over complex issues in complex ways; ethnography as a methodology enables a nuanced understanding of these narratives. The paper also argues that public engagement defined as social movement is an end in itself. These are citizens engaging in deliberative democracy, complementing public engagement as part of a governance framework, and contributing to citizenship stakes through the forms their participation takes and the issues they raise.



## **Breaking through the deafness and muteness: practicing xenotransplantation in Latvia**

*Putnina Aivita (Latvia)*

Public participation is often seen in the West as self understanding tool for negotiating the development of controversial biotechnologies. The paper is based on Latvian case study of the EU 7th framework project „Citizen participation in decision making in knowledge intensive policy field” including media and policy text analysis and interviews with the participants in the field of xenotransplantation policy. It uncovers the complex networks of knowledge and power relations underlying the application of the biotechnology which is based on strict power asymmetry between doctors/scientists and patients creating particular relations of trust and silencing possible controversies. Using the lens of public participation embedded in the Western democracy the paper allows seeing the public participation as a definite and ethnocentric power and knowledge balance which Latvians are striving to adapt to their understandings and relations due to the EU regulations. The case study shows that the practice of citizen involvement requires a particular distribution of skills and knowledge and it itself serves as a tool for silencing specifically situated knowledge, power positions and practices.

**Protest movements, citizen participation and (un-) responsive states: The case of the anti-biotech movement in four European countries**

*Seifert Franz (University of Vienna, Austria)*

In spite of the public's key role in technology controversies studies on the socio-political dimensions of science and technology (STS) are often reluctant to provide a thoroughly conceptualised and empirically validated account of the public in such debates. In particular, the well-established field of social movement research hardly ever crosses the way of STS even though movement actors are those who play the active part in social debates: Movement actors are the "speakers" in public arenas, nurture public discourse with media-savvy protests and oppositional frames in order to pressurize governments to adopt alternative techno-environmental trajectories. Yet, often ignoring movements, STS tend to invoke a diffuse, unspecified image of the public to bolster the normative call for its enhanced inclusion in techno-scientific decision-making. This presentation sheds light on the relation of protest movements, public participation and political decision-making. Drawing on an ongoing empirical project analysing the anti-biotechnology movements of four European states - Austria, France, Spain and the United Kingdom - over a period of 15 years, the study investigates the relationship of movement activity and state responsiveness at domestic and supra-national levels. As a major element of domestic state responsiveness various forms of participatory citizen engagement constitute a focus of the study. The following questions will be addressed: How do movements relate to participatory proposals made by national governments facing intensive public opposition? How do these participatory arrangements fit into the agenda of state policies at domestic and supranational levels? Do participatory arrangements constitute a device mediating between movements and governments?

## **Exploring Controversial Sociotechnical Futures in a Non-Participatory Culture: How Citizens Engage with Nanotechnology in Austria**

*Schwarz Claudia (VIRUSSS, University of Vienna, Austria)*

*Felt Ulrike (VIRUSSS, University of Vienna, Austria)*

*Schumann Simone (VIRUSSS, University of Vienna, Austria)*

*Strassnig Michael (VIRUSSS, University of Vienna, Austria)*

Much of recent academic and policy discourse has been gravitating around both the importance of engaging the public in the governance of science and doing so more upstream. The aim was to move away from a governance mode that focuses merely on issues of risk and safety to a governance of innovation more widely speaking. When nano arrived on the scene, this new technoscientific field was immediately identified as lending itself particularly well for upstream public engagement: it was regarded as being in a relatively early development stage and as having an inherent potential to become a controversial technology. While many countries started such engagement exercises and put in place specifically focused ELSA programmes, this did not happen with nanotechnology in the Austrian context. Quite on the contrary, policy makers engaged quite explicitly in a “deficit model” discourse branding the public as being highly technology averse. In this vain, they much more focus on classical dissemination strategies and risk assessment exercises, thus engaging in what could be called Non-Participatory Technology Assessment.

Situated in this context, we organised four public engagement exercises, dealing respectively with nanomedicine, nanofood, nano in ICTs/surveillance, nano in everyday life, in a larger project on nano and society. Our paper aims at delivering a fine-grained analysis of how citizens construct and assess nano-related sociotechnical futures in the different contexts and its (potential) innovations. In doing so, we will focus not so much on the concrete outcome of the assessment, but much more on how participants construct their position towards this new technological field. We will thus investigate the resources participants draw upon and deploy when making their assessments (e.g. experiences from other technological fields), what value structures they see inscribed in nanoscientific innovations, how they perceive the institutional actors involved in the nano field and many more. Further it will be essential to understand which of the resources and frames of reference are shared and where controversies emerge. This will also allow us to understand how participants situate themselves and their potential participation in decision-making in Austrian technopolitical culture.

## **New Topologies of the Public: Science, Technology and Political Subjectivity**

*Szerszynski Bronislaw (Lancaster University, UK)*

*Soneryd Linda (SCORE, Stockholm, Sweden)*

This paper critically examines public engagement processes as a way of democratising science and technology policy. As a contribution to a growing critical literature on the deliberative turn in public policy, it contends that such exercises need to be understood not as ways of tapping into the views of a pre-existing public, but as technologies for generating different kinds of public in controlled ways. The paper uses a survey of theories of political subjectivity to develop a contrast between liberal, disciplined political subjects and the more 'evental' character of radical political subjectivity. It then sets out a topological approach to political subjectivity, drawing on the work of Hannah Arendt, Giorgio Agamben and Alain Badiou. It argues that the emergence of 'the political' crucially depends on the topological tension between the abstract and the empirical in political subjectivity. The paper proposes that the demarcation in deliberative mechanisms of those characteristics and capacities of the human person that are deemed appropriate for political exchange performs a topological *caesura* through the subject, and thereby operates to control the conditions of emergence of the political. In developing this analysis, it looks briefly at three genres of engagement process – the citizens' jury, the scenario workshop, and the focus group – and explores how this topological approach to political subjectivity helps make sense of their fundamental dynamics. The paper then deepens this analysis by considering three applications of one particular methodology, tracking its transformation from Future workshop methodology into the scenario workshop method developed by the Danish Board of Technology in the 1980s and subsequently adopted by the European Commission. It attends to the way that particular arrangements, developed in a certain epistemological context, translated into new settings with quite different understandings of citizens and participation produce different forms of political subjectivity. The paper concludes by drawing out the broader implications of this analysis for an understanding of the relation between science and democracy today.

**Instructions for being unhappy with PTA. The impact on PTA of Austrian technology policy experts' conceptualisation of the public**

*Torgersen Helge (ITA, University of Vienna, Austria)*

*Degelsegger Alexander (ITA, University of Vienna, Austria)*

Introduced in Austria later than elsewhere, participatory technology assessment (PTA) hardly found attention in policy-making and the media. Based on expert interviews, the paper shows how Austrian members of the technology policy elite linked this to particular national context factors. Apart from “hard” facts like research expenditure the focus was on “soft” factors such as the public perception and political salience of novel technologies. The paper describes the interviewees' conceptualisation of the public and their rationalisation of a presumed lack of public enthusiasm for science and technology. From an analysis of interpretive frames in the elite discourse, a consistently gloomy picture of the public emerged almost irrespective of affiliation and political background. PTA was seen at best as promoting better factual understanding for the few involved. Moreover, Austrian technology policy itself appeared to suffer from fundamental problems due to a low political profile and public esteem. Interviewees traced back innovation problems to a mismatch between (their view of) the Austrian political and cultural mindset (“cultural giant” versus “technological dwarf”) and the demands of a modern economy. Internationally prevailing concepts of innovation and of public participation appear as mere rhetorical super-structures missing the central problem: the relevant actors' dominant frame of an alleged culturally and historically determined technological innovation weakness rooted in public opinion and populist political tradition.

Rather than the factual level of public understanding or the will of involvement, the Austrian case shows that problems for PTA already grow from elite expectations. We therefore propose the elites' conceptualisation of the public to be a limiting factor: as a governance measure, PTA is only effective if key actors consider it functional. If members of the technology policy elite picture the public they officially seek to involve as immutably inactive, technology-averse and innovation-resistant, they not only cannot activate the publics' potential for agency in a targeted democratised technology governance. Moreover, their construction becomes socially relevant by anticipating negative results, impeding any future endeavour. Departing from these considerations, the paper aims at identifying minimal standards for decision makers' conceptualisation of the public if PTA is to deliver sensible results.

## **Constructing bodies, publics and consensus: the making of normality in the Dutch xenotransplantation debate**

*Versteeg Wytske (University of Amsterdam, The Netherlands)*

*Loeber Anne (University of Amsterdam, The Netherlands)*

Biotechnology presents a field of highly complex and ethically sensitive new technologies, which provoke fundamental questions about what it entails – or should entail – to be human. Partly for that reason, some governments have initiated so-called participatory technology assessments (PTA) in this domain, in an attempt to open up the traditional expert assessment of new technologies, and their associated risks and ethical issues, to the broader public sphere. Such an exercise in public deliberation presents a forum for contesting dominant assumptions about normality and legitimacy. Behind the obvious question of a PTA – ‘what does the public think about a particular technological development?’ – hides a struggle about a much broader normative framework: who is ‘the public’ and how should it relate to science and to politics? What is the appropriate role for national politics in a world of highly transnational scientific and technological developments? How are we to set standards by which to judge manufactured life? Who has and who should have the right to speak?

Focusing in particular on the Dutch participatory technology assessment on xenotransplantation, we analyze in this paper how these questions on normality were expressed within the various stages of the debate on animal to human transplants, how boundary demarcations developed and were (re-)produced during the process, and how gradually a meaning evolved about what it means to be human, political and Dutch.

## Imagining Complexity: The Intentional Co-option of Controversy in Science and Technology

*Watermeyer Richard (Cardiff University, UK)*

Where the complexity of science equals narrative indecipherable but to only a select specialist few, a separation of science from 'public' understanding is acute. This separation, where science is latent and scientists unaccountable, may tend to contribute to 'public' anxiety, uncertainty and mistrust. The 'public' may thus be said to be excluded and marginalised from a process of decision making that constitutes the trajectory of scientific research and policy, and the ways with which it impacts at the societal level. The paucity of 'public' interaction with complex science and ways of meaning making may correspond to mystification, misunderstanding and sensationalism. Where the societal impact of science and levels of confusion surrounding it are correspondingly high, science may be stigmatised as controversial or risky.

Tools for visualisation, forms of image – static, moving, immersive, may be adapted as strategy for improved 'public' involvement with science (Bijvoet 1997). The diverse qualities of the image as a cultural artefact and the forms of emotional and intellectual response it conjures, intimates its potential as a semantic device *par excellence*. The image may extol any number of given scientific narratives that more lucidly and immediately articulate concepts that are otherwise remote or unwieldy (Anker and Nelkin 2003). It may be (re)constructed, or imbued with meaning, through the subjective experience of the viewer. The extent to which the image may evolve and change, be deconstructed and epistemologically rebuilt according to the social, cultural and political orientation of its viewer, also 'reveals' the production of new knowledge claims. In other words the image may be used as an exposition of new knowledge and method of accrual. From a phenomenological perspective, the image is not only an access-point or prompt to types of knowledge but a creative facilitator in conceiving or imagining variations of account (Nelkin and Lindee 1995). Image as an explication of knowledge, intentionally uses distance not to alienate, but to empower the spectator within a momentary epiphany (Bazin 1967); where powers of critical reflexivity and abstraction may be harnessed in building understanding. The mediation or translation of controversial knowledge accordingly should not seek to reduce complexity but commit to it as a process of abstraction that opens new and arguably unexpected pathways for meaningful participation. There is furthermore a sense that controversy is an aberration for science to expurgate. I argue in this paper that controversy is in many ways an important condition necessary for the wider discussion of science. Image as art, performance or motion picture is disposed of a similar predilection, most notably evidenced amongst many Sci-Art ventures; particularly the BioArt School. Characterised by a similar if associated parlance of controversy, risk and uncertainty, image may be usefully co-opted or co-operatively used in an attempt to 'unpack' complex science and technology to new unspecialised audiences. This paper is based upon ongoing ethnographic research with genetic artists, in art galleries and through Sci-Screen exercises, where image is being experimented as a mechanism inducing broad dialogue of 'controversial' topics from psychiatric genetics to nanotechnology amongst diverse publics.

## Why Public Engagement is a Problem not a Solution

*Wickson Fern (GenØk Centre for Biosafety, Norway)*

*Delgado Ana (Centre for the Study of the Sciences and the Humanities, Norway)*

*Lein Kjølberg Kamilla (Centre for the Study of the Sciences and the Humanities, Norway)*

This presentation will provide an overview of a recently published paper, titled “Public engagement coming of age: From theory to practice in STS encounters with nanotechnology”. In this paper, we begin by suggesting that Science and Technology Studies (STS) has entered an ‘age of engagement’, in which there is a general consensus that members of the public should have increased involvement in the governance of science and technology. We suggest that while this view was previously typically expressed in calls for enhanced ‘public participation’ in policy making on controversial fields such as biotechnology and stem cell research, it is now commonly expressed through emphasis on the need for ‘public engagement’ in emerging fields such as nanotechnology and synthetic biology. We question the meaning and significance of this discursive shift from participation to engagement and suggest that it would benefit from further attention from STS researchers. The paper then moves on to suggest that despite the apparent consensus within the STS community on the need for enhanced public engagement, there are five ‘top topics of tension’ that can be identified within the field. These tensions stem from competing answers to the general questions of: “*Why* should public engagement be done?” “*Who* should be involved?” “*How* should it be initiated?” “*When* should it be conducted?” and “*Where* should it be grounded?” Following a description of the competing positions within these topics of tension, we employ nanotechnology as a case study to demonstrate how in moving from theory into the practice of public engagement, these tensions become entangled and force potentially uncomfortable compromises in ideals. This is because in putting public engagement into practice, the choices one makes in relation to one topic of tension influence and limit the choices available in others. We demonstrate how this tension entanglement operates in the case of nanotechnology by discussing some of the problematic implications that stem from the commitment to practicing public engagement upstream in innovation processes. We then suggest that this tension entanglement is perhaps what underlies much of the emerging dissatisfaction with the practice of upstream public engagement on nanotechnology. This presentation of the different tensions in STS theory on public engagement, and the explication of the way these tensions become problematically entangled in practice, not only illuminates the various conceptual understandings available, it also highlights the tough choices and compromises that must be made by researchers and practitioners working in the “age of engagement”.





## **TRACK 32**

# **Practicing Responsibilities**

### **Convenors:**

**Cristina Grasseni (University of Bergamo, Italy)**

**Luca Guzzetti (University of Genoa, Italy)**

**Giuseppe Pellegrini (University of Padua, Italy)**

**The quiet revolution of an innovation in East Africa. Practicing responsibilities in transferring technology and scientific research to small scale farmers**

*Avveduto Sveva (IRPPS – CNR, Italy)*

*Pisacane Lucio (IRPPS – CNR, Italy)*

The OECD Innovation Strategy is built around five priorities to promote innovation, each one involves at different levels different society and economy actors. The priorities are:

- Empowering people to innovate;
- Unleashing innovation in firms;
- Creating and applying knowledge;
- Applying innovation to address global and social challenges;
- Improving the governance of policies for innovation.

The actions that governments and single institutions can implement to foster innovation are very dependent on different factors (UNESCO 2009), but from a single experience a sum of evidences and lessons learnt can be used as a track to path more general innovation policies.

The paper analyzes the socialization process of the agroecological technology *Push and Pull* in East Africa as a best practice of scientific research and TT, in which innovation and responsibility have been interacting positively. To address the food security, remains a fundamental need to foster growth and development in poor countries (FAO 2009). Investment in agriculture and agricultural research and education are crucial.

The *Push and Pull* technology was developed at the International Centre of Insect Physiology and Ecology (ICIPE) in Kenya and at Rothamsted Research, UK, by a multidisciplinary scientific team. The technology is based on a simple agroecological system for controlling agricultural pests.

The *Push and Pull* technology became, during the last ten years, an integrated livelihoods improvement system adopted today by hundred of thousand of small scale farmers around East Africa.

The specific interest of this experience lays also in the fact that end-users have been involved during all research stages in a democratization process of innovation (Von Hippel, 2005), contributing to the *fine tuning* of the technology once it was brought from trials to field. The continuous sharing of knowledge with farmers have permitted ICIPE researchers to develop a “cultural grounded technology”, that has been adopted very easily by the end users.

The paper analyzes the key issues of the *Push and Pull* socialization process: multidisciplinary composition of the ICIPE research staff (biologists entomologists, economists and social scientists) and the tactics of technology dissemination at the small scale farmer (farmers’ school, drama for radio broadcasting, manuals).

The paper presents data and interviews collected in Kenya during 2009 by a research team from the SET-DEV European project, "Science Ethic and Technological Responsibility in Developing and Emerging Countries", funded by the European Seventh FP coordinated by the Italian National Research Council, which objective is to support the research systems of two countries, India (an emerging economy) and Kenya (a developing country) by assisting them in developing their own perspective on the socialization of scientific and technological research (STR).

## **Biobanks as a collective endeavour: The case of Sarroch (Sardinia, Italy)**

*Biggeri Annibale (University of Florence, Italy)*

*De Marchi Bruna (Istituto di Sociologia Internazionale di Gorizia, Italy)*

*Tallacchini MariaChiara (Università Cattolica S.C. di Piacenza, Italy)*

Sarroch (Sardinia, Italy) is a small municipality of 5243 inhabitants (2001 census) close to one of the six European petrochemical supersites (large-scale, highly complex oil refinery with petrochemicals integration) and to the largest European liquid fuel gasification plant.

In June 2006, the local Municipality sponsored an integrated project of epidemiological, environmental and public health actions, which was carried out by a number of scholars (including the first author of this paper) from different institutions and with different professional specialisations. Among other, the actions undertaken included: air quality monitoring campaigns; a cross-sectional comparative study with a reference not-exposed population on childhood respiratory disorders; a bio-molecular study on DNA adducts in respiratory epithelium among children with and without asthma symptoms; a longitudinal panel study on all the resident children; a longitudinal panel study on children affected by respiratory disorders. A sociological survey on risk perceptions was also held on a sample of residents.

Based on the project results, some guidelines were designed to be applied locally. Also, the idea of establishing a biobank emerged, with the main purpose of verifying whether the measures for toxic emissions' reduction to be undertaken by the industry are effectively implemented. A group of professionals, including the authors of this paper, have been convened by the municipality in order to investigate the most appropriate structure of the biobank. Their task is to investigate the implementation of technical procedures, as well as the ethical and legal aspects of the initiative, so that the main objective of the biobank is achieved, i.e. to safeguard and possibly improve the residents' quality of life.

Biobanks for scientific purposes have become an important tool for medical research and are going to change the way of thinking about individual and collective health. While a shared and agreed regulation is still under development, some regulatory aspects appear to be problematic. Informed consent and donation of biological materials for scientific research are amongst the most controversial issues. In fact, if the existing rules both in the US and European contexts prescribe a specific consent from donors, a tendency towards forms of wider, blank, and blanket consent is developing, often supported by pharmaceutical industry. Because short-term individual benefits can hardly be invoked as a reason for donation, the wide and open consent has been introduced as a strategy for the individual level to be dissolved in the collective dimension of general health and future benefits.

The experience taking place in Sarroch and described in the paper has the potential to show how biobanking may be framed as a collective endeavour, engaging professionals, administrators and citizens for the achievement of a common goal.

## Responsible Monitoring of Technoscience: Political Postulates of Governing The Collective's Expansion

*Binczyk Ewa (Nicolaus Copernicus University, Torun, Poland)*

The paper discusses political, sociological and philosophical postulates formulated within the current debates on the role of technoscience in the risk society. The paper focuses on: Bruno Latour's politics of nature, Ulrich Beck's cosmopolitanism, Immanuel Wallerstein's utopistics. Some other analyzed suggestions are: the idea of transforming the very frames of the public debates on innovations (e.g. by eliminating experts' paternalism), the proposal to institutionalize the macro-ethics of global responsibility, the precautionary principle. The main theoretical background of the article is Latour's actor-network theory.

The postulates articulated in the presentation advocate (*inter alia*):

- 1) a public open debate on innovations must be created before they are introduced into the society. Directions and the very reasonableness of technoscientific research should not be discussed *post factum*, when it is usually too late;
- 2) not only experts, representatives of corporations or government, but also sociologists, ethicists and lay people afflicted by changes, should be invited to the discussion. At this point paternalism of state and experts should be avoided;
- 3) we should stop analyzing the relation between technoscience and society in terms of the *impact* of one independent sphere on another, or in terms of *isolated, innocent* discoveries/gadgets. We rather observe deep and global interconnections between heterogeneous elements. Introducing an innovation in one sphere may cause a serious, unexpected effect in the another, distant domain. Human and non-human factors are mutually dependent and this situation must be represented politically;
- 4) no matter how difficult such project may seem, we should try to create a global, institutional, systemic monitoring of the industrial and technoscientific development;
- 5) many philosophical and theoretical assumptions, taken for granted until now, demand serious problematization. Among them are: a) the Enlightenment's idea of progress (defined as inevitable); b) the normative fundamentals of a capitalist system (for example the values of profit, constant consumption, expansion of production); c) the premise that knowledge is always a non-problematic good; d) the assumption that technology is a field of certainty and a beneficial, innocent instrument of progress.

## Discussing the role of scientific associations in policy and governance

*Delicado Ana (Instituto de Ciências Sociais da Universidade de Lisboa, Portugal)*

*Conceição Cristina Palma (CIES, Portugal)*

*Inês Pereira (SOCIU, Portugal)*

*Rego Raquel (SOCIUS, Portugal)*

Scientific associations are a fairly neglected object in the social studies of science. Though it is often discussed the collaboration of individual researchers or research institutions with civic groups, there is little work done on the collective action of scientists.

The majority of scientific associations, chiefly of a disciplinary nature, are mainly concerned with the internal affairs of the scientific field, namely the regulation of scientific practice, the dissemination of scientific knowledge among peers, the aggregation and representation of professional interests (which includes lobbying government).

However, on the one hand, some of these organisations also take part in defining R&D policies and are represented in advisory councils of national and transnational S&T governing bodies. On the other hand, not only these associations often engage in social intervention (issuing risk assessments and expert advice, promoting the diffusion of innovations, taking sides in S&T controversies, developing actions and initiatives aimed at society at large, establishing cooperation with NGOs), but also new kinds of scientific associations have emerged, specifically devoted to acting in particular areas such as environment, energy, development, peace, health, education, public understanding of science. This clearly points to the need to discuss the scope of scientific associations and its implications in policy and governance.

This paper will examine the civic role of scientific associations, by drawing on the case of Portugal. It will present and discuss some examples of actions and interventions of Portuguese scientific associations both in science policy and in wider societal debates and controversies, in issues such as new technologies, climate change policies, nuclear energy or euthanasia, exploring the alliances made with political actors or NGOs, the tensions within the scientific community and the effects of “scientific” activism. This paper is based on an ongoing research project funded by the Portuguese Foundation for Science and Technology.

**Political cultures, identity building and reflexive governance of science and technology: emergence and evolution of Parliamentary Technology Assessment in Denmark, UK and Wallonia**

*Delvenne Pierre (FNRS, SPIRAL, Université de Liège, France)*

Nowadays more than ever, dealing with risky scientific and technological issues requires careful attention and policy-making support. In Western Europe, since the 1980s onwards, science, technology and innovation (STI) issues are addressed in the institutional arena of Parliamentary Technology Assessment (PTA) offices. The main function of those PTAs is to provide the policy-makers and some stakeholders with anticipatory knowledge on technological innovations and/or by enhancing social debate.

In previous researches, we have demonstrated that the emergence and evolution of Parliamentary Technology Assessment institutions (PTAs) embody a relevant indication of STI governance becoming more reflexive. We argue that there appears to be a reflexivity pathway, on which some PTAs have moved farther than others. The empirical evidence for such a pathway to exist reveals that PTAs are embedded into STI regimes which are themselves influenced by narratives building on elements of political culture and national identity. For example, such narratives can be related to an instrumental logic of innovation (to achieve growth and economic goals), to an ecological logic of innovation (to achieve sustainable development) or to an adversarial or consensus-seeking policy style.

In this contribution, we will focus on different narratives visible in collected empirical data to estimate how they influence (1) the emergence of PTA offices and (2) their evolution towards more or less reflexive approaches. Being based on literature research, participatory observation, official document analysis and qualitative data collection (through semi-structured interviews with academics and TA practitioners) we will concentrate on three case studies: Denmark, United Kingdom and Wallonia.

In the first two case studies, Denmark and United Kingdom, there is a PTA office, but of a different shape. The Danish Board of Technology is a discursive TA, which emerged in a context of “*folkelig*” democracy and which has been shaped within a consensus-seeking political culture. It is able to open up to plurality and deal with blurring of boundaries, which leads to a more reflexive approach than other offices, like for instance The British Parliamentary Office of Science and Technology. The latter has a different shape. It is an instrumental PTA institution, strongly bounded by Parliament and (seemingly happy to be) limited by the latter in its autonomy. One reason for this is that British political institutions, including the Parliament, are entrenched in a narrative of deficit model of public understanding of science which prevents from further openings. In Wallonia, there is no institutionalised TA but there is an ongoing discussion on PTA's emergence. Nevertheless, if a TA institution would emerge, it would not take up a very reflexive approach because Wallonia builds on a narrative of economic approach to innovation to achieve growth and to follow economic goals in order to consolidate a somehow recent identity building project.

## **Why is it difficult to find a common research and dev. policy at EU level?**

*Elmas Umut (Turkish Asian-Center for Strategic Studies, Turkey)*

This study will be examined the main difficulties for the creation of a Common Research and Development (R&D) Policy at EU level. European integration with its sui-generis structure can be seen as the most developed regional cooperation in history. Establishment of a common ground in specific areas between twenty-seven states is the matter of integration issue. On parallel to that view, the study will be approaching the difficulty of reaching a common ground on research development at the EU level as a problem of integration process.

In order to analyse the historical and theoretical backgrounds of European R&D attempts, Neo-Functionalism and Supranationalism will be considered as theoretical framework. Also some empirical data will be used to see current situation and/or measuring the success and/or failures of European R&D integration.

The need for setting a research and development policy comes no closer than until the 1980s, both for companies and individual states. In order to take a place or to improve their existing ones in the international competition, innovation and technology areas has taken the key roles in policy considerations. This 'new competition' among the states is argued to be the competition of technology rather than the competition of gaining more territories or power.

On March 2000, the necessity of collaborative and effectual "Research and Development Policy" accepted as one of the most important priority to become powerful global player in Lisbon Summit by the leaders of the member states of the European Union. On the basis of this statement, "Lisbon Strategy" has been announced to make the EU "the most dynamic and competitive knowledge-based economy in the world capable of sustainable economic growth with more and better jobs and greater social cohesion and respect for the environment." by 2010.

After the statement of great ambitions in Lisbon European Council, member states of the Union have agreed to increase EU's R&D investment from 1,9 % to 3.0% of GDP by 2010 in Barcelona Summit 2002, which aims to reach Lisbon Strategy.

It has become clearer that through concrete steps especially Lisbon and Barcelona Submits research and development concerns have raised in the political arena and become hot topics for politics. I will start with answering the questions such as why research and development has become important for EU members, why collaborative policy is needed.

After having a general framework about European research and development initiatives from theoretical, empirical and historical perspectives, I will come up with main hypotheses to question "why is it difficult to form common research and development policy at the EU level?"

**Questions of knowledge use regulation and scientists' societal responsibility formation within contemporary society**

*Fedorova Julia (Centre for Science Research and Statistics, Moscow, Russia)*

*Shuvalov Sergey (Centre for Science Research and Statistics, Moscow, Russia)*

Matter of fact that specially designed ethical code of scientist never exists manifests strong social opinion that science is process of finding impersonal knowledge and society believes in social institutions' pliancy enough for use of scientific knowledge to humanity wellness and not to humanity harm. Now, questions of making of ethical and humanistic consciousness for scientists and their societal responsibility are of utmost importance to provide further development of science and its institutionalization.

Contemporary science faces different questions such as ethic questions those can not be solved only by means of methodology, logic and ethic of cognition itself.

Meanwhile one can state that ethical self-knowledge of society falls far behind scientific and technological advance rate that, on the one hand, gives to people great possibilities to societal integration and, on the other hand, brings along, indirectly, harmful trend for erosion of moral rectitude and civilizational values.

Development of contemporary science is, in many ways, conditioned with political, economical and military behoove. Real conditions are, that science is far away from perfect idea of *unity of societal goals of cognition and value system of humanity*.

Considering the potentially harmful applications of certain parts of science knowledge the societal responsibility of scientists, engineers and designers increases greatly among with all society's responsibility for rightful use of science and technology achievements.

Unequalled growth of knowledge and technological possibilities in contemporary society causes manifestation of completely new policy of knowledge that regulates questions of influence of science to society living and world order and limitation of human manipulations to nature and society.

Need for planning and adjustment and regulation of factors those conduce alterations, include societal transformation, is increasing greatly.

Basic principles of contemporary policy of knowledge can be resolved to follows:

- Attempts for systematic regulation of societal role of knowledge
- Limitation of use of new knowledge and new technology
- Increase of society awareness concerning scientific, technological and societal problems those occur due to scientific achievements use and creation of new technologies.

Effectuality of regulation of knowledge use is important criteria to estimate civic disposition of social interaction within contemporary society. Changes those caused by new knowledge and technology often threat naturalized societal patterns, trends and norms. So, it's necessary to consider the danger of mutation of knowledge use regulation to *status quo* preservation only, that guarantees stability and provokes downshifting to conservatism. Also one have to avoid unnecessary restrictions to scientists' work those can block the scientific progress.

Intrinsically, the main goal of knowledge policy in contemporary society is to foresee the influence of new knowledge and technology to social and nature environment and to proactive prevention of its harmful effects.

Age of information technology puts the global challenges to humankind. Anyway, current changes put the necessity to considerable transformations of political environment and basic institutions of contemporary society, those are caused by development of knowledge policy as a new sphere of politicing.



**Risk Perception, Culture, and Legal Change. A Comparative Study on Food Safety in the Wake of the Mad Cow Crisis**

*Ferrari Matteo (University of Trento, Italy)*

The goal of the paper is to illustrate the way risk perception, and the socio-cultural context within which it occurs, is able to mold the process of legal change. The analysis is based on a case-study exploring the different regulatory responses that three legal systems, namely Europe, Japan and the USA, have enacted in coping with Bovine Spongiform Encephalopathy (BSE, also known as mad cow disease), one of the major food crises occurred in the last decades. In particular, by making reference to the recent advancements on risk perception that cognitive and social sciences, such as legal anthropology and sociology of law, have experimented, the paper aims at investigating the reasons behind the different approaches that the three legal systems mentioned above have adopted in dealing with this new threat. While Europe has comprehensively reformed its food safety framework, the USA has paid scant attention to BSE: a third interesting paradigm is represented by Japan, a country which, even if almost totally unaffected by BSE, has nonetheless implemented radical changes to the institutional and regulatory frameworks concerning food safety.

At a general level, in Europe and Japan the mad cow crisis has represented a breaking point by which the traditional institutional arrangements through which risk was managed have been contested, calling for a more direct involvement of social groups in the risk management process: this is not the case of the USA, where BSE had determined only limited, *ad hoc* reforms. In order to explore these differences, attention will be devoted to the administrative regulations implemented to guarantee the safety of the food chain against the BSE menace, as well as to the liability responses sketched to compensate the mad cow disease's victims.

The role that culture has in addressing the process of legal change is often understudied by comparative lawyers, who prefer to focus on the functions that norms fulfill rather than to examine the socio-cultural context within which such norms are created. The paper seeks to fill this gap by showing how the legal changes occurred in the wake of the BSE crisis have been influenced by the cultural context within which they are placed.

**Responsible Innovation? Innovation policy and its tacit governance effects on the societal responsiveness of researchers in the life sciences**

*Fochler Maximilian (Department of Social Studies of Science, University of Vienna, Austria)*

Currently, both on national and supra-national levels, innovation policy is seen as *the* key political means for securing economic competitiveness and shaping societal futures. Quite homogeneously at least across Europe, as set of central key notions/values such as mobility, excellence, transparency or application orientation are invoked which are supposed to foster both the epistemic and social development of science as well as its integration in society. The call for societal responsibility is often part and parcel of these discourses, though as has been convincingly argued by recent science studies writing, it often remains a mere lip service.

The main thesis this paper seeks to develop is that the symbolic orders implicit in the mentioned key terms/values central to innovation policy tacitly govern and change research cultures and practices, and that these changes have considerable unintended consequences for and effects on the societal responsiveness of scientists. Concretely, I will draw on biographical interview data with life scientists in Austria<sup>18</sup>, and study how two of these central notions/values – the call for application orientation and the race for scientific excellence – impinge on researchers' epistemic and career narratives and decisions, and on their self-understanding. In doing so, I will discuss whether and how these tacit governance effects open up or close down researchers' responsiveness towards specific societal actors and rationales.

In conclusion, I will argue that to truly foster societal responsibility, innovation policy needs to include a more nuanced debate and reflection of its impacts on current research cultures and practices.

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<sup>18</sup> Project: "Living Changes in the Life Sciences. Tracing the 'Ethical' and 'Social' within Scientific Practice and Work Culture", Project Leader: Ulrike Felt, Collaborators: J. Allgaier, M. Fochler, R. Müller, funded by ELSA-GEN-AU.

## **Food, science and the challenges of innovation**

*Grasseni Cristina (University of Bergamo, Italy)*

Risk assessment and management has become staple food for many disciplinary discourses and policy statements about innovation. The many complex ways in which this reflects on food production and strategies of food provisioning requires a language of analysis that is in many ways distinct and different both from academic debates on innovation and from policy discourse on risk.

The problem of how to pursue and foster responsible innovation - for instance, in the field of GM crops or large mammal cloning - should find a solution in criteria for responsibility in relevant public debates. This in turn means having a clear value framework which inspires political action (politics at its best being about deliberating the goals of the polis, namely of the community of citizens).

STS provide a critical attitude to thinking about the assumptions and the languages in which such debates - or the absence of debate - establish local practices of reciprocal relationship between science and democracy. Techno-scientific innovation in fields that are the subject matter of bioethical scrutiny and inquiry - such as how to assess and manage risk in frontier fields such as research on animal cloning - reflect facts about science in society which have been highlighted in vast bodies of literature: for instance, that the lab is porous and that scientific objects and facts are not just of interest and concerns to experts but to society at large. In particular, media and public debate on scientific facts are not just a matter of "Public Understanding of Science" but a matter of their social appropriation and co-construction.

In a sense Plato and Aristotle already knew and said that science and society co-produce each other. Nevertheless, it is particularly important in our world to understand how technoscientific questions are configured within public discourse and practices, since science and technology are political objects.

Academic reference points to assess the question of responsibility in innovation competently and in an inter-disciplinary manner are dramatically scarce or fragmented. On the other hand, a rich evidence of self-organised grassroots movements are posing the question of food as a political object of risk perception and of collective deliberation, devising and organising alternative food provisioning networks that value health standards, but also social and environmental sustainability in food production. From Slow Food to Community Supported Agriculture, from Groups of Solidarity-based Purchase to Transition towns, a collective and participatory response to the public perception of technoscientific innovation and of risk is emerging in a concerted way. Which constructive scenarios do these movements provide for rethinking the role of technology and science in food production? How do they convey expectations of responsibility in scientific research? Is responsible behavior in food production and provisioning by definition averse to technoscientific innovation?

## **The Construction of Public Interest in Ethical Review of Human Biomedical Research: A Longitudinal Qualitative Study**

*Jaspers Patricia (University of Maastricht, The Netherlands)*

*Rob Houtepen (University of Maastricht, The Netherlands)*

*Klasien Horstman (University of Maastricht, The Netherlands)*

*Rein Vos (University of Maastricht, The Netherlands)*

Several publications in science and technology studies have shown that the success of science is depending on the ability of scientists to draw a line between scientific and other interests. Scientists have developed specific repertoires and have undertaken all kinds of activities to reinforce their position as objective experts, producing reliable knowledge. The legitimation of scientific work to 'the world outside' is essential for scientists to be able to continue that work. Ethical review can be considered a technology which enables the development of a research practice with human beings and that develops a repertoire to distinguish ethical and non ethical research, that is between 'appropriate' and 'non-appropriate' science. It provides research practices – instead of a label of risky - with a label of reasonableness. Medical Ethical Review Committees (MRECs) are multidisciplinary committees that are supposed to balance possible risks, burdens and benefits of research. However, these committees are expected to act in the public's interest. Though it is the main task of MRECs to protect research participants, in constructing what should be protected and what should be left out, boundaries are drawn between what is of public and private interest. In this paper we will focus on how MRECs construct this public interest in daily medical ethical review practice. We have conducted a longitudinal qualitative study in 3 MRECs in the Netherlands, each in a different institutional field: a) an institutionally affiliated MREC in a multi-disciplinary field, b) an institutionally affiliated MREC in a single disciplinary domain, and c) a non-affiliated MREC in a commercial field. MREC-meetings were observed, as well as public meetings in the field on ethics review. MREC members and stakeholders on a local, national and international level were interviewed. Furthermore, relevant journal articles and policy documents were analyzed.

Based on these data we will show that MRECs – although being highly regulated and formalized official bodies - construct public interest in different ways, e.g. in terms of constructing different perceptions of responsibility concerning the various stakeholders and their own responsibility. We will show how MRECs, shaping this boundary between what is 'within' and what is 'beyond' their scope, using the different repertoires that make up the technology of ethical review, construct the boundaries between public and private interest. This way, we hope to provide more insight in the complex machinery underlying ethical review of human biomedical research and its service of the public interest.

## Governance of Technoscientific Innovation: Legal Approach

*Laukyte Migle (University of Bologna, Italy)*

One of the modalities to govern technoscientific innovation is by legal regulation. In fact, if we look at some of the technoscientific innovations of the XX century (namely, In Vitro Fertilization (IVF) and Internet), a sort of pattern can be observed. The paper analysis this pattern coining it under the name of three-factor model, which is composed of factors that have a key role in framing legal approach towards the governance of technoscientific innovation. These factors cause a scientific or technological development to set up a new way of thinking or a new practice (first factor) in such a way as to affect society at large, sparking a public debate (third factor) arising in consequence of the competing interests and values the changes in question call into play (second factor). Thanks to these factors, then the development in question (1) introduces a paradigm shift, (2) entails socioeconomic consequences, and (3) becomes an object of public debate.

The idea is that the more a technoscientific innovation does these things, the likelier it is to come under the purview of law and to be governed by it. The three factors in question are purposely broad and subject to interpretation: they need to be applied to the case at hand—to the specific technoscientific innovation in question—to see what they mean and what role they play in framing that innovation's relation to law.

But once a public debate is underway, the need is clear to think about how the technology in question ought to be governed. A solution needs to be forged, offering a way to harmonize all of the competing interests, claims, and values at stake. What happens in this process, or how it unfolds, is something worked out in this paper by considering science in two roles that have been ascribed to it:

- (a) as research science, where the technology in question is first developed; and
- (b) as regulatory science, once the technology has entailed socioeconomic consequences and made its way into the public debate, and *law* invokes *science* as a source to look to in understanding the new phenomenon as it relates to *society*.

The input of regulatory science and all the voices emerging from the public debate then enters the public forum, where different views compete as to what the best way to regulate the new phenomenon might be. The law, or rather the people who make law and design policy, need not respond coherently in the process, but you eventually do see something like a policy, understood as the choice of governance, take shape: the law takes this multiform input (heeding many concerns, none of which can be said to prevail on the others in any definite way) and forges out of it a shared view or a policy under which to govern the innovation in question.

**To screen or not to screen? Reordering disease through the practice of prostate specific antigen screening**

*Metzler Ingrid (Life-Science-Governance Research Platform, University of Vienna, Austria)*

This paper tries to explore what is known as “PSA controversy”. The acronym PSA stands for “prostate specific antigen”, a protein that has been shown to be increased in the blood of individuals afflicted by prostate cancer. Since the early 1990s, assays that make PSA levels visible have been used as biomarkers to detect individuals with prostate cancer at an early stage of disease progression when the disease is still asymptomatic. Since the introduction of this biomarker into the clinic in the early 1990s, the practice of PSA based testing has spread in both centrally organized screening programs and in more dispersed ways of proliferation.

It has supplanted pre-existing and more invasive practices of prostate cancer diagnostics, thereby reordering ways in which prostate cancer is diagnosed and done. However, despite its benefits the practice of detecting prostate cancer through making PSA levels of asymptomatic men visible has been discussed in controversial ways since its inception—both inside and outside of the field of bio-medicine.

This paper tries to make sense of this controversy. It reviews bio-medical articles in which the pros and cons of this practice are discussed, analyzes what sort of arguments and evidences are assembled in these articles, and explores how this controversy has changed over time. Moreover, it tries to make sense of why the practice of PSA-based testing is so controversial in the first place. It argues that one of the reasons for the “wickedness” of this controversy relies on different understandings of what diseases are and what sort of conditions fall into the jurisdiction of biomedicine. In other words, the controversy on the practice of PSA-based testing assembles different understandings of the role of bio-medicine and its boundaries in the 21<sup>ST</sup> century.

## Innovation, social practises and 'tailor made technologies'

Nicolosi Guido (Department of Sociology, University of Catania, Italy)

Explicitly referring to the *corpus* of philosophical and socio-anthropological analysis best known as the 'theory of practise', in the first part of this paper we will try to show the theoretical relevance of the so-called 'law of irreducibility of skills' (Sigaut, 1994). That is, a principle according to which, skill is inherent to the creative ability of practitioners in de-assembling the technological artefact to re-embed its parts or procedures into their locally situated social experiences. Following this theoretical approach, we will claim with Tim Ingold that the end of the 'social production of technical skills' due to the rise of modern technology is against the evidence, and that: 'the entire history of technics might be interpreted as a constantly renewed attempt to build skills into machines by means of algorithms, an attempt constantly foiled because other skills always tend to develop around the new machines' (Sigaut, 1994).

In the second part of this paper, we will use the previous theoretical perspective to show that today as Susan Oyama (1998) claims, modern techno-science produces a paradox: it is pervaded by an idealistic aim of democratization of knowledge, but generates a technocratic and globalized elite. The main consequence of that has been a significant concentration of knowledge in the hands of few and the shift of the techno-scientific production far from the communities and the environments where it produces its effects. Biotechnology is a very emblematic case. Developing countries have been expropriated of their huge deposits of material and symbolic resources and have been marginalized from the scientific knowledge production processes applied, for example, to agriculture. In this sense, what Giddens calls 'disembedding' implies always a dramatic social and cultural uprooting process. But we will try to relativize the meaning of the term: disembedding. Technology is still and always a process involving social relations. The political problem here is that global elites are social professional communities, but *they* are hardly disembedded by the wider *forms of life* (Hannerz, 1998). Today, social communities can only re-appropriate technology *ex-post*, after production, as active consumers. They become 'centrifugal force' facing an hegemonic power.

So, our final question is: could we design new strategies for (partial) social re-appropriation of technology? This re-appropriation should be founded on individual and collective new forms of shared '*reskilling practises*' (Giddens, 1991), that is processes of partial *re-embedding* of technology within wider society, *ex ante*. This effort should link technological innovation to traditional knowledge, environmental landscapes and shared socio-cultural practises, stimulating the direct involvement of farmers, citizens, consumers together with scientists and technicians within the stage of technological production. There are many historical experiences of that (see Ruivenkamp, 2008 for agro-biotechnology). And there are many other technological developments going towards this direction: see the case of the 'open source movement' in informatics, biotechnology, robotics, etc. In other words, to acknowledge the social embeddedness of technology could lead us to realize new more sustainable forms of what Ruivenkamp calls *tailor-made (bio)technologies*?

**Citizens and experts debating on Climate Change issues. Questions and answers from different points and from different expertise**

*Pellegrini Giuseppe (Dept. of Sociology, University of Padua, Italy)*

In this paper I propose the theoretical framework and consideration regarding public perspective on science through sociological approach to knowledge, science and related phenomena by mapping and questioning among others the concepts of public “understanding of science” and “science communication” in the context of the shift towards greater public involvement in science related issues.

I will present the results of my research on representative status of Local Citizens Debates (LCDs) conducted by a group of 13 European Science Centres. The aim of this LCDs is to promote public debate involving different social actors such as citizens, scientists, stakeholders and institutional representatives interested in the issue of Global Warming. The format entailed a remote preparation of participants by means of selected materials on climate change issues. In the first phase of the LCD citizens were able to form an opinion by themselves, helped by a moderator without the intervention by the experts; in the discussion phase citizens exchanged views and made questions together with scientists, stakeholders and institutional representatives. This format had the main advantage of putting citizens in a more powerful position thanks to the possibility of discussing issues among themselves without listening to the experts'/stakeholders perspective beforehand.

The participants on citizen panels do not represent in the sense of acting for anyone else, rather they stand for diverse opinions, concerns and point of view.

The last part of the paper considers how LCDs, as advisory rather than decision making institutions, can best contribute to the democratic legitimacy and responsibility of political decisions. I argue against the common overemphasis of their capacity to facilitate political participation. I suggested instead that Citizens Debate at Science centres have a genuine potential to promote informed deliberation among experts and lay citizens. I argue that they can provide temporary composition points of existing public discourses, stimulating additional and more informed discussion of sociotechnical issues. Furthermore they can contribute to the procedural elements of democratic legitimacy. In other words they propose a new way to link citizens panels and traditional forms of organization and participation.



**Margined considerations about a quali-quantitative Questionnaire on Roboethics**  
**A Delphi research on Ethical, Legal, and Societal (ELS) Issues in Robotics**

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Robotics is rapidly becoming one of the leading fields of science and technology, so that very soon humanity is going to coexist with a totally new class of technological artefacts: robots. Robots can assist humans in several activities, and in solving many problems, from daily life to productive activities to healthcare, from amusing kids to safeguarding of the well being of our planet. However, robots can rise ethical, legal and societal (ELS) issues in magnitude and quality never seen in all our technoscientific history.

Actually, when Robotics is applied to society in numbers and volumes bigger than today, it will trigger widespread social and economic change, for which public and private policy must now be prepared. Technological change continually disrupts employment patterns. Machines have already replaced people in a variety of jobs. This can only increase, as machines become more intelligent. (Especially in sensitive fields: biorobotics, military applications of robotics, robots in children's rooms).

Since 2004, following the First International Symposium on Roboethics (Sanremo, Italy) and the Euron Roboethics Atelier (Genoa, 2005) which produced the Euron Roboethics Roadmap, an increasing number of roboticists and scholars of humanities (STS Studies, Law, Philosophy, Sociology, Psychology, etc) involved in enriching the subject of the ELS issues in Advanced robotics with ideas and important considerations. So that Roboethics has acquired the status of an Applied Ethics promoted, among others, by the IEEE Robotics & Automation Society.

Authors have collaborated with the European Commission's funded CARE project, aiming at setting up a common agenda for robotics in Europe (the Strategic Research Agenda for Robotics in Europe, SRA) to 2020 and beyond. One of the tasks of CARE was to analyze the potential Ethical, Legal, and Societal issues in Robotics from today to the next decade (2020).

In the frame of CARE's WP on ELS Issues in Advanced Robotics, the opinions of a selected group of about 25 experts in robotics and STS Studies on the possible trends in the field of Robotics related social issues, have been collected, confronted and processed through the Delphi interpretation.

A quick view of the data shows a manifold of different representations of robotics and of the robots. In fact, the experts' answers express diverging opinions about robotics' symbolic elements and its effects - perceived and assessed - on society. On one side, we can notice several elements of stereotyped judgement, accompanied with thorough considerations of deep novelty.

In this paper, authors submit the main elements of the processed Questionnaire's data analysis along with its methodology and results.

## **Conceptions of Responsibility in Biotechnology Governance**

*Snell Karoliina (Department of Social Studies, University of Helsinki, Finland)*

Responsibility and social responsibility have become commonly used concepts in social theory as well as in public and political discussion about biotechnology. In both forums, it is acknowledged that in order to guarantee a safe and desirable future, people need to strive towards the common good and minimise the risks of new technologies, and this has to be done as a collective effort. Even though talking about responsibility has become a collectively accepted and even a normative frame, there are different ways to construct this responsibility frame. Not all actors, for example, question the neutrality of science or impose ideas of participatory democracy in biotechnology governance. Different actors use the concept of responsibility for their own purposes and from their own perspectives. In addition, definitions and interpretations of the concept have often remained vague and even contradictory.

This paper presents an empirical case from the governance of Finnish biotechnology – how responsibility is being articulated in biotechnology policy; what are considered to be the responsibilities of biotechnology researchers; and what kind of responsibilities are being attributed to the public? Policies often have contradictory goals and methods for attaining them; at the same time national competitiveness through innovations in biotechnology and wide public discussion that could hinder utilisation of innovations, for example, are emphasised. Knowledge economy emphasises the value of knowledge and that producing new knowledge is a responsible action as such. Discourses of social responsibility on the other hand aim at evaluating collectively the value of each new innovation. Researchers balance between academic autonomy and meeting demands of commercialization. The public on the other hand is put in number of different roles – consumers, citizens, patients etc. – that all include different interpretations of responsibility.

All these aspects of research, development and governance of biotechnology imply different conceptions of responsibility and also different practices of responsibility. In addition to the empirical case the notion of responsibility is scrutinized from a theoretical and conceptual perspective. The paper is based on findings of my doctoral thesis from 2009.



## **TRACK 33**

# **New Developments in Surveillance Practices and Technologies**

### **Convenors:**

**Kevin D. Haggerty (Dept. of Sociology, University of Alberta, Canada)**

**Andrea Mubi Brighenti (Dept. of Sociology, University of Trento, Italy)**

### **Banal surveillance? Variations on the theme of the “banalisation of surveillance”**

*Bellanova Rocco (Vrije Universiteit Brussel, Law, Science, Technology & Society; Facultés universitaires Saint-Louis – CreSPo)*

*De Hert Paul (Vrije Universiteit Brussel, Law, Science, Technology & Society; Tilburg University – TILT)*

Ex. 1: A UK enterprise offers the possibility to “stream” on-line the images randomly captured by CCTV in shops. Occasional users can connect to the website, register, watch the streaming and spot eventual “criminal” behavior. Each reported alert is rated, and the “user of the month”, i.e. the most successful amateur online detective, wins money.

Ex. 2: A growing number of gymnasiums provide their clients with an electronic key that, among others, registers their health data and their training program. While doing exercise, the key monitors the performance, warning for excessive physical stress, or blaming the user for not fulfilling the scheduled program. Several manufacturers sell similar devices that can also communicate the outcomes through Twitter.

Ex. 3: According to a newspaper, more than the 15% of the Facebook workers have “police-like” functions: they check the “morality” of the photos posted, they ensure cooperation with law enforcement authorities and they control the “security” of the platform by simulating hackers’ attacks.

Those few examples share several features of classical modern surveillance practices, but they also invite to question classic approaches. One could say that these, somehow atypical, practices re-shape the assemblages to a point in which surveillance becomes “banal”, commonplace, something society does not care about. Banalised forms of surveillance enter daily life without notice, and they become a common part of socio-political and economic relations.

While already significant, this first common sense description of banal is not the only possible definition of the notion. The French word “banalisation” offers at least four other definitions: the process of becoming ordinary and entering social mores; the disguise of a police car; the shift of the legal status of goods, from a feudal to a communal one; and the modification of a train rail in order to allow its use in both directions. These different meanings of “banalisation” mirror several features and developments of surveillance practices and assemblages. Among them: the evolution of the relations between surveillant and surveilled, evolving beyond acceptance and collaboration; the emergence of new esthetics of surveillance, based on invisibility and “mimesis”; the dynamic nature of power relations as well as the pivotal and ubiquitous role played by technique, generally hidden by its folding.

The aim of this paper is to introduce the concept of “banalisation of surveillance” to sketch a possible analysis of what could be considered modern atypical surveillance practices. Playing with few examples and different variations of “banalisation”, the study identifies some of the current impasses of surveillance studies and highlights the need for a better understanding of the re-articulation of assemblages in different environments. In particular, it proposes to build on the insights of authors such as Der Derian, Marx, Foucault and Latour, to develop a framework of analysis able to take into account the effects of esthetics’ redefinition of surveillance and the participation of both human and non-human actors to surveillant assemblages.

## Expressions of security in South Africa

*Duca Federica (University of Trento, Italy)*

Crime, as well as the correlated dynamics of desegregation and re-segregation, dominates the South African daily discourse. Yet what it means to talk about these concepts is at stake: as given ideas they pertain to the public sphere but they undertake many different meanings according to the perspectives taken into account. What remains constant and perceivable to the majority is the continuous condition of insecurity and uncertainty in which the country finds itself, especially when considering those public and intimate spaces in which the daily life is unfolded. South Africa has always been a highly controlled country, even though in different forms. During the apartheid regime, the spatial division and separation within the country was guaranteed by the police state. Nowadays, South Africa having undergone a so-called process of democratization, it has also switched to a different form of control and surveillance, becoming more sophisticated and with a much more difficult task of maintenance of the status quo of the country.

This situation translates itself in a generalized and variegated array of security devices either of technological or non-technological nature and they are to be understood in a double facet optic. Practices of surveillance (institutionalized or informal) are indeed differentiated and multi layered along the lines of the suburb, of the CBD and of the township. Yet, a particular form of embedded surveillance trespasses these spatial lines through the body: the need for security and the vulnerability of the girls body led to the ideation in South Africa of a tool (exported and commercialized in Europe as well) aimed at the defense and the police of the body: the chastity belt (wired and connected to an armed response security system) and the anti-rape condom (invisible in itself but the girl wears a warning button indicating that she is guarded). The continuity line between the protection of the body and the protection of the house is here very relevant; the widespread imagination of protection inhabits the body as well as the space in which it acts.

The continuity lines of wired protection between the body and the house, as well as the forms of securing it are going to be hegemonic points of discussion.

In such a situation surveillance works as a group defining institution, differentiating between those who fit into the vision of the “New Country” and those left aside, creating a new configuration of visibility: the most the area is under surveillance, the most importance is given to it.

The following three axes might direct the surveillance discourse in South Africa: the predominance of the rationale of the event prediction (involving the body in the street and the house) to produce social order under neoliberal circumstances; the modalities of surveillance in the different urban forms and in the streets, thus the engagement of the on foot movement seen as the final objective and a means of the surveillance (engaging the traffic between the CCTV, vigilantism, gates, bumps); the intertwined relation between the panoptic and the synoptic, due to the over visibility and acceptance of control devices.

## **From Telecare to Ambient Assisted Livings: The Securitization of Care Spaces**

*López Daniel (Universitat Oberta de Catalunya, Spain)*

*Sánchez-Criado Tomás (Universidad Autónoma de Madrid, Spain)*

Telecare technologies should be understood not only as care technologies aimed at increasing older people's wellbeing and independence but also as surveillance technologies through which life is governed. The aim of this paper is to offer a critical diagnosis of the care-delivering model that telecare technologies is bringing about. The materiality and spatiality of care are discussed drawing on an ethnography of a home telecare service and on some insights from the Surveillance Studies and the Foucaultian literature on governmentality. Through this discussion on telecare, we would like to show that care-delivering operates through the securitization of *milieus* where certain living processes take place (e.g. ageing, getting ill, recovering...).

## **Invasions of Publicity**

*Neyland Daniel (Lancaster University, UK)*

*Kroener Inga (Lancaster University, UK)*

A convention for articulating concerns over surveillance has been to discuss invasions of privacy. Such concerns are talked about in relation to spaces (such as the home), forms of information (such as medical records) and/or physical things (such as the body), from which or about which we would not want information to be collected. Implicit within these discussions are notions such that there is a proper direction to concerns over surveillance (something from outside, moving in by invasion), that it is invasion which we need protecting against and that these concerns ought to form the focus for legislation (data protection, rights to privacy, etc). This paper will argue that these concerns and their associated implications are all misplaced.

In place of concerns over invasions of privacy, this paper will suggest that more appropriate matters of concern are invasions of publicity. The paper will achieve such an argument by drawing on the recent history of Science and Technology Studies (STS) research. A number of STS scholars have proposed situating an inversion at the centre of their research as a means of opening up to scrutiny the basis for the relationship between various technologies and their populations. These inversions have been particularly prominent in the field of Actor-Network Theory (ANT). Hence counter to then contemporary notions that we were becoming post-modern, Latour argued we have never been modern (1993); counter to ideas that global sea-faring navigation is about travelling great distances, Law argued it is about building durable locales (1986); counter to the idea that apparently brute objects such as water pumps are fixed entities which simply carry water, de Laet and Mol argued it is the pump itself that can be usefully conceptualised as fluid (2000); and counter to the notion that things like the city streets of Paris are external to the development of a new electric car, Callon (1989) suggested the streets needed to be built into the car.

These inversions are designed to open up otherwise taken for granted aspects of the relationship between humans and non-humans, actors and worlds. But what questions are opened up by our inversion? The paper will utilise three examples which have been discussed as examples of invasions of privacy: first, the case of an individual attempting suicide whose CCTV image was shown on national TV; second, UK government loss of individuals' banking details; and, third, the development of biometrics in airports. These three examples will draw on our STS inspired inversion to ask whether the implied direction (from outside to in), content and consequence of invasion, is appropriate. In place of these conventional concerns, the paper will argue for a focus on movements in the opposite direction (moves from inside to out), the mutability of content (shifting what the content of image demonstrates and its referentiality) and for a closer look at scale consequences (usage of footage which accomplishes grander audiences). The paper will suggest that these three areas are more appropriate matters of concern and should sit at the heart of surveillance-based legislation in the future.

## Atmospheres of Exception: Techno-securitisation, Safety and Fear in London Buses

Pavoni Andrea (Westminster University, UK)

This paper explores the interaction between law, space, technology and security in the contemporary city, mainly taking inspiration from Gabriel Tarde's theory of imitation, Giorgio Agamben's theory of exception and Peter Sloterdijk's theory of spheres. Juggling with the notions of affect, exception, sphere and foam, the paper firstly focuses on the role of technology and security in materialising spatio-legal orders into the multiple micro-spheres of exception in which contemporary cities are increasingly fragmented. Secondly, the attention is turned on one particular space, the public bus, whose techno-securitisation is investigated so as to formulate more general conclusion as regards the urban space in general.

Urban space is to be understood as traversed by flows of affects, ideas, opinions, emotions, moving increasingly quickly and uncontrollably due to technological dissemination. Among them are flows *fear* and *safety*, feelings which move unpredictably and erratically across media and space, escaping the institutional attempts to encapsulate them within an atmosphere of *safe* urban space from which *fear* would be warded off – i.e. within an urban-wide state of exception. Instead, we observe a fragmented production of micro-spaces (spheres) of exception, where a spatio-legal and atmospheric order is materialised according to techno-logics of security. From *defensible spaces* to *safescapes*, this process has been already observed, although often from unsophisticated understanding of space, either objective or subjective, either constructivist or deterministic. What often lacked was a sophisticated understanding of space, whereby observing the unstable and contradictory ways in which institutional materialisation of *spheres* of exception encounters the transitory agglomerations of affects, objects and individuals who happen to occupy and traverse these very spaces. This turbulent and unstable agglomeration of different human and nonhuman elements in contemporary urban space, this *assemblage* of multiple spheres, is well captured by Sloterdijk's notions of *foam* and *atmosphere*. Both point beyond the familiar space/place dichotomy, as well as the control/resistance dyad: co-constituted by multiple overlapping spheres, foams are moving, bubbling distributions, full of *frictions* and *cracks* which testify the impossibility of a tautological correspondence between order and space. In this sense, today's techno-securitisation of space is literally 'exceptional': by prioritising stability over flexibility, it 'freezes the foam', depriving it from movement and thus capacity to adapt to the unavoidable *frictions* characterising their everyday reality. The second part of the paper explores what this could mean in empirical terms, by focusing on the techno-securitisation of London's public buses. These transient spaces, places of friction *par excellence*, are foamy intersection between highly-structured and controlled institutional assemblages and the bubbling, temporary aggregation of travellers, objects, sounds, smells. Through empirical observation will be investigated whether 'freezing' dynamics of techno-securitisation, by decreasing the atmospheric flexibility of these spaces, could unleash unpredictable distributions of fear and safety, paradoxically increasing their atmospheric vulnerability. Eventually, this could suggest a critique of techno-securitisation alternative to the libertarian one, and perhaps more effective.



## **The role of resistance relations in the (re)emergence of pre-emptive surveillance**

*van Brakel Rosamunde (Centre for Criminological Research, University of Sheffield, UK)*

A general consensus is growing within criminology that there have been profound changes in the delivery, practice and orientation of criminal justice and security policy in Western societies (Feeley & Simon, 1992, Garland, 1996/2001; Ericson and Haggerty, 1997; Johnston and Shearing, 2003; Zedner, 2007; Crawford 2009). Zedner (2007) described these changes as a temporal shift from a post-crime to a pre-crime society, which is “characterised by calculation, risk and uncertainty, surveillance, precaution, prudentialism, moral hazard, prevention and which has the overarching goal of the pursuit of security.” As a result of this shift, earlier and earlier interventions are seen as necessary to reduce criminal opportunity and to increase surveillance before harm is done. ‘ShareCare for children’ is one of the results of this ‘pre-emptive turn.’ This is an integrated assessment and case management system of which the key focus is to facilitate the secure sharing of health, youth justice, social care and education systems data with the goal of targeting children and young people before they get into trouble.

By looking at such surveillance practices as assemblages, actors and resistance relations come to light that otherwise would have stayed in the dark. Both the surveillance studies literature and literature on the governance of security and risk fail to address the agency of technology in an analytically sensitive way. Latour (2000) argues that technologies may also resist their human adaptations and coding. Technologies “strike back” beyond the point of simple malfunction when database security mechanisms give inconsistent results, profiling systems crash, or databases produce false positives and false negatives. Through inadequacy, design flaws or inherent limitations, technologies can and do resist their intended applications. Moreover the traditional theories of surveillance tend to understand surveillance as an exclusive relationship between the surveillance authority and the subject of the surveillance. Hence, looking at surveillance in this way not only ignores some of the actors who govern and resist surveillance, but also excludes the assemblages that conduct the surveillance (Martin, van Brakel & Bernhard, 2009, 215).

The main purpose of this paper is to explore the surveillance dynamics and resistance relations within the governance of children's security in Britain, using the multi-disciplinary, multi-actor framework for understanding resistance to digital surveillance proposed by Martin, van Brakel & Bernhard (2009); and investigate the role that resistance relations have on the shaping and (re)emergence of surveillance practices. ShareCare will serve as an exemplary case study.



## **TRACK 34**

# **Surveillance in Society**

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## **Balancing protection and autonomy in the design of a intelligent environment to support nursing homes caregivers**

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When interviewed about the possible advantages coming from the exploitation of monitoring technologies, a manager of a nursing home explained us that the ideal nursing home is an open place where patients can freely but safely move and behave in the institute and where patients' privacy and dignity is guaranteed. This vision contrasted – in his view – with the actual organization of nursing homes where patients live in a sort of a “golden cage”: protected at the expenses of their autonomy.

The issue of balancing control, privacy and autonomy in designing a highly-developed smart environment to support medical staff within nursing homes lied at the core of the user-centered design process deployed within the ACube project. In recent years it has been observed that the increasing aging societies will face a rising number of people with cognitive disabilities. If technology will be a potential solution to overcome the lack of control and monitoring human resources, it has been also suggested that technology could provoke conflicting reactions especially to people with cognitive impairments.

ACube is a large research project founded by the local government of the Autonomous Province of Trento in Italy with the aim of designing a monitoring infrastructure to be deployed in nursing homes as a support to medical and assistance staff. The project implies a network of sensors distributed in the environment or embedded in users' clothes. This technology should allow monitoring the nursing homes guests unobtrusively, i.e. without influencing their usual daily life activities. Through advanced automatic reasoning algorithms, the data acquired through the sensors network will be used to promptly recognize emergency situations and to prevent possible dangers or threats for the guests themselves.

An User Centered Design (UCD) approach has been pursued within ACube<sup>19</sup> to envision scenarios where wireless sensor network technologies allow for cost containment, quality improvement of services in specialized centers for people with severe motor or cognitive impairments.

Contextual inquiries were performed in 3 different nursing homes and involved about 40 health professionals. Current practices of monitoring were investigated with nursing home staff to understand the organization of current human and technological (non human) monitoring, values related to the monitoring activities, problematic events and contexts that need to be controlled. Results of contextual inquiries can be organized around three main issues that should be balanced in the design of the ACube infrastructure: (a) the ethics, privacy and dignity issues, specifically sustained by patients' parents and the nursing home staff, (b) with the possibilities offered by the network sensors technologies, sustained by the ICT partners of the project, (c) and the sustainability of the renewed nursing staff working practices.

Starting from contextual inquiries five scenarios have been generated that embed the balancing of the three specific issues and try to ensure the more open life experience for monitored people while operating through pervasive technologies.

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<sup>19</sup> The research was funded by the Autonomous Province of Trento, Call for proposal Major Projects 2006 (project ACube).

## **Vernacular Resistance to Data Collection and Surveillance: A Political Theory Of Obfuscation**

*Brunton Finn (New York University, USA)*

*Nissenbaum Helen (New York University, USA)*

Computer-enabled data collection, aggregation, and mining dramatically change the nature of contemporary surveillance. Innocuous traces of everyday life, logged and submitted to the increasingly sophisticated analytic tools being developed for commerce and governance, can become the keys for stitching disparate databases together into unprecedented new wholes. Simply refusing to contribute to these profiles and collections is not a practical option, as data collection is an inherent condition of many essential societal transactions, from connecting with friends in online social networks to shopping and traveling to engaging with a variety of public and private institutions.

We present one vernacular response to this regime of everyday surveillance, a tactic we call obfuscation. With a variety of possible motivations, actors engage in obfuscation by producing misleading, false, or ambiguous data with the intention of confusing an adversary or simply adding to the time or cost of separating bad data from good.

Our paper develops a political theory of obfuscation. Linking contemporary and historical cases, we develop a descriptive account of obfuscation that is able to capture key commonalities in systems ranging from chaff, which fills radar's sweep with targets, any one of which could be a plane, to the circulating exchanges of supermarket loyalty cards to muddle the record of purchases, to BitTorrent systems protecting their users from legal action by producing records of many IP addresses, only a few of which may be guilty of file sharing. Through these and other cases we can begin to clarify obfuscation among the other forms of resistance to surveillance.

Obfuscation moves can be further distinguished by their -- if you will -- politics. In dialog with the work of Gary Marx and other surveillance theorists, we distinguish and evaluate different modes of obfuscation as well as motivations and power topologies of key actors. We examine whether obfuscation tactics are more typically the response of the weak against the strong, adopted by those outside of circles of power and influence, or vice versa. Our political theory of obfuscation also addresses normative questions of legitimacy, asking whether smokescreens to avoid monitoring are morally defensible. Under what conditions in the political landscape of surveillance are obfuscation's deceptive tactics acceptable? We discuss when they can be deemed legitimate assertions of autonomy, when they become problematic instances of economic free ridership (relying on others to be less conscientious in muddying their tracks and therefore better targets for data mining), when they are justifiable in resisting the obligation to acquiesce to monitoring, and when they are destructive acts, poisoning the wells of collective data.

Finally, this study of obfuscation, as a tactic both personal and political, offers a platform for studying legitimate and problematic aspects of surveillance and resistance to it in an age of ubiquitous data capture.

## **DNA – the Nor-way: black boxing the evidence and monopolizing the key**

*Dahl Johanne Yttri (NTNU and the Norwegian Police University)*

Forensic DNA databases may be seen as a new form of bio-surveillance. The Norwegian legislation on the use of forensic DNA was recently expanded considerably. While there was general political agreement that the DNA database should be expanded, related issues created some controversy. In this paper special attention is paid to the fact that there at the time was only one DNA laboratory with a monopoly on DNA analysis in Norway, because (i) the issue of monopoly was prominently debated in connection with the expansion of the DNA database, and (ii) the prominence of the issue was reinforced by respondents in the in-depth interviews of key stakeholders that I conducted on the use of DNA evidence in courts and the expansion of the database. Drawing on these interviews this paper debates a number of aspects regarding monopolising forensic DNA suppliers especially in relation to private versus government-owned DNA institutes. Several of the interviewed defence lawyers claimed that they felt they lacked knowledge, and partly due to this, DNA evidence seemed to appear in black boxes. Due to the monopoly situation there are no, what Latour would call, counter laboratories or dissidents that can enable the defence lawyers to open the black boxes.

**Public assessment of new security technologies: Beyond the trade-off between privacy and security**

*Degli Esposti Sara (Universidad Carlos III, Madrid, Spain)*

*Pavone Vincenzo (IPP-CSIC)*

Global threats like international terrorism and transnational organized crime constitute a serious challenge for domestic and foreign security. Although the effective response to these threats remains a contested issue, after 9/11 several western governments have chosen to invest in new technological devices to foster a proactive attitude against terror and crime. Although expected to enhance national security, these technologies are subjecting ordinary citizens to an increasing amount of permanent surveillance, often causing infringements of privacy and a restriction of civil rights. According to the traditional economic based approach, people are expected to trade part of their privacy in exchange for the benefits derived from the higher security promised by the security technologies (STs). Two critiques have been moved against this argument. First, this approach reduces people perception on a one-dimensional continuum where security and privacy are exchangeable commodities. Second, the focus on individual privacy obscures the technocratic and political implications of STs. Drawing from the data gathered through the PRISE project, this study contributes to the debate by analysing how the lay public assesses security technologies. Through a composite research design, focus groups are used to grasp people's ways of reasoning and their hidden motivations, whilst the existence of a trade-off between privacy and security is tested through analysis of correlations based on survey data. We come to two main conclusions. First, people do not assess STs in abstract terms but in relation to specific institutional and social contexts. Second, from this embedded view-point, some citizens express concern about government's real surveillance intentions and consider STs as essentially privacy infringing, while other citizens trust political institutions and endorse the adoption of STs to enhance their security. Neither group provides evidence of adopting a trade-off approach because concerned citizens see their privacy being infringed without having their security enhanced, whilst trusting citizens see their security being increased without having their privacy affected.

## **Toward horizontal control: User Generated Content and private sphere in the web 2.0 environments**

*Farinosi Manuela (Department of Economy, Society and Territory, University of Udine, Italy)*

The overall purpose of this contribution is to explore the meaning and significance of the terms control and privacy in the light of the intensive diffusion of user generated content (UGC) on the web. In recent years, the boundary between private life and public life has been blurred. The global diffusion of modern communication networks, the proliferation of human practices using these networks, the development of new digital media that support social relationships, the increasing use of new tools of self-publication on the Internet (such as Facebook<sup>20</sup>, YouTube<sup>21</sup>, Flickr<sup>22</sup>, Wordpress<sup>23</sup>) and the trend toward computerizing and networking everyday objects have exposed a great deal of personal information to intrusive eyes (Rodotà, 2004; Zwerger and Medosh, 2007; Livingstone, 2008; Thompson, 2008; Paissan, 2009). Thanks to the Web 2.0, everyday a large number of people all over the world use digital media to create online profiles, share personal details with a vast network of friends and, often, with an unspecified number of strangers thereby producing digital information that remains on the web for a long time. Therefore an enormous amount of personal data is exposed to a mass audience. In the context of an online environment, the new Internet applications challenge the traditional ideas of surveillance (Albrechtslund, 2008) and the new control practices cannot be adequately described within the classical framework of vertical control. In the Web 2.0 environment the traditional panoptic principle of observation has to a certain extent been transformed and the Panopticon itself has come to have a broader meaning (Cascio, 2005; Albrechtslund, 2008). In the modern world, everyone online can be at the same moment observer and observed. The central tower is changing its meaning, but, as in Bentham's building, the observer is invisible to the observed. Social network sites (SNS) seems to introduce a horizontal control as well, which can change the informational dynamics of the space and contribute to privacy violations (Peterson, 2009). The potential and underrated implication of these new forms of exposure is the development of what has been defined as "peer-to-peer privacy violation" (Grimmelmann, 2008) or "participatory surveillance" (Albrechtslund, 2008). Users can now monitor each other, invisibly and in real time.

My empirical analysis is based on 145 essays written by students from the University of Udine (aged between 19 and 27) and 47 essays written by high school students (14 to 16 years) from the Istituto Superiore Macchiavelli of Rome. The data from the essays were content-analysed. The themes that emerged were ranked according to their frequency and were then categorized and analysed from a qualitative point of view to understand how young people frame the topic of control on the Web 2.0: especially the main categories of discourse that young people employ when speaking about this topic, the most interesting metaphors used to describe new online public spaces, the most important social

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<sup>20</sup> <http://www.facebook.com>

<sup>21</sup> <http://www.youtube.com>

<sup>22</sup> <http://www.flickr.com/>

<sup>23</sup> <http://wordpress.com/>

environments involved in the diffusion of personal content online and the possible impacts of this phenomenon on offline life.

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## **Critique of the Political Economy of Web 2.0 Surveillance**

*Fuchs Christian (University of Salzburg, Austria)*

The basic research question of this contribution is: How does the political economy of web 2.0 work and what is the role of surveillance? For answering this question, further questions are asked: What is the role of surveillance in critical political economy studies? What is the role of surveillance in the political economy of capitalism? How does capital accumulation work on web 2.0 platforms? What is the role of surveillance in web 2.0 capital accumulation? For answering these questions, first the role of surveillance in the classical critical political economy studies is discussed. Then, a model that conceptualizes the cycle of capital accumulation and distinguishes between production and circulation of capital is introduced. Next, the multiple roles of surveillance in capital accumulation are discussed and the connection of privacy, surveillance, and capitalism is outlined. Turning to the relationship of the Internet and economic surveillance, an overview of existing works is given. The relationship of capital accumulation, web 2.0, and surveillance is discussed, the role of the users in this process is empirically studied, and finally some conclusions that centre on the notion of resistance are drawn.

The method employed in this paper is a combination of social theory and empirical research. For conceptualizing the role of surveillance in capitalism and on web 2.0, critical political economy is used as method for theory-construction. Data collection about Internet usage and statistical analysis are used for analyzing the political economy of web 2.0. For analyzing user perspectives, the results of a quantitative and qualitative online survey are reported.

In classical critical political economy, there is a focus on surveillance conducted by two actors: capital and the nation state. In the cycle of capital accumulation, the economy is conceived as a dynamic system that is based on labour power, constant capital, surplus value production, commodity production and circulation, and profit realization by consumption. Six forms of economic surveillance in capitalism can be distinguished: applicant surveillance, workplace surveillance, workforce surveillance, property surveillance, consumer surveillance, and surveillance of competition.

Web 2.0 is a relatively novel topic in the discussions about Internet surveillance. Political economy approaches that give a detailed analysis of capital accumulation on web 2.0 and show the underlying strategies, mechanisms, and interests as well as the role of surveillance are largely missing in these debates. For analyzing the political economy of surveillance on web 2.0 the notion of the Internet produsage commodity is introduced and the role of targeted advertising is discussed. The results of a survey show that users see a contradiction of surveillance and communication/community at the heart of perceived disadvantages and advantages of web 2.0. As policy conclusion, the perspectives of corporate watch platforms, online protests, opt out solutions, and non-commercial web platforms are discussed.

## Resistance is fertile – on art and oligoptics

*Gad Christopher (University of Copenhagen, Denmark)*

*Koefoed Hansen Lone (Aarhus University, Denmark)*

Surveillance of Danish citizens starts right after birth, when they are registered with a personal identification number. This makes it possible for the state and other actors to inspect and intervene at different points in their lives. It could even be argued that surveillance starts much earlier in western countries as the wellbeing of unborn citizens is continuously monitored by the health care system. Furthermore, the phenomenon of surveillance can be located in very diverse areas such as video surveillance in housing associations, speed cameras on roads, and registration of consumption patterns in supermarkets. Furthermore, more and more people participate in a kind of voluntary surveillance of themselves and others in social networks like Facebook.

In many respects, it seems fair to suggest that surveillance is a pervasive phenomenon of modern society. At first glance, the media artist Jill Magids' performative artefact "Surveillance Shoe | Legoland" (2000-7) exemplifies a performance of an ever-present and penetrating surveillance situation. The artefact is a stiletto that has been equipped with video surveillance technology. The video camera is pointed at the leg of the performing artist. We get an extreme worm's eye view of the world, focusing constantly on the lower leg – and often on the thigh and crutch of the artist.

In a way, Jill Magids' "Surveillance Shoe" points out how anything can become the subject of a surveillance gaze. Yet, in another way the artefact exemplifies how contemporary art investigates the limits and detailed aspects of surveillance situations.

In this presentation we will discuss Magid's shoe and the way in which the artefact problematizes the effects and consequences of surveillance. Like Bruno Latour's concept of the 'oligoptic', the artefact points out that the surveilor holds a very precise, yet limited and fragile, view. The artefact is a statement about the specific and limited nature of a surveillance phenomenon and also about the possibility of resistance. Accordingly, we use Magid's shoe to discuss how we can conceptualize surveillance as particular, multiple, and situated phenomena.

## **Everybody Else Es Doing It, So Why Can't We? Understanding video-surveillance beyond conspiracy theory**

*Galdon Clavell Gemma (Institut de Govern i Polítiques Públiques, Universitat Autònoma de Barcelona, Spain)*

With the advent of mass camera surveillance in cities throughout Europe and the US, many claim that we now live in a “surveillance society” (Lyon 2001) where surveillance technology is not so much a security device but a symbol of political and economic power (Coleman, 2004). Others have drawn parallels between our CCTV'd cities and Bentham's Panopticon as understood in Foucault's thought (Fyfe and Bannister, 1996).

However, for all the talk about Power, very little has been said about how surveillance policies have come about, how the different political, economic and sociocultural landscapes at the local level have shaped and understood the demand or the need for surveillance, or how globalization may have impacted on the political processes at the local level by creating a There Is No Alternative rationale that may have worked against any potential resistance.

However, any understanding of surveillance intending to go beyond a conspiracy theory or portraying a non-caricaturized picture of Power in our societies must address the motives and expectations of those who hold that Power. If our cities are not Panopticons where the few try to “induce” in the many a “state of conscious and permanent visibility” so that the surveilled “becomes the principle of his own subjection” (Foucault, 1991: 201 and 1977:202), how can we understand the growing tendency to develop and implement surveillance mechanisms?

By looking at the evolution of the legal framework, the articulation of the demands for CCTV, the expectations of politicians and policy-makers and the reasons given to approve or reject petitions to install surveillance cameras in public space in Barcelona's Metropolitan Area (Spain), I intend precisely to look at an often overlooked side of surveillance which, when observed from up-close, provides a much more complex picture than the one we usually come across, one where local processes interact with global trends and the inherent complexities of public policy implementation and the political process play a big (and unglamorous) role.

Understanding this complexities, however, might put us in a better position to come up with new paradigms that explain how social control is articulated in our globalized, public-private environments.

### **METHODOLOGY**

My research includes semi-structured interviews with key actors (politicians and policy-makers), a review of the legal framework and the reports made by the Catalan Commission on Videosurveillance of the Catalan Supreme Court, a review of the petitions submitted to the Ministry of the Interior and the evaluation by the Commission in the last 10 years, a follow-up of the media input and impact on issues related to surveillance in public space, as well as a review of global trends.

**The Other Side of the Surveillance Society: Media Competition and the Quest for Increasing Liveness as Key Dynamics behind the 'Culture of Control'**

*Krause Michael (Potsdam University, Germany)*

At first sight, it seems somewhat paradoxical that the rise of the surveillance society has come in an age of new political, economical and social liberalism. Yet, there are many ways, in which liberalist *gouvernementalities* have contributed to the rise of the dominant surveillance culture(s). Although hardly noticed within surveillance studies, the deregulation of TV and radio broadcasting has played a major role in this process, because it has increased the competition between all mass media profoundly. The dynamics of increased media competition have, since then, been crucial for the emergence of a dominant public crime and security discourse that is characterized by a "Criminology of the Other" (Garland). Furthermore, this dynamic holds a special, mutually amplifying relation with the increased *visuality* of the mass media. This visual turn, which is characterized especially by the production of ever greater levels of liveness and *evidentiality* through moving images, has become possible through the technological changes within video and photo technology. For the massive migration and prominent visibility of CCTV-footage of real crimes in British Television and the press since the early 1990s, these two socio-cultural dynamics were, and continue to be, crucial.

## **Biology and Citizenship: DNA testing for family reunification as a technology of surveillance**

*Lemke Thomas (Goethe-Universität, Frankfurt am Main, Germany)*

*Heinemann Torsten (Goethe-Universität, Frankfurt am Main, Germany)*

Since the 1990s, many countries around the world have begun to use DNA testing to establish biological relatedness in family reunification cases. Family reunification refers to the right of family members living abroad to join relatives who hold long-term residence permits in a given country. While this right has been an integral part of many countries' immigration policies, the current trend among host countries seems to favour more restrictive family reunification policies. Even if applicants possess the required documents (birth and marriage certificates, passports etc.), immigration authorities often reject the information as they question the authenticity of the documents. In this context, many countries resort to DNA analysis to resolve cases in which they consider the information presented on family relations to be incomplete or unsatisfactory. Today, thirteen European nations have incorporated the use of DNA testing into decision-making on immigration: Germany, France, Austria, Belgium, Denmark, Finland, Italy, Lithuania, Norway, the Netherlands, the UK, Switzerland and Sweden.

Using Germany as exemplary case study, we will argue that DNA testing for family reunification represents a new technology of surveillance in the process of immigration which raises serious legal, social, ethical, and technical questions. We will focus on concerns with regards to the principles of privacy, informed consent, and the right not to know. We will show that the applicant's right to the protection of privacy and the family is not respected by the German authorities. The German Act of Genetic Diagnostics implements a dual standard by refusing immigrants the right to informational self-determination that is granted to German citizens. Concerning the use of DNA analysis in the context of family reunification important legal guarantees are inoperative. For example, immigrants cannot demand that their genetic data will be erased once the test is completed, and their data may be used for criminal prosecution purposes. Finally, we will argue that the use of DNA analysis in immigration decisions opens up a new dimension in the discussion of biological citizenship that so far mostly referred to the importance of patients' associations, disease advocacy organisations and self-help groups that are giving rise to new forms of subjectivation and collective action.

## **More or less visible: Body surveillance in aging home care**

*Lutz Peter (IT University of Copenhagen, Denmark)*

This paper considers healthcare technology employed in aging home care and the implications for an increased understanding of body surveillance. It is based on ethnographic fieldwork in the United States and Sweden among older people who receive home care. The technology in question is an emergency response system. The system's intended purpose is to enable a more effective emergency response and in turn reduce the potential consequences of hazardous situations like falling. It consists of a wireless button worn on the body, either as a pendent or wristband. This bodywear is combined with a home radio intercom linked to an emergency call centre via the telephone connection. If the button-wearer senses danger they may push it to initiate a call to the call centre. The call centre will then notify the appropriate emergency services. Identical systems are currently employed in the US and Sweden (as well as many other Western countries). Since the technologies are identical – wearable buttons, intercoms and call centres - one might assume that their performances are as well. However very contradictory situations were observed and here a continuum between 'visible' and 'invisible' body surveillance practices is proposed. For instance several older people in the US study reported that they sometimes purposely disused the system in fall incidents and hence rendered their accidents less visible. They explained that they were unwilling to burden their families or friends with their own troubles. A significant point here is that the US system is often packaged as a paid subscription service. The subscriber's closest family and friends are entered into their user profile and then routinely contacted should an emergency occur. Meanwhile in Sweden the system is often enrolled as a component of the public healthcare and welfare services. In this case older people tended to view the system as within their citizen's or taxpayer's rights. Moreover their personal relations were not consulted in the case of an emergency unless otherwise specified or if it appeared life-threatening. Hence many of the older Swedish participants did not hesitate to activate emergency calls and in turn rendered their body surveillance more visible. Accordingly this paper suggests that the performance of body surveillance technologies depends directly on how they are enmeshed with social relations, especially in the case of aging home care. Subsequently it argues that identical technological systems (in terms of their material configuration) used in surveillance potentially reveal the body very differently; from more, or less, visible.

## **Encrypted fragments: Rethinking privacy and security with(in) peer-to-peer**

*Musiani Francesca (CSI, Mines ParisTech, France)*

Peer-to-peer (P2P) is a computer network model structured so that communications and/or exchanges take place between nodes having the same responsibility in the system. During its relatively brief history, P2P technology has often been framed, both in public and academic debates, as a threat to the content industry – its main usage by the public being the sharing of copyright-protected materials. However, in recent times, a number of research projects and applications have developed which label themselves as “legal/alternative” P2P, and propose decentralised alternatives to services and instruments such as search engines, social networks, data storage facilities; likewise, recent scholarly works argue that the socio-technical significance and potential for change of P2P technology is likely to be found in its capacity to promote increased effectiveness, freedom and stability in online content distribution and circulation processes (Elkin-Koren 2006; Hales 2006). Drawing on this approach, I suggest that for a better understanding of the social and legal implications of P2P systems, it is useful to focus on the elements and technical choices underlying their architecture – what they allow to do, what they can change, and how their appropriation by actors developing, using, regulating them construct and change them in return.

This paper addresses how privacy and security evolve within these P2P applications, and how this affects data protection, retention, exploitation – ultimately, the availability and “surveillability” of private data in Internet-based services. I rely on two case studies: Wuala, a P2P data storage company, and Tribler, a P2P social community. The analysis relies on licenses to users, release notes, forums for user support, and interviews with developers and users to shed light on the ways in which a definition of security and privacy is elaborated in words and practices with(in) such contexts.

The conclusions of the paper are twofold. Firstly, I discuss how debates and pioneer practices in and around alternative P2P tools construct a multi-faceted definition of security and privacy: one that speaks of encryption keys, file fragments, trading of storage space, secret links – and allows to enlarge the P2P debate from the damaging consequences of illegal file-sharing to the creation of “private and secure” possibilities for data storage and distribution over the Internet. Secondly, I outline the possible implications of introducing such elements in the debate for the design of present and future Internet-based services – and argue that P2P-fostered changes currently underway may be read as a re-empowerment of end users as not only producers, but managers and hosts of their own content.

## **Digitizing NREGA<sup>24</sup>: Small and Medium Private Enterprise as Mediators for Democracy?**

*Nair Sumitra (Science and Technology in Society, Virginia Polytechnic Institute, and State University, USA)*

*Pant Aditya (Massachusetts Institute of Technology, USA)*

This study examines the socio-technical context of the digitization of record-keeping and remuneration for tasks allocated under the India's National Rural Employment Guarantee Act (NREGA, 2005). A job-guarantee legislation, the NREGA is India's most ambitious anti-poverty drive, with the government having spent approximately 8 billion dollars and generated work worth approximately 20,000 billion person-days in 2008-09 alone.<sup>25</sup> However, India's biggest development challenge remains systemic corruption. Pre-empting this, the Act devises digitization of delivery processes by private entrepreneurs as a means to ensure transparency and accountability. We suggest that this private software solutions entrepreneur, often a small and medium engineering enterprise (SME), is a unique site for innovating and operationalizing enumeration, bringing together diverse socio-technical networks and value systems. Its solution must integrate with a larger national system of record-entry and the forthcoming Unique Identification (UID) systems, and collate and translate biometric measures into entitlement measures. It collaborates with large competing global service providers to fulfil complex business and technical processing. Simultaneously, it must be accessible to the bottom-of-the-pyramid "citizen-consumer" as a window for state accountability. Thus, the SME's solution must encapsulate multiple value systems of surveillance, transparency, control, profit and local and global competition. This study examines one such SME's design solution and roll-out process to understand the entry of predominantly private entities into the surveillance-transparency discourse, how they negotiate and mediate these diverse and even divergent pressures, and builds these into their solution.

Using qualitative ethnographic methods of observation and interviews of NREGA beneficiaries, computerization professionals of the SME and its service providers, state officials, and civil society leaders, the study reveals the construction and maintenance of a discursive space for private small scale engineering enterprises as mediators between state and citizen, and the opportunities and challenges of this process. The success or failure of the recordkeeping-process to accurately capture the Act's transactions and ensure democracy must be read within the design process, the values built into the monitoring instruments, and finally in the context of actual design and implementation.

Informed by Social Construction of Technology (SCOT) and the discursive approaches of Maarten Hajer and David Lyon, this work examines the entailments of such hybridization of agencies in enumeration. It explores the normative visions that construct these agencies, and their role in the project of democracy in the new "network society" built on to a

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<sup>24</sup> The act aims "to provide for enhancement of livelihood and security of the households in the rural areas of the country by providing at least one hundred days of guaranteed wage employment in every financial year to every household whose adult members volunteer to do unskilled manual work." Ministry of Rural Development, "National Rural Employment Guarantee Act – 2005," Ministry of Rural Development, <http://nrega.nic.in/>.

<sup>25</sup> Department of Rural Development, "N.R.E.G.A. Implementation Status Report for the Financial Year 2008-09," Department of Rural Development, [http://nrega.nic.in/writereaddata/mpr\\_out/nregampr\\_0809.html](http://nrega.nic.in/writereaddata/mpr_out/nregampr_0809.html).



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“developing economy”. This study locates itself at the intersections of science and technology studies, policy studies and Information and Communication Technology for Development (ICT4D) literature. Within the larger socio-technical discourse, the study calls for a closer examination of politics of the policy - design interaction as embodied in design processes, objects and actors. Thus, artefacts like scanned thumbprints and electronic musters become meaningful objects only through acts of configuration, mediation, and active interpretation by social actors that include beneficiaries, state agents, and designers. Equally critically, these acts shape and challenge these actors’ self-identities. The study uncovers these meaning-making processes.

## A Critical Empirical Case Study of Consumer Surveillance on Web 2.0

*Sandoval Marisol (University of Salzburg, Austria)*

### PURPOSE AND BACKGROUND

In recent years there has been much debate about the participatory potentials of web 2.0. Critical scholars have pointed out that besides of its enabling effects, web 2.0 is not at least about new business models, in which user-generated content is exploited for the purpose of capital accumulation.

In avoiding technological determinism a critical examination of web 2.0 should not only look at technological potentials, but also consider the societal context in which web 2.0 technologies are developed and employed. Today this means looking how capitalism shapes web 2.0 and probably undermines its enabling potentials.

This paper aims at contributing to this task. I pose the question how surveillance is employed as a means for enhancing capital accumulation on web 2.0.

Web 2.0 is suitable for economic surveillance, more precisely for consumer surveillance, in two respects: first the content of web 2.0 platforms is almost entirely produced by users, who provide information about themselves. Thus web 2.0 constitutes an enormous data source for advertisers who are interested in the behaviour and attitudes of customers. Second as it is based on Internet technologies, web 2.0 entails a variety of technical possibilities for tracking the behaviour of consumers, gathering information about them, and sorting them into consumer groups.

### APPROACH AND METHODOLOGY

In this paper I employ a critical political economy perspective to the study of economic surveillance on web 2.0. I argue for an understanding of surveillance as necessarily dominative practice that serves the interests of capital and/or the state. Consequently economic surveillance is defined as surveillance for the purpose of capital accumulation.

Based on this theoretical perspective I conduct a content analysis of the terms of use and privacy statements of the 52 most popular web 2.0 platforms (according to the Alexa top Internet sites ranking). I combine quantitative and qualitative measures in order to find out

- which rights regarding data usage are granted to platform owners, and
- in how far these rights allow platform owners to exploit user data for the purpose of capital accumulation.

### FINDINGS

One interesting finding of my study is that 92,2 % of commercial web 2.0 platforms deliver personalized advertisements to their users. Furthermore 67% of all commercial web 2.0 platforms use the contact information of users for sending them personalized advertisements. 90% of all commercial platforms sell aggregated user data and 41,2% are even allowed to sell personally-identifying information to third parties.

Furthermore my findings illustrate that web 2.0 is mainly the domain of corporations. Corporations own 51 of the 52 most popular web 2.0 platforms.

These and other findings of my study confirm the hypothesis that commercial web 2.0 platforms employ surveillance as a means for capital accumulation. Particularly striking is that non-commercial alternatives to these platforms are almost not existent and/or very unpopular.

Corporations dominate contemporary web 2.0 and their interest in capital accumulation places users under constant economic surveillance.

## The art of rent in Web 2.0 surveillance business

*Schafranek Matthias (UTI research group, ICT&S Center, University of Salzburg, Austria)*

The presentation will focus on the role of surveillance in the Web 2.0 business field from perspective of a critical political economy. Such a viewpoint demands the embedding of the topic in the context of the current mode of capitalist accumulation. First of all, this means to address the present social relations of production of capitalist society as a consequence of the crisis of Fordism and the successive rise of global networks of computer mediated communication. In this regard, I will bear on one prominent strand of current neo-Marxist thinking, namely post-Operaism and its focus on the transformation of labour and the reconceptualization of the class concept (Negri 1989; Dyer Witheford 1994; Lazzarato 1996; Hardt & Negri 2000 and 2004; Virno 2001). The reference to this discussion is of importance for especially two reasons. First, the post-Operaist examination of the transformation of labour to its cooperative and communicative forms (discussed as “immaterial labour” or the “social factory” based on Marx’s notion of the “General Intellect”) has played a central role in critical Web research at least since the late 1990ies (Dyer-Witheford 1999; Terranova 2000 and 2004). Second, with respect to the genealogy of the immaterial labour concept the intermixing of Foucault and Marx has attracted particular attention. Essentially, the reference to Foucault’s “dispositifs of power” for describing the new affective forms of labour in Web 2.0 spaces (Coté & Pybus 2007) has immediately linked the discussion to the surveillance topic too. The first part of my presentation will provide a state of the art of this critical political economy of surveillance in terms of the Web 2.0 issue. In the second part of the talk I will present own ideas related to this project. Based on my PhD research, the focus will be laid on the current state of the “republic of property” (Hardt & Negri 2009) and its particular shape in Web 2.0 business. I will describe the shift from the traditional capitalist logic of rent extraction in the information realm, the ailing copyright regime, to a new monopoly rent construction that builds upon a real-time tracking of online networked users in an increasingly hybrid space of virtual and real life interaction. The commercial appropriation of and proprietary control over such high-dynamic databases of intention and social expression are used to extract a rent from third parties, who value this new (artificially) scarce resource for their profit-based aims; at present typically for advertisement, but there is much more to come in future. I will refer to this new capitalist property logic as “biopower rent”. A first discussion of this idea should reveal both its foundation in a biopower type of surveillance and, correspondingly, its comprehensive scope.

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## **From the Beginning: Children as Subjects and Agents of Surveillance**

*Steeves Valerie (University of Ottawa, USA)*

*Marx Gary T. (MIT, USA)*

This paper examines the claims made by surveillance entrepreneurs selling surveillance to parents and government agencies responsible for children. Technologies examined include pre-natal testing, baby monitors and nanny cams, RFID-enabled clothing, GPS tracking devices, cell phones, home drug and semen tests, and surveillance toys, and span the years from pre-conception through to the late teens. For example, computerized dating services use software solutions that ensure that long term relationships are no longer left to accidents of contiguity, or the attractions of risk taking. Instead, genetic dating services analyse buccal swabs to identify matches based on genetic compatibility and, to “promote honesty”, many online dating services verify the age, marital status and bankruptcy history of all its members and ban identified felons. Monitoring for targeted diseases continues after the child is born, as many governments move to creating DNA databases of all newborns. Once in the home, baby monitors, RFID-enabled pyjamas and GPS locators embedded in a child’s knapsack, clothing or cell phone create an electronic fence around the child designed to protect the child from dangerous strangers. Monitoring becomes more extensive as children move into the online world and learn to drive. Crime control software is brought into the home market to determine whether a child is taking illegal drugs or sexually active. Online monitoring seeks to both protect the child from dangers and control the child’s behaviour.

We argue that governments, both in the context of health care and education, use surveillance to identify and “manage” genetic or behavioural deviations from the norm. Parents, on the other hand, are encouraged to buy surveillance technologies to keep the child “safe”. Although there is a secondary emphasis on parental convenience and freedom, surveillance is predominately offered as a necessary tool of responsible and loving parenting. Entrepreneurs also claim that parents cannot trust their children to behave in pro-social ways, and must resort to spying to overcome children’s tendency to lie and hide their bad behaviour. We conclude by offering some ideas to rein in the variety and complexity of the issues raised and to help order controversies in this domain.

## Performing surveillance in Danish health care

*Tietze Jørgen (Dept. of Information and Media Studies, Aarhus University, Denmark)*

In Denmark it is obligatory for clinics treating patients with schizophrenia, to participate in national performance measurement. The infrastructure for performance measurement of 6 different diseases begun development on a national scale from late 1999. Data about the quality of treatment has been collected since 2003 and the first reports appeared the following year. Having been in service for some years now, how does performance measurement work and measure up in the places where data are collected, presented and acted upon?

Surveying the performance of treatment in healthcare on a national basis involves an ensemble of technologies, people and work. Thus it requires significant work not only to configure, but also to continually orchestrate and maintain surveillance that can act as basis for quality improvement.

From an empirical qualitative study with a post-actor-network approach this paper investigates the workings and impacts of performance measurement at places where people are working, data are being processed, and indicators work.

The purpose of this paper is to bring together central resources in Science and Technology Studies especially ANT and the concept of oligopticon, with the debate about performance measurement. The empirical study provides a concrete illustration of how surveillance of work is performed, maintained and used through performance measurement.



## **TRACK 35**

# **Energy Use in Everyday Life. Combining Sustainable Technology and Practices**

### **Convenors:**

**Kajsa Ellegård (Linköping University, Sweden)**

**Jenny Palm (Linköping University, Sweden)**

**Helen Gansmo (Norwegian University of Science and Technology)**

## **Climate, Costs and Consciousness**

*Aune Margrethe (Department of interdisciplinary studies of culture, Centre for technology and society, Norwegian University of Science and Technology)*

*Godbolt Åsne (Department of interdisciplinary studies of culture, Centre for technology and society, Norwegian University of Science and Technology)*

The liberalization of the energy market in the early 1990s changed energy supply and the role of the user. From being a good that was delivered to a reasonable and stable price, energy became a market object and users became consumers in a market. Consequently users were expected to develop an interest for energy efficiency and saving because it gave economic benefits. During the first decade of 2000, climate issues have also entered this field of consumption. Thus today, the framing of the energy market internalizes morally correctness as well as economic rationality. Consumers are supposed to save energy through being rational as well as moral actors.

Why is it still difficult then to achieve a permanent reduction of private energy consumption? In this paper we shall discuss this challenge through an analysis of three case studies of Norwegian consumers during a period of 14 years. We focus on how users frame energy consumption and climate issues in three periods; 1995; 2006; and 2009 (Callon 1998). Our main questions concern if and how mechanisms of the energy market and questions about global warming influence the organization of everyday life in these periods. The analysis will demonstrate that the level of consciousness regarding climate changes and personal responsibility has risen from 2006 till 2009. However, regarding how everyday life is performed, only small changes are observed. Moreover, the mechanisms of the deregulated energy market are not fully understood in any of the three periods.



**Here are tools. Now go and build an energy-efficient house! Or: Why tools work better when their use is learned in interaction**

*Backhaus Julia (Energy research Centre of the Netherlands)*

*Breukers Sylvia (Energy research Centre of the Netherlands)*

*Mourik Ruth (Energy research Centre of the Netherlands)*

*Kamenders Agris (Ekodoma Ltd)*

Efforts to reduce energy consumption of private households face a multitude of challenges. Intermediary organisations specialised in the implementation of energy demand-side management (DSM) programmes frequently fall short of achieving far-reaching or long-lasting behavioural changes in their target groups. The European research project CHANGING BEHAVIOUR is developing an online 'toolkit' containing theoretical background information and practical activities aiming to improve the success of DSM programmes. This work is carried out in an action research approach, conducted by a group of scientific researchers and a group of intermediaries, i.e. DSM programme managers. Therefore, theoretical analyses have a focus on implementation practices and the 'tools' developed are practically tested in six pilot projects.

This paper addresses the learning process involved in one of these pilots - the renovation of large multi-apartment building blocks in Latvia. This pilot project aims to increase the number of residents in support of increasing the energy efficiency of their building. The role of the intermediary in this case is that of an energy advisor that provides clear, transparent and relevant information to residents and that supports their decision-making process. During the pilot researchers facilitate the testing of the 'toolkit' by the intermediary. This is a highly interactive process which has been well-documented throughout the period. Analysing this rich documentation allows us to qualify the learning process resulting from using the 'toolkit' and being supported by the researchers. Thereby, this paper discusses the question in how far the researcher-intermediary interaction forms an important aspect in the effectiveness of the 'tools'.

In order to answer this question the rich material sources collected from the onset of the pilot are analysed with respect to the additional benefit of personal interaction during application of these 'tools'. Of particular interest concerning effectiveness is the occurrence of reflexive learning on the part of the intermediary organisation concerning its role 'in-between' the target group and other stakeholders in the process of project implementation. As learning is situated in the particular context of this project this paper will address the challenge of accrediting found effects to the 'tools' alone, researcher-implementer interaction or other contextual events, such as involvement in the larger framework of the CHANGING BEHAVIOUR research and in the implementation of other (possibly previous) DSM programmes. This provokes a discussion of the conceptualisation and measuring of situated learning. At the same time the more practical question concerning the autonomous effectiveness of online 'tools' for DSM programmes is answered by a substantiated call for process facilitators supporting reflexive learning in DSM programme implementers.

## **Long-term energy use in Sweden, actual and counterfactual**

*Bladh Mats (Department of Thematic Studies—Technology and social change  
Linköping University, Sweden)*

Why has energy consumption stagnated since the 1970s in Sweden, and why has electricity consumption stagnated since the mid 1980s? This paper analyzes the details of stagnations and discusses how they can be explained.

Energy saving through energy efficiency measures has been proposed as one important way forward in the climate change mitigation debate. Green pessimists point at the limited character of energy efficiency measures as growing consumption is not taken into account. Other pessimists say that rebound effects will counteract and even undo savings from energy efficiency improvements. However, long-term energy consumption (and electricity consumption) has levelled off in Sweden. Minor increases can still be seen, but the overall picture is, in fact, no ground for pessimism. An analysis of how stagnating consumption came about is important knowledge.

The big picture will be broken down in the main areas of consumption: where were the biggest changes made and when? The descriptive part will focus on residential and everyday energy use: heating, car fuel and electric home appliances. How important were the growth of district heating and electric heating for the reduction in energy use in the housing sector? However, it is debatable whether electric heating is an environmentally sound form. Energy for car use has been quite constant. Car use has resisted price shocks and has not really been diverted from the fossil fuel path. The rebound effect is most relevant here. Home appliances show a mixed picture where technologies for old functions show efficiency gains while the number of new technologies seem to increase indefinitely.

However, the danger in explaining the empirical development is that alternative development paths are excluded from the possibility set—the actual outcome cannot be assumed to be the only possible one. Therefore will path dependence in certain areas of consumption be discussed, and estimates of counterfactual development presented, such as phase-out of electric heating and phase-in of electric cars. A more general change of lifestyle would be a reduction in working-hours, operationalized as a non-growth in real income. It is hard to calculate this as it causes responses and reactions in all parts of society, but a quantitatively informed discussion is at least a start.

The concluding part discusses interpretations and how this knowledge can be turned into useful recommendations for other countries and for the future.

**The disconnect between *mobility-as-plan* and *mobility-as-practice*. A Case study about urban parking policies in Lyon**

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This abstract aims at presenting a research work focused on the rationalities of *resilient* car-driver's social mobility practices in the metropolitan space, compared to the rationale of urban mobility masterplans in order to underline the disconnect between the design of mobility systems and their actual use in the context of targeted modal shift. "*Resilient*" refers to the ecological concept and is applied to social practices of mobility that remain stable in spite of urban environment changes (parking policies, public transportation alternatives, development of intermodal solution). We consider here the urban environments (in the plural form as many of them are different) as the subject of urban planners and designers (broadly referred to as architects, urban planners, elected officials together with engineers) [Toussaint, 2004]. In the new paradigm of the so-called sustainable city, these planners and designers now target a modification of social behaviour, which is particularly obvious in the urban mobility field. Among other minor targets (such as lowering car-mobility or isolated attempts of car-free neighbourhoods, which are far from sustainable planning practices) the issue of modal shift seems to gather consensus in the planning community in a majority of European metropolitan contexts. Having said this, the majority of French metropolitan cases show no decline in the modal-share in favour of private cars but only stagnation in some of the most volunteer cities. This situation leads us to our first hypothesis assuming that mobility-as-planned is developed in a different rational context than does mobility-as-practices'. To establish this hypothesis we refer to several recent works from the French-speaking urban planning research community<sup>26</sup> [Kaufmann, 2002]. This approach of identifying the disconnect between rationalities in planning and rationalities in social practices in the urban mobility context is aimed to extend to the complex perception of urban environments by car-drivers, to identify the target of modal-split policies. This perception will deal with several issues in the urban fabrication (time, space, distances, social context, prices, and constraints for parking).

The second main issue of this conceptual framework deals with rationalities of user's mobility practices. The axiological rationality [Boudon, 1995] seems to be heuristic to question values and practices, searching for the rationale behind the conclusions that users draw when making mobility decisions (for example, "the car is faster"). This justification process needs to be finely analysed in combination with several concepts, norms and values that "make sense" for the

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<sup>1</sup> Vincent Kaufmann particularly focused on an interesting urban mobility key-issue concerning the misunderstanding of the low rate of modal-split from car to public transportation following the development of new heavy infrastructures of mobility (such as metro, tramways and BRTs). Focusing on the question of the relative perception of time in different transport modes, he showed that the people he ask to estimate their daily travel to work generally whether underestimated this time for car-drivers or over-estimated it for public transportation users. He assumed that the modal choice is mainly a matter of *duration* (time-as-perceived by individuals) and less a question of *time* (as calculated, and used in the mobility planning studies of urban impact of projects).

individual. We propose the hypothesis that the combination of perception biases and axiological rationalities could help to explain behaviours defined as “irrational” for urban mobility planners.

## METHODOLOGY AND RESULTS

Assuming that the best experts in usage are the users themselves, we developed a user-oriented methodology for the first and most important field-work survey of my PhD. This survey will be organized in three phases and will follow the key-issues and concerns of 50 individuals with car exclusive modal practices throughout metropolitan Lyon:

- “*In action*” survey giving hand held recorders to private-car drivers to describe their urban environments and their choices during their mobility practices;
- After the synthesis and analyse of practices, half-guiding clarifying interviews with drivers
- Comparison to “real” environments (price, distances, time...) and their planning rationale.

This survey will start next week making allowing for the presentation of first results during the conference. The objective is to focus this presentation on the role of “*parking*” and “*sustainability*” in the axiological register of justification by resilient drivers.

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**Poverty and its impact on everyday life routines of energy consumption. A case study of vulnerable households in Vienna, Austria**

*Christanell Anja (Austrian Institute for Sustainable Development)*

*Spitzer Markus (Austrian Institute for Sustainable Development)*

Although some of the reasons for the increase in energy consumption are obvious (rising number of households, growing degree of mechanization), basic social scientific knowledge about meanings, practices and dynamics as well as possibilities of steering energy consumption are only rudimentary. This paper analyses lifestyle-specific patterns of energy consumption specific for households that are poor or in risk of poverty since these households are under special pressure due to increasing energy prices and since there is considerable need for research in this respect.

Energy as a consumption domain is characterised by its invisibility, it is strongly embedded in daily habits and routines so that in most cases an understanding of energy use can only be achieved, if referring not only to the energy consumption itself, but e.g. to lifestyle-specific concepts of „home“ (relevance of convenience, comfort or hospitality) and its energy-related impacts (the „right“ light, the „comfortable“ room temperature).

The paper highlights socio-cultural and everyday life images that shape energy consumption in poor households and those in risk of poverty. Furthermore it gives insights in individual and household-related concepts of warmth and comfort under precarious living conditions and how these concepts influence energy behaviour patterns.

Within the project NELA the link between energy consumption and poor households and those in risk of poverty in particular is analysed from a social science and cultural studies perspective with a qualitative research design. A socially and culturally embedded analysis of interpretations, practices and dynamics of energy consumption has been conducted in 50 Viennese households. The analysis will disclose starting points and barriers to sustainable energy consumption. The goal of the project is the investigation of energy consumption in poor households and those in risk of poverty and, building thereupon, a stakeholder-oriented compilation of data-based measures towards energy efficiency and energy saving. Without an understanding of the social nature of energy consumption, measures aiming at energy efficiency and energy saving will be of limited success.

## **Energy Use in Everyday Life – Results of an owner occupier survey**

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As part of the UK government sustainability agenda a target of 80% reduction in CO<sub>2</sub> emissions by 2050 based upon 1990 levels has been set. To achieve this, the carbon footprint of existing housing must be addressed by capitalising on energy efficiency and the installation of low and zero carbon technologies. There are two inter-related issues that need to be considered: physical improvements to the performance of existing homes; and changes to lifestyle to support sustainable living

Considering that, due to the very low demolition rates currently observed approximately 70% of the housing stock in 2050 will comprise of that which already exists, 27% of the UK's CO<sub>2</sub> emissions are directly attributable to housing and 68% of all UK housing is privately owner occupied, UK government policy must engage with the private owner occupier if its emissions target is to be met. Average figures suggest that 3000kWh/annum of electricity is used in the housing sector which masks a variability of less than 500 to more than 10,000 kWh/annum. This variability suggests that many households are already living in ways which achieve the government target and are able to manage their homes in such a way that results in significantly reduced energy consumption than the average figures suggest. Thus energy variability arises largely from the way occupants manage their home, so by understanding how homes are occupied; how lifestyle, activity patterns, the building fabric and how the use of technology impacts on energy consumption and quality of life, we will start to decipher this variability and help promote energy reducing practices to other private owner occupiers which do not sacrifice current standards of living.

This paper will present a critical review of a desk study and the findings of a telephone survey of privately owned and occupied homes within the southeast of London. The survey will investigate the daily activities and patterns of occupation, how technology influences such activities and impacts quality of life and attitudes towards energy consumption and conservation and what roles occupant behaviour, building fabric and technology play in that.

The paper will identify the factors that could support the governments' climate change agenda to influence the energy consumption practices of private households and identify the role household technology and occupancy behaviour have in determining energy reducing solutions.

## **Winter warmth: everyday heating practices and conventions of older households in England**

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In the UK, there is particular concern over older people's use of energy for keeping warm during winter. Despite by no means having the coldest climate in Europe, the UK has a relatively high number of excess deaths among older people during winter, attributable to the effects of cold. We know that the design of buildings plays a part in this, as does fuel price relative to income, because both of these directly affect the costs of keeping warm. Policy therefore focuses on financial aid plus measures to increase the energy efficiency of buildings.

Both of these intervention approaches, however, construct these households as passive recipients, who will respond in similar and predictable ways to these interventions. What is less well understood are the socio-cultural drivers of how this age cohort manages their winter warmth, why certain technologies are used or not used, and how they are incorporated in to daily routines so that everyday life may be lived as they like. What are conventions regarding winter warmth among the current 'older' generation, and are they shared across this age cohort? How have they been shaped by their life experience of wider social change in heating practices? How are warmth-related practices adapted to accommodate both the physical and cultural experience of ageing?

This paper draws on research conducted with older person households (aged 70-85) in the Midlands of England over the course of one winter. The research involved repeat home visits with depth interviews, and some diary keeping. We discuss our findings regarding participants' heating routines, the range of newer and older technologies employed in keeping warm, and the rationales for these. We also reflect on the extent to which this generation have a distinctive approach to heating and energy use which may have positive and negative elements. The ultimate aim of the project is to improve understanding of how older people in the UK may be supported in keeping warm in ways that are at once effective, efficient and culturally sensitive. Our argument is that this might only be possible through a much fuller understanding of the dynamics of conventions of home energy use.

## **Energy use derived from individuals' performing everyday activities**

*Ellegård Kajsa (Technology and social change, Linköping University, Sweden)*

Making energy use in the household sector more efficient is regarded as one key factor for getting into grips with climate change. Then policies are needed which people agree upon and find it worth making the efforts to follow. We know quite a lot about energy use in the household sector as a whole, total energy use is mapped and various kinds of use is known at aggregate level (for heating, hot water, lightning, household appliances etc). We also have deeper knowledge about some of these categories of use, for example heating and lighting. There is also research on the variation in energy use between different socioeconomic groups. In this paper I will show how energy use can be derived and visualized from peoples' daily activities as written in diaries. The result shows energy use generated from the appliances utilized when performing everyday activities in the course of the day. The method used is based on a soft ware called *VISUAL-TimePAcTS* which is developed in a Swedish interdisciplinary research group (Ellegård & Cooper 2004, Ellegård & Vrotsou 2006, Vrotsou, Ellegård & Cooper 2009). Individuals' diary data is put into the soft ware in which a model for electricity use from appliances is integrated, forming *VISUAL-TimePAcTS/energy use* (Widén 2009, Ellegård, Vrotsou & Widén 2010). The integrated method allows identifying energy use from everyday activities at individual and household levels and thereby puts the demand for energy in a context that is meaningful for the diarists (individual household members), i.e. energy use is seen in socially relevant contexts. It may also identify energy use at various aggregate levels, like group and population levels. Defining groups of individuals by categorizing people according to similarities in their daily activity sequence is an opportunity and makes it possible to define target groups in a new way that can serve as a complement to conventional socioeconomic criteria. It can also serve as a complement (and maybe as a substitute) for expensive detailed electricity metering on appliance level. *VISUAL-TimePAcTS/energy use* reveals energy use in the household sector in a new way and it may open for new research paths and be helpful in directing policy measures to precisely identified target groups. Hence, the opportunity to delimit relevant target groups will increase the possibility that people can recognize their own everyday life habits in the policy measures – which in turn may increase the willingness of people to make changes in their everyday life activity sequence and daily rhythms.



## **Brøset – a carbon neutral settlement in the making**

*Gansmo Jøsok (Centre for Energy and Society/Centre for Science and Technology Studies, Norwegian University of Science and Technology)*

Energy-related emissions constitute a major environmental load. Buildings represent about 40 % of total energy consumption in Norway, while transport contributes to more than 40 % of the total CO<sub>2</sub>-emissions in the city of Trondheim, where this research takes place.

The Norwegian Government aims at making Norway a carbon neutral nation within 2030. In order to achieve the goal we must be able to construct local carbon neutral settlements within a few years where ordinary citizens' living conditions, travel patterns and life style choices contribute to drastically lowering CO<sub>2</sub>-emissions.

In Trondheim the local authorities have selected the green field/psychiatric hospital area Brøset to be developed as a sustainable neighbourhood for approximately 1200 dwellings. Sustainable is defined in a holistic way, including low energy demand and healthy materials as well as social and economic issues such as low cost housing for vulnerable groups. The vision is to plan a carbon neutral settlement where each inhabitant's carbon footprint in the long run will be reduced from today's 8-11 tons CO<sub>2</sub>-equivalents a year to 3 tons, which is the estimated reduction necessary for developed countries in order to constrain global warming to 2 degrees by 2050.

Planning and designing a sustainable carbon neutral settlement is not only a matter of innovative technology and material and energy development and use, but includes for instance knowledge on people's lifestyle, housing patterns, transportation and leisure-related travel. The aim is to make Brøset a neighbourhood where residents can live, work, shop, go to school and find meaningful leisure activities in settlements which enable people to lower their carbon footprint without turning it into a green village only of interest to special groups of environmental activists.

(How) can we plan for more efficient energy use on the part of all users in order to achieve major reduction in carbon dioxide emissions at the same time as catering for living the "good life"? In other words: how can we plan for a necessary development of our future everyday lives?

The empirical basis for this paper is observations of all meetings of the municipal planning committee as well as qualitative interviews with planners, policymakers and politicians involved in the first stages of the planning process. The paper will address how the planners try to meet the desires of diverse future residents as well as getting renewable energy and sustainable solutions integrated into the area. How can we achieve high ambitions when the technological means are not yet invented? What sociotechnical actors and solutions are regarded as (un)controversial in the process? And what mediating actors do/could contribute in building alliances towards planning, building and living in carbon neutral settlements?

## **Websites as a tool towards a low carbon everyday life?**

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*Haunstrup Christensen Toke (Danish Building Research Institute, Aalborg University)*

In this paper we will report from the evaluation of a project developing websites, connected to television programmes, with the aim of promoting climate friendly changes in everyday life routines and habits. The websites include a CO<sub>2</sub> calculator and the possibility of comparing your personal CO<sub>2</sub> emission with public figures known from Danish media or with average Danish households as well as viewing some of the effects that climate changes may have in your local area. Furthermore the websites provide customised suggestions for lowering CO<sub>2</sub> emissions. Approximately 14.000 persons visited the websites in the months before and during the COP 15 Climate Summit in Copenhagen, where climate changes were high on the political agenda and in the media. The results of the evaluation presented in this paper build on surveys as well as focus groups with users of the websites. The quantitative material provides possibility for statistical analysis of the self-reported impact of the websites on different socio-economic groups and for comparing which everyday practices people are more or less inclined to change. The qualitative material provides opportunities for a more detailed description of people's experiences with the use of the websites. Themes from the focus groups include the participants' discussions on responsibility and guilt in relation to mitigate climate change, trust in the information on climate change and its relation to people's own daily habits, and also the question of which practices people feel more or less able or inclined to change. The theoretical framing of the paper will draw on recent practice theory in the understanding of energy consuming and CO<sub>2</sub> producing everyday practices, and will combine this with discussions from research on mass media campaigning. Key research questions include how changes in everyday practices come about, what can initiate these changes and what role information technology and mass media have in relation to these changes.

## **Understanding how householders interact with feedback from smart energy monitors. Opening the black box of the household**

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*Nye Michael (The Environment Agency and the University of East Anglia, UK)*

*Burgess Jacquelin (University of East Anglia, UK)*

In December 2009, the UK Department for Energy and Climate Change (DECC) announced its intention to roll-out 'smart meters', accompanied by free standing real-time displays, to all UK householders by 2020. As well as paving the way to a 'smarter' grid able to handle large amounts of micro-generation and improved demand management, this decision is justified by the assertion that: "These meters will provide consumers with real time information on their electricity use to help them control consumption, save money and reduce emissions" (DECC, 2009, 71). Previous studies on the provision of feedback to energy consumers support this assertion, suggesting it can help to realise savings of between 5 and 15% annually, depending on the quality and type of feedback provided (Burgess and Nye, 2008). Most of these studies assume that the provision of feedback on energy consumption fills an information deficit amongst energy consumers and enables them rationally to decide to reduce their energy use for either financial or environmental reasons. As yet, however, very little is known about the processes through which these kinds of savings are achieved.

This paper attempts to open up the 'black box' (Darby 2003) of the household by exploring how UK householders interacted with feedback on their domestic energy consumption in a trial of real time display devices, or 'smart energy monitors'. After examining relevant bodies of literature on the effects of energy feedback on consumption behaviour, and on the complex role of energy and appliances within household 'moral economies', the paper draws on qualitative evidence from interviews with 15 UK householders trialling smart energy monitors of differing levels of sophistication. It focuses specifically on householder motivations for acquiring the monitors, how the monitors have been used, how feedback has changed consumption behaviour, and the limitations to further behavioural change the householders experienced.

The paper concludes by identifying three previously under-researched issues that should be considered in future research and policy on energy feedback and smart energy monitors: i) the relative importance of both the form and function of monitors; ii) both cooperative and conflictual dynamics in household moral economies; and iii) the ways in which feedback on energy consumption can both empower and disempower householders to take action to save energy

## **Building Expertise: A System of Professions Approach to Low-Carbon Practice**

*Janda Kathryn (Oxford University, UK)*

The built environment must undergo dramatic changes to meet climate change targets. The large technical potential for improvement in the housing sector has been demonstrated, requiring a integrated combination of ambitious demand reduction strategies (eg insulation, improved airtightness, more efficient appliances, behaviour modifications) and low- and zero-carbon technologies. Research shows that to reach higher levels of carbon savings in refurbishment (e.g. 50% or more) it is not just one technology that needs to be implemented, but a suite of coordinated strategies that treats the dwelling, services it provides, and its occupants as an integrated system (Hermelink 2006, Roudil 2007).

The STS literature provides an over-arching framework in which the ‘seamless web’ of social and technological effects of change can be understood. This perspective tells us that technological change does not come about independently of behavioural change and the development of social norms; rather, the technical and the social co-evolve and depend on each other in a complex socio-technical system (Hughes 1983, Bijker, Hughes & Pinch 1987, Bijker & Law 1992). With regard to energy use in buildings, this means ‘relating the form, design and specification of more and less energy-efficient buildings to the social processes that underpin their development.’ (Guy & Shove 2000, p. 67). The social processes that have been studied in this field often focus on the behaviour, habits and motivations of the individuals who occupy homes (eg, Wilson & Dowlatabadi 2007). In contrast, we analyse the common experiences, work practices and shared understandings among experts who renovate homes.

Although optimising the suite of available technical and social strategies for each existing dwelling will yield the best results in reducing carbon emissions, it is a tremendous challenge to assign this task to a fragmented construction industry. In many countries, housing refurbishment is the preserve of small and medium-sized enterprises which include general builders, specialist builders (eg roofing contractors), plumbers, heating engineers, electricians, architects, design engineers, project managers, and building control inspectors. These groups are often considered to be “intermediaries” in the technology adoption process, and as such are expected to provide low carbon refurbishment if their clients demand it. Yet we know that expertise matters, and it is not equally distributed. Quality design and highly skilled installation are essential to the success of low-carbon refurbishment projects, particularly in the areas of insulation, thermal bridging and air-tightness (Bell & Lowe 2000). If some intermediaries are more equal than others, then the supply of low carbon refurbishment is *not* perfectly responsive to the demand. Instead, intermediary groups have their own habits, practices, ways of thinking about problems, and ways of working that affect their ability to provide (and interest in promoting) low carbon refurbishment. In this paper, we take up the challenge of discerning which institutions can successfully intervene in the total socio-technical system of the built environment to steer it toward sustainable performance. In doing so, we move from discussions of *what* needs to be done to reduce carbon emissions in the existing housing stock, and draw attention to *who* will do it and *how*. Specifically, we use a “system of professions” approach focus on the role of so-called “intermediaries”, their expertise, and their ability to enhance (or inhibit) the implementation of sustainable strategies in existing residential buildings.

### **Communication about energy consuming devices and activities in households**

*Karlsson Kristina (Dept. of Thematic Studies, Technology and Social Change, Linköping University, Sweden)*

The aim of the paper is to present the design of a pilot study called *Visualize, communicate and change – developing encounters between energy- and climate advisors and households* as well as some preliminary findings. The project aims at developing methods that may contribute to reduced energy use in households. The methods in question are 1) conversations between energy- and climate advisors and household members about energy use and reduction of energy use, and 2) a basis for discussion in the form of visualizations of the household members' activity patterns and calculations of the amount of electricity that different activity patterns entail. The basis for discussion is based on a time-geographical approach and comprises the household members' written time-diaries and a list of all of the electricity demanding devices in the household, including their rate of consumption. One round of time-diary writing and conversation is followed by attempts to change energy consuming activity patterns, which, in turn, will be followed up by a second round of time-diary writing and conversation. The conversations will be video-recorded. The collection of material proceeds during the first half of 2010 and three households, five energy and climate advisers, and one researcher take part in the study. In the project the analyses will focus on the result of the attempts to reduce the energy use, what possibilities for and obstacles to change of energy demanding habits and activities that are manifested in the conversations, the organization and accomplishment of the video-recorded conversations, and perceptions of the methods used. In the paper some preliminary findings will be presented. These will deal with the total number and types of devices that exist in the households and which of these devices that are used in the activity patterns that may be considered most "typical" and habitual (in terms of regularity, frequency, and length). How these devices are used and the householders' reasoning about this habitual appliance use will also be discussed and interpreted from a dialogical perspective implying that the householders' and advisers' joint meaning making is taken into account.

## **Sustainable housing = good housing?**

*Karresand Helena (Department of Thematic Studies – Technology and Social Change, Linköping University, Sweden)*

There has been for some time a discussion of how to make people change their behavior into more energy efficient habits and routines in order to reduce energy use in households. While appliances and buildings gradually become more energy efficient the trend does not seem to go down where energy use is concerned. There are many reasons for this, among others because households tend to use more appliances in their daily lives and there are more single family households, each with a set of appliances of their own. The houses tend to grow bigger and more spacious, the bathrooms being converted into spas and living rooms moved outdoors to copy a Mediterranean life style even if it does not match the realities of the Swedish climate and hence requires heating devices to be able to use them at all. Leading these trends are of course people with higher incomes but very often the masses will follow in a few years when the market can offer more affordable alternatives. So far the design of houses, interior design and lifestyle have not moved towards more sustainable or energy efficient housing. If the national energy efficiency goals are to be reached households also need to become energy efficient. How could the development of housing change into something less energy consuming but still be regarded as comfortable and even desirable housing?

The aim of the paper is to explore how the idea of good housing has developed in Sweden during the last decade and the role of energy in this development. Does good housing always include using a lot of energy or are there other factors that matter more? What perceptions lie behind the idea of good housing in Sweden? Is it possible to find any connections between less energy consumption and quality of life, or in this case quality of housing? Is good housing also sustainable housing? To answer these questions I intend to explore the field of energy efficient housing related to the idea or conception of good housing. Method used will be a literature study of both historical and contemporary material.

## Understanding energy. A matter of communication?

*Lindstedt Inger (Malmö University, Sweden)*

*Mårdsjö Blume Karin (Linköping University, Sweden)*

In 2002 the Swedish Parliament (Riksdagen) decided that from 1 July 2009 all electricity meters in Sweden must be read at least once a month. The long-term objectives of such a change are that bills will be clearer and easier to interpret, customers will be more aware of their energy consumption and that consumption will gradually be reduced. The electricity grid companies have since the decision installed new electricity meters in all households, about 5.2 million meters, which can be read by remote control.

Important customer-related questions need to be addressed in connection with this technological change-over, such as whether people are interested in this new technology, whether they are interested in energy issues, and whether they are willing to take an active interest in their electricity consumption. In an attempt to answer these questions, interviews with customers in Alvesta and Gothenburg have been conducted.

Although the replacement of electricity meters has been a big step for the electricity suppliers, as far as their customers are concerned it seems relatively insignificant. While those interviewed had a vague notion that the meters would be changed, very few knew why. The respondents also said that as they were unable to calculate how much energy an apparatus used, they had difficulties in determining whether it was worth changing to an energy-saving alternative or not. No social stigma is attached to a lack of knowledge about electricity, energy and other related issues. The respondents also maintained that everyone knows that electricity bills are incomprehensible and that complaining about them is natural.

An important factor for successful communication is whether those you want to communicate with, in this case the customers, are motivated and interested in the issue or not. The interviews clearly showed that when it comes to energy, all the respondents have a low degree of subject-involvement. They know very little about the physical measure 1kWh, energy consumption, and experience that they “fall short” when it comes to energy matters. Making up your mind about products and their energy consumption also means understanding the unit of measure and what it is that consumes energy. Failure to understand this also leads to difficulties in changing one's consumption patterns, in that no connection is made between the unit of measurement, behaviour patterns and the apparatus used. This naturally leads to complications in the communication context. In communicating with the consumer, this needs to be both understood and taken account of.

In the paper, the challenges the energy companies face when it comes to addressing the different levels of consumer understanding will be discussed. Even though the introduction of the new electricity meters was an important step for the network operators, it was of little significance to their customers.

## **Convincing the energy users. A challenge for the energy companies**

*Mårdsjö Blume Karin (Linköping University, Sweden)*

*Lindstedt Inger (Malmö University College, Sweden)*

The energy consumption needs to be reduced. In order to accomplish that, the Swedish government has initiated two major changes during the last 10-12 years. The first one was the deregulation of the energy market in 1999, which was an attempt to increase the competition and the efficiency in the energy market. The second change was implemented by July 2009, and it was the introduction of individual energy meters. The idea behind that initiative was to make the energy users more aware of their consumption, and thus hopefully more interested in saving energy.

The deregulation of the public monopoly created a totally new situation for the distributors. From a situation with a public monopoly, based on publicly owned electricity companies and geographically defined borders, the distributors now were obliged to compete on a free market. For the distributors there suddenly appeared something called a customer, not only a client or “a connection”.

Both these political decisions, the deregulation and the individual energy meters, created a huge need for information. It became clear for the energy companies that they needed to get in touch with the users, address them in a way that created an interest in their companies and messages, and generally speaking creating a good atmosphere in the communication. Considering the fact that the relation between users and energy companies is a long-distance relationship, the demands on the communication skills have become very strong. If they fail, the political ideals of saving energy and the need to affect user behaviour would not become a success.

So, how did the companies work on this? How should they deal with this? These questions arose at first during the autumn of 1999, when we as consumers met advertisements and direct advertising. The electricity was “free” and we had to make choices or choose not to choose. The advertisement used puns and jokes – and facts – in attempts to reach both the mind and feelings of the users.

The communication campaigns before July 2009 were far more elaborate. In order to inform the users of the installation of the individual meters, several different communication channels were used: road shows, advertisements, information on the Internet, brochures, post cards... In these, many different rhetoric devices were used, both concerning texts and visual images.

It can be noted that the companies worked in diverse ways to present facts and try to make a positive contact. Both these factors appear vital in connection with the introduction of new technology in our homes, and in trying to affect user behaviour.

In the paper, the different rhetoric strategies will be discussed, as well as other factors connected to the relationship between energy companies and users, such as distance and geographical closeness.



## **The 20 degrees culture and the Danish standard houses, 1950-1970**

*Mogens Rüdiger (Aalborg University, Denmark)*

One of the most important and interesting aspects of energy use in relation to everyday life and everyday culture is the suspension of the natural preconditions of life, especially darkness and coldness. Innovations in the use of energy are introduced for many reasons; one of them is to overcome the nature given limitations and improve the level of comfort. In this paper I will address the introduction of the 20 degrees culture in the Danish Standard houses in the 1950s and 1960s as a way of examining the impact of energy on everyday life and the possibilities it opened.

Central heating or even better district heating – which experienced a breakthrough in the 1960s – rendered superfluous that some rooms (e.g. the hall and the best room) were kept at a low temperature. Instead a constant temperature became the standard, normally at 20-21 degrees.

The 20 degrees culture had a substantial impact on designing or redesigning of the home. It contributed to a changed distribution of the rooms; hot water in the tubes became a matter of course, the physical well-being improved, and all in all the constant temperature paved the way for a more casual lifestyle characterized by a loosening up the restraints on life in the form of climate as well as a far more widespread use of lighter clothes like nylon and cotton.

How to explain this process? The introduction of the 20 degrees culture can be explained with a need for and a vision of avoiding (unpleasant) external impact on the way of living with the help of technological innovations like central or district heating, 'new' fuels as oil and natural gas, insulation of buildings and a more efficient regulation of temperature, etc. In other words, the 20 degrees culture (as well as the electrification of the home) can be described as an outcome of the perpetual quest for a better life or to be more specific as a realization of the welfare state at the micro-level. The changed use of energy in standard houses reflected one of the basic features at modernistic architecture, namely the interaction of standardization and individualization in order to optimize the functional organization of the home and the well-being of the residents/individuals. In my presentation I will discuss the connection between the standard house design and the introduction of new heating methods including some reflections on the relationship between energy system and (individual) energy use. The presentation rest on source material like building plans, magazines, adds, etc.

### **Intertwined practices of gender and technology. The case of home heating**

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Embracing 70% of household energy consumption, space heating accounts for the largest energy end-use in households in the EU-15 (EEA, 2005, p. 33). The further development, market diffusion, and use of technologies based on renewable resources and the home production of heat and electricity in private households, such as pellet heating, solar plants, and the cogeneration of heat and power, are becoming increasingly important for EU's current strategy aiming at sustainable development (European Commission, 2006). However, energy consumption and energy efficiency are not merely an issue of technological fixes, but of how technologies are used on an everyday basis (Shove, 2003).

This paper focuses on the everyday practices of technology acquisition. Acquisition decisions not only have a large and long-term impact on the structural possibilities for sustainability as an everyday practice and have so far been mainly ignored by research on everyday consumption, also interpretative flexibility (Bijker, Hughes & Pinch, 1987) is especially visible here. Our research focuses on the question how heat energy technologies based on renewable resources become part of people's everyday life. We argue that the use of technologies can be analyzed as a socio-technical system in which the social construction of technology is intertwined with practices of doing gender. We apply a double perspective on gender as a social and discursive practice (Bruni, Gherardi, & Poggio, 2005; Gherardi, 1994) as well as a symbolic resource inscribed and re-inscribed into the materiality of the technology (Akrich, 1992). Analyzing gender as shifting, fluid, and multiple in practice (Martin, 2003) and at the same time re-inscribing a symbolic binary into the materiality (Faulkner, 2000), our analysis shows how gender, sustainability and technology are "done". The empirical data consist of marketing material and ethnographic observations collected at trade fairs for building and living exhibiting home heating technologies as well as interviews with couples conducted within a reasonable time after their buying decision for a new home heating technology. So far, our analysis focused on the design of the oven and its placement in a family home and how gender is done here as a binary symbolic resource (Offenberger & Nentwich, 2009). Within the next months, we will broaden our analytical scope and further investigate the discursive construction of subject-technology interactions in the context of the buying process. Our analysis will show how gendered symbolic repertoires are used by different users when accounting for a specific acquisition decision. The research contributes to an understanding of how the symbolic and interactive gender order is made relevant in the context of sustainable energy technology.

**Track 35**  
**Energy Use in Everyday Life. Combining Sustainable Technology and Practices.**

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**Living in a passive house – how comfortable is that? A comparison of tenants living in passive houses and tenants living in district heated houses**

*Palm Jenny (Linköping University, Sweden)*

Recent years have seen an increased interest in reducing global warming and much focus is on energy-related emissions that constitute a major environmental load. Any major reduction in carbon dioxide emissions will require more efficient energy use on the part of all users. In EU the housing sector accounts for approximately 40 per cent of total energy demand (in Sweden this figure is 35 %), which make this sector important to approach. To build energy efficient buildings is in this perspective vital. In this paper the passive house concept will be in focus. Passive houses are well-insulated buildings that are mainly heated by the energy already present in the building, like people and appliances, and a minimum of additional heating is needed.

This paper will present a case study of semi-detached apartment houses in Linköping, Sweden. Nine apartments have been constructed according to the Swedish passive house standard. Another 30 standard apartments have also been built in the area. The passive and the standard houses are of the same size and design which make them interesting to compare.

In the paper I will focus on the experience from the householders living in these apartments. We have interviewed 7 of the households in the passive houses three times, and 7 households in the standard apartments twice. The first interviews were done in February 2009 and the last in Mars 2010. The interviews focused on the tenants' expectations and experience from living in a passive house respectively a district heating apartment.

The aim is to analyze the expectations and experiences these tenants have had and discuss this in relation to how the building construction and heating system co-exist with the householders' expectations, routines and practises.

## **Driving electric vehicles at work: Establishing EV Usability?**

*Toftaker Marit (Norwegian University of Science and Technology)*

Greenhouse gas emissions stemming from the transport sector are at the core of the climate problem as transport accounts for about 19% of global energy use and 23% of energy-related carbon dioxide (CO<sub>2</sub>) emissions, shares that are likely to rise in the future (IEA 2009). To avoid the worst impacts from climate change and achieve a global cut in CO<sub>2</sub> emissions by at least 50% by 2050, transport will have to play a significant role. One important strategy to curb emissions from transport is to replace diesel and gasoline cars with electric and plug-in hybrid electric vehicles.

Transport research has often been dominated by technological and economical issues, and economic incentives have been, and continue to be, a strategy for the phasing of the electric vehicle (EV). In the process of technological innovation and implementation the role of the end user is too often neglected (Aune 1997). For the electric car to achieve a large-scale breakthrough, a fundamental change in purchasing and mobility behaviour is crucial. Of approximately 2,2 million private cars in Norway, the number of EVs is relatively small (2700). Increased investment in EVs in private and public companies is apparent, and it is therefore my aim to investigate the interrelationship between EV user experiences at the workplace and user perception of the “usability” of the EV in everyday life.

Buland et al. (1996) claim the actual needs of everyday life only constitute part of what motivates the choice of a car, and that its symbolic function and potential capacity to be a “working” technology and a “good” car, relies on its ability to make long trips constituting Norwegian culture of leisure. Any car may serve as a symbol, however Gjølén and Hård (2002) found that in the case of vehicles that use new technology symbolism is particularly strong.

Silverstone et al. (1989) view the dual relationship between technologies and humans as an outcome of a process of “domestication”, a process that for Sørensen and Lie (1996) takes place in the routine activities and ordinary actions in spheres of life such as work, home and leisure (everyday life). Domestication analysis investigates the interrelationship between these social fields, looking at the practical, cognitive and symbolic dimensions of user experiences and explores how user patterns are generated, new knowledge about an artifact is appropriated and how meaning is constructed. By looking at how the EV is implemented in the work situation, and how user and technology negotiate with each other about the interpretations of use and of meaning, I aim to understand whether (or how) the EV becomes “good” or “usable” technology.

The study will be based on individual and focus group interviews with relevant actors who use EVs for work related tasks on a regular basis, providing important knowledge about the significance of the user in shaping technological implementation and development, and possible future practices regarding EVs. The first findings will be available and presented during the conference.

## **Less energy – more comfort? Technology as motive and barrier towards energy efficient refurbishment**

*van der Land Victoria (Institute for Social-Ecological Research, Germany)*

*Stieß Immanuel (Institute for Social-Ecological Research, Germany)*

Private home owners can reduce their energy consumption significantly by retrofitting their homes in an energy efficient way. In the EU 27, more than 40 percent of total energy consumption is directed towards heating and hot water generation in private homes. By applying energy efficient technology, this demand and the related CO<sub>2</sub> emissions could be reduced by up to 80 per cent.

Thus, refurbishment and maintenance of a home can have a high impact on energy consumption. In contrast to many forms of energy use in everyday life, they are linked to a strategic consumption decision which is performed only a few times in a home owner's life. Refurbishment is a situation where energy consumption can be made explicit and become subject to change.

Home owners who wish to cut down their energy consumption by insulating their home, improving its heating system or turning to renewable energy have to face a complex set of technology. Many of these technologies are innovative and some are additionally highly visible, like thermal collectors. Nevertheless, most of them appear to be only of low interest.

Against this background, the paper will focus on the role of technology for the decision towards energy efficient refurbishment. Based on the results of a survey with 1,000 private home owners in Germany, it will be explored how expectations, beliefs and attitudes towards technology can promote or hamper energy efficient refurbishment. To enable a comparative analysis, home owner's refurbishment activities were classified on the basis of determined set of measures in standard quality and in energy efficient quality.

The results show that socio demographic patterns, like education or income, do not significantly influence the decision for the quality of measures implemented. Distinct differences exist rather in view of motives and barriers for refurbishment in standard and in energy efficient quality. Main motives for energy efficient refurbishment are among others saving of heating energy and reducing energy costs. Moreover interest in innovative technology and the desire to improve living comfort are important drivers for energy efficient refurbishment. At the same time anxieties related to energy efficient technology, like reservations about the technical development as well as the feeling that technological details are too challenging, can be obstacles to the implementation of energy efficient measures. Enthusiasm about new technology can encourage people's action towards energy efficient refurbishment, just as ignorance and uncertainties about technology can be obstacles towards the implementation of energy efficient technology.

The paper will discuss the role of technology for the decision towards energy efficient refurbishment. By highlighting home owner's motives and barriers, it will elaborate how home owners deal with the demand for technological knowledge to overcome obstacles, like uncertainties and ignorance related to energy efficient refurbishment.

**The relation between consumption of electricity and hot water and different consumer variables**

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*Wallin Fredrik (Malardalen University, Vasteras, Sweden)*

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24 apartments in Vasteras were thoroughly investigated with respect to consumption of electricity and hot water during a four year period. Questionnaires were answered by 19 of the 24 inhabitants, and correlations could be done between their energy behaviour and the actual consumption. The 24 apartments were of different size, 8 of each: 64 m<sup>2</sup>, 80 m<sup>2</sup> and 96 m<sup>2</sup>. A total of 40 people were living in the apartments, and no single individual was below 18 years old. The remaining were split as mostly two persons per apartment, but some singles as well. Although so similar conditions we could see a very large difference between household with the same apartment size and number of inhabitants, up to ten times difference. This was actually the case for both hot water and electricity.

From the results we can see that the most important variable to explain the difference in usage was the income. Those with high income had high consumption. Those with low income were watching TV more, were home much longer time every day, but still consumed less. In the paper we will present the consumption patterns as well as how different variables correlated to this, including both these major ones and others.

## **Modelling energy use in everyday life. A new approach to achieve a 100% renewable goal**

*Xing Yangang (Centre for Sustainable Technologies, Ulster University, Ireland)*

Fossil fuel remains the dominant source of primary energy worldwide, in spite of the fact that fossil fuel resource is limited. It might be wise to accept the eventual depletion of oil (sooner or later) and to reduce demand and improve renewable energy systems. The questions lay here is how to replace oil with renewable energies, such as wind, solar and biomass, to meet everyday energy end use. A 100% renewable energy system (RES) is expected to provide an alternative route to satisfy human needs and provide similar comfort levels we have. However, Renewable energy generation may be more intermittent than conventional energy sources in normal operational conditions. It is crucial that energy demand management, harvesting and storage are well integrated. It can be predicted, a 100% renewable energy system (RES) requires dramatic progress in the areas of energy use analysis. We need a new perspective to investigate energy use in everyday life in a 100% renewables society. Currently, building sector is the largest energy end user in UK. Growth in population, increasing comfort level, living space per capita, and uses of air conditioning systems has all boosted building energy consumption. In EU, shifting away from heavy industry towards service sector activities, building has become the biggest sector in terms of energy consumption. Building has become one largest sector in terms of energy consumption most European countries. Buildings account for close to 40% of total energy used in most EU countries. The next largest energy user is transportation, which has significant links with building energy systems. For example, building locations have major impacts on travelling patterns. On the other hand, electric vehicles as a mechanism of providing better use of off-peak electricity generated through built environment may be advantageous to improve efficiency of a renewable energy system. In this research a computer simulation model has been developed to facilitate energy system planning and energy uses prediction. Contributions of building integrated/attached RES applications are explored in this research. Conceptual structure of the model and initial simulated results are presented in this paper.



## **Under-consuming energy?: conceptualising energy vulnerability in everyday life**

*Walker Gordon (Lancaster University, UK)*

*Day Rosie (Birmingham University)*

*Cass Noel (Lancaster University, UK)*

Much attention is currently being given to the domestic consumption of energy in terms of profligacy, excessive consumption and the need to reduce demand. However, within a country such as the UK, and more widely across various parts of Europe, there are many households who live in 'energy poverty', where their ability to afford energy is low, and who are as a result at greater risk of various adverse health and wellbeing consequences. In this paper we consider this apparent 'under-consumption' of energy and the ways in which the vulnerability that follows can be conceptualised and understood. Beginning from the position that demand is not for energy itself, but rather the services and outcomes that energy consumption can provide, we outline the heterogeneous social, technical, natural and institutional elements that come together in structuring practices that demand energy and produce energy vulnerabilities. We consider how these vulnerabilities relate to everyday practices that draw on different forms of energy provision and energy service (e.g. comfort, light, mobility) and how these vulnerabilities also have particular forms of spatial and temporal contingency. Implications are drawn out for how energy vulnerability should be understood, including in relation to transitions towards more sustainable energy technologies, and for the conceptual basis on which policy interventions might be made. The paper draws on work undertaken as part of the InCluESEV research cluster project and other programmes of empirical work.



## **TRACK 36**

# **Practices and the Environment: Performing Sustainability and Doing STS**

### **Convenors:**

**Ruth Rettie (Kingston University, UK)**

**Kevin Burchell (Kingston University, UK)**

**Eleonore Pauwels (Woodrow Wilson International Center for Scholars, UK)**

## **Energy practices and the workplace environment: the social technologies of retrofitting**

*Abi-Ghanem Dana (Imperial College Business School, UK)*

*Hewson Chris (University of Manchester, UK)*

Understanding energy use within buildings is a social and political priority, as they count for almost half of UK CO<sub>2</sub> emissions, with workplaces accounting for 12% of total carbon emissions in 2008 (DECC, 2009). Moreover, despite efficiency improvements, total energy use continues to grow, leading to calls for a more thoroughgoing approach to the 60% CO<sub>2</sub> reduction measure posited with the Government's Energy White Paper (2007). On a practical level the government points towards the need for a "professional management of costs" within the commercial sector (CCC, 2008), stressing that in addition to the promotion of 'zero-cost measures' or 'quick wins', a longer term view should also be taken that seeks to identify and remedy "a range of non-price barriers to uptake of cost-effective abatement potential", including issues around 'split incentives' and 'bounded rationality' – both within organisations and sectors – in addition to the currently patchy provision of necessary information, geared towards the modification of individual energy intensive behaviours.

This study presents results from an energy-focused case study of an organisation involved in procuring, developing, maintaining and servicing office spaces in the North of England. The company's business model has led them towards the retrofitting of a wide range of office properties, to a variety of specifications and standards. Our research paid particular attention to their 'energy focused' decisions and actions that emerged out of this business model, and how these processes affected – and were understood by – those who used these serviced office space(s).

In examining the ongoing involvement of the company in the day-to-day management of the building's structure, functions and facilities, our research (interviews with key informants and users, alongside a focus group) aimed to explore sustainability practices with reference to three dimensions: firstly, in relation to building materials and office 'space design' within the wider refurbishment process; secondly, the choice, adoption and use of energy-related building technologies – particularly heating, ventilation and air-conditioning (HVAC) – and their overall integration; thirdly, the extent to which the social practices of users had both short and long term effects in relation to ongoing decisions around building services provision.

## **From disaster zone to sustainability showcase: the “greening” of a New Orleans neighborhood**

*Allen Barbara (Virginia Tech, USA)*

The Lower 9th Ward, an area of immense destruction during the flooding in post-Katrina New Orleans, has become a showplace for green building and technologies. From Brad Pitt's "Make It Right" project to Global Green's demonstration home, the neighborhood has been featured in top design and architecture magazines. In addition, numerous green organizations have emerged both from within the community and from outside with express interests in furthering environmental projects. Given that these groups, their volunteers, material donations, and funding, form one of the main resource streams into the community, the "greening" has been welcomed by many. Indeed, Holy Cross, a National Historic District within the Lower 9th Ward, hopes to become the nation's first sustainable, carbon neutral, urban neighborhood. From numerous interviews with citizens, activists, and neighborhood organizers, it became clear that the situation was one of opportunity for all. For the environmentalists, it was a place to put their ideals to work while at the same time helping to "fix" a situation that was terribly unjust. For the residents, help had arrived—they were better able to re-inhabit their homes. Even if the residents were formerly neither 'believers' in the ideals of sustainability nor adherents to its practices, they could, on a pragmatic level, see the benefits of this movement.

My research will show the hopes, successes, challenges, and pitfalls of these two cultures' opportunistic marriage through several STS lenses: actor-network-theory, laboratory studies, and environmental justice. The question I am asking is whether sustainability, driven by external forces, can become part of the intrinsic values and practices of a community, or will it remain secondary to the pragmatic needs of survival? The answer could provide important "best practices" knowledge as to how other disaster zones might be rebuilt sustainably.

## **Improving the design of open innovation processes with some help of STS**

*Beck Gerald (Munich Project Group for Social Research, Germany)*

*Kropp Cordula (Munich Project Group for Social Research, Germany)*

Innovative products and services to enhance sustainability – as there are low/zero-energy buildings, zero-emission vehicles or intelligent mobility concepts for the future – often stay in the corner of the market or lack, in spite of their technical potential, customer's acceptance at all. But positive effects for the environment can only be achieved if ecological products are successful on the market and if they are widely used. Processes of open innovation promise to improve the market introduction and the distribution of products by directly involving later users and their ideas in the design process (von Hippel 1998, Reinicke 2004, Piller & Walcher 2006). The integration of (especially "lead") users in innovation processes is expected to incorporate customers' ideas into new product development, to improve customers satisfaction, to early detect unintended side-effects in later contexts, to foster public awareness and thus to accelerate the distribution of innovative sustainable products and services. This is why open innovation collaboration and user integration is assumed to produce products that are better adapted to the needs and expectations of users' everyday life and to better capture markets.

Following these promises the paper discusses the outcomes of participatory scenario workshops with (lead- and non-lead-) users in the two spheres of activity of mobility and habitation in Germany. The workshops aimed at developing integrative scenarios respectively future concepts for sustainable mobility and low energy buildings. The analysis suggests that users have rather linear (first modernity) understandings of progress and development in case of mobility, which largely blind out the relational character of existing mobility-networks and possible social transformations. In contrast, in the case of future habitation resulting scenarios prove to be more open towards innovative re-arrangements of social networks and society at large ("reflexive modernisation"). We will contrast these results with expert scenarios of future mobility (e.g. Dennis/Urry 2009) and future low energy building (Henselling/ Köhn/ Vallenthin 2004). Thereby we will explore to what extent STS can help to identify important elements, drivers and barriers in networks of innovation in order to provide us with knowledge about how to better represent these elements in innovation processes. In practice this means that participatory innovation processes for sustainable can be improved by taking serious STS in the design of participation in open innovation processes.

**Low carbon learning and behaviour change: integrating practice theory, the social norm approach and community action**

*Burchell Kevin (Kingston University, UK)*

*Rettie Ruth (Kingston University, UK)*

In this paper, within the context of our Smart Communities project, we discuss a novel integrated theoretical and practical approach to making low carbon learning and behaviour change social. In most institutional contexts, low carbon strategies emphasise behaviour change alongside infrastructural and technological developments. Most institutional approaches to behaviour change embody assumed relationships between information, learning, attitudes, financial incentives, and behaviour change (reflecting contemporary institutional interests in social psychology and behavioural economics). Such information tends to focus on: climate change, carbon and carbon reduction tools and tips (for instance, see the UK ACT ON CO<sub>2</sub> website). Some sociologists have drawn attention to the individualistic and economically rationalistic characteristics of such approaches, and have emphasised the highly social – that is to say, contextual, contingent, relational and multi-rational – nature of both learning and behaviour change (Shove; Heiskanen; Darby). While it is certainly true that institutional approaches now nod towards the social through an emphasis on ‘community’, too often such projects are technologically-led and underplay the potential of community action itself.

In Smart Communities, our objective is to emphasise the social in low carbon learning and behaviour change. To do this, we integrate practice theory and the social norm approach, with community-based action research. While we accept the premise of practice theory that behaviour can be fruitfully understood as part of a practice, consisting of doings, sayings, norms, things and so on (Schatzki, Reckwitz), and we regard as invaluable the insight that energy is indirectly consumed through everyday practices, we note that these approaches suffer from a lack of practical application. Following a practice theory approach, in Smart Communities a community will be invited to actively discuss, select and adopt new ways of doing things that produce less carbon. In addition, while we accept the premise of the social norm approach that behaviour change can be encouraged by telling people what other people do (Berkowitz, Cialdini), we note that this approach adopts individualistic explanations of these behaviour changes. In Smart Communities, we apply the social norm approach by asking the community to record on a website: their energy consumption, their pledges to try new ways of doing things, and their achievement of these new ways of doing things, and we use this data to provide social norm feedback throughout the community. This will facilitate both social learning about norms and further uptake of new ways of doing things. This highly social approach to learning and behaviour change will be complemented by engaging the catalytic potential of schools, school children and community ‘mavens’, and by drawing on the local and technical expertise of project partners, such as the local authority, a local sustainability group and low carbon specialists. Finally, extensive qualitative and quantitative analysis will assess the dynamics through which a community can be facilitated to reduce its carbon by making learning and behaviour change social.

### **New practices and emerging routines in local food niches. The case of 'Food Teams'**

*Crivits Maarten (Ghent University, Belgium)*

*Paredis Erik (Ghent University, Belgium)*

This paper reports on a research project (Consensus) in which a short-chain niche of the Flemish food system is analyzed on the basis of a practice approach. In Flanders an initiative called Voedselteams (Food teams) has slowly grown over the last ten years: it concerns groups of households closely tied to local, mainly organic, farmers in function of the direct trade of local, fresh and minimally processed products.

The research takes a consumer perspective to analyse patterns of interconnected elements that constitute the routine behaviour and the emergence of new routines of practices related to food. Using a combination of in-depth interviews, focus group sessions, observation, document analysis and literature review, the research aims at discerning the constituting elements of the new food practices in Voedselteams and clarifying the linkages between discursive events, motivations, bodily routines, artefacts and other elements typical of practices.

In this paper we aim at reporting on three aspects of the research. First, we stress the importance of taking a consumer perspective as a necessary complementary unit of analysis in addition to the more typical socio-technical approach (focusing primarily on producers and technology), often prevalent in transition research. Our research shows e.g. that the changes in everyday behaviour (in purchase, cooking, kitchen, relationship with producer, etc....) are conspicuous and clearly discriminated vis-a-vis previous more mainstream routines. These changing routines seem to be a condition for the advancement of local food niches, in that they are a necessary complement to and even co-constitute the new, more sustainable practices of the involved farmers. Second, we wish to illustrate the importance of niche analysis with regard to gaining understanding in re-routinization of everyday behaviour and its ties to enhanced sustainability. In presenting the results of the research we try to show how the routines that sustain the practice at the same time confirm and re-interpret typical doings and sayings as they are enacted within the food regime. Finally, a methodological aim is to give some indications on the applicability of practice theory on empirical data. Although the practice approach is not (yet) fully structured in a theoretically systematic way, its non-essentialist logic does provide a promising endeavour to purport on the intrinsic heterogeneity of social activities. We systematically reconstruct and reflect upon the research design.

**The practice of sustainability: don't call it sustainable! The generation of electricity in Germany**

*Fuchs Gerhard (University of Stuttgart, Germany)*

The paper discusses the practice of using and partly developing renewable energies in a context that was characterized by strong anti-nuclear feelings and worries about climate change among a group of concerned scientists and citizens. A set of initially unconnected, isolated experiments and initiatives later on led to a concerted effort to kick start the idea of a more general sustainable, decentralized generation of energy. Giddens has argued that for sustainable practices to take hold, a strong state is necessary. The case of renewable energies can be a case in point. After a shift in power (in the late 1990s) the frame work conditions were altered by a new political coalition to enable the decentralized generation of electricity to take hold as more than an isolated practice of "fundamentalists". The success of the sustainable practice of using renewable energies, however, depended on the idea not to frame it as a "sustainable" practice, but as a "profitable" practice. Renewable energies are still being advertised as being "green" practice and sustainable and it is worth paying a premium for using it, but the modal user meanwhile is one who is first of all interested on a safe return on investment.



## Lighting and entertaining at home. From energy efficiency to energy-consuming and energy-saving practices. Comparison between France, UK and Norway

*Garabua-Moussaoui Isabelle (EDF R&D, GRETS, France)*

*Ose Tommy (SIFO, Norway)*

*Fudge Shane*

This communication is based on the results from an EU project (Framework 7), named BAREnergy (2008-2010). This project explores the barriers and opportunities related to the reduction of energy consumption in six countries in Europe. The principal aim of the project was to provide an understanding of the comparative influence of structural, political, financial, psychological, social/cultural and knowledge barriers to pro-environmental energy use across three principal areas: domestic energy use; household appliances; fuel consumption of cars. Within this project, we developed a qualitative study, based on 4 focus groups per country. We present here the results from the qualitative study from France, Norway and United Kingdom. We will focus on the area of domestic energy use and household appliances, i.e. the energy-related practices at home, and more particularly on lighting and entertaining at home.

Activities	Lighting	Entertaining
Technologies	Light bulbs/ Low-energy bulbs	Brown products with stand-by (screens, radio, etc.)
Energy consumption	"Traditional" use of electricity	New use and increasing consumption of electricity
Representations of consumption	Visible consumption	Invisible consumption (or underestimated)
Energy savings	Embodied energy savings, but how can a new energy-efficient technology be adopted?	The stand-by technology encourages people to consume, but "turning off" practices
Energy policies	Shifting from incandescent to energy-efficient bulbs purchase (regulation tool on markets)	Using awareness tools and voluntary energy labels from manufacturers
Social meanings (depending on the country)	Social status, security, comfort, indoor "mood"	Sociability, self identity, "modern" way of life

Our hypothesis is that technologies are ambivalent. The two activities mentioned above involve people in both consuming energy and saving energy. So what are the conditions for using technologies as energy-saving tools or as energy-consuming tools? What are the social norms, the familial dynamics, the political engagement, the practical procedures, the constraints and agency to save energy, as regards lighting and entertaining at home?

The communication will consider the "complex" status of contemporary domestic technologies. In some conditions, energy-efficient technologies can drive energy consumption, instead of saving energy. And in some conditions, new energy-consuming technologies can support energy savings. The way in which people use technologies in their

social practices, with meanings, routines, priorities and social efficiency is at least as important as the potential technical efficiency of technologies. So what are the conditions in which technologies may be “sustainably” used by households in Europe?

Our analysis is comparative: the same focus groups guideline was used in all countries, so we compare the reported practices and discourses in the three countries. It is mainly qualitative, but we contextualise our results with the documentary, bibliographical and quantitative analysis provided by the Barenergy Project and from other surveys. Our theoretical background is the social practices theory (Bourdieu, Warde), the socio-technical analysis (Shove, Latour) and the theory of the social construction of reality (Berger and Luckman). The originality of this communication consists in the in-depth analysis of households’ reported practices and discourses, with an European perspective.

## **Designing a practice is also a practice. The ultimate political lesson of STS**

*Goeminne Gert (Vrije Universiteit Brussel, Belgium)*

In this paper, I want to argue that there is a double political twist in connecting STS to sustainability. The first twist results from STS's normative conception of practices indicating several human-environment interstices where the good life is given shape, ranging from the grindingly ordinary of our everyday practices to the presumably isolated micro-worlds of science and technology in the making. This first twist is broadly recognized and cherished as being part of a critical STS attitude opening up pertinent ethical and political questions related to the non-neutrality of science and technology. The second twist however goes mainly unrecognized and occurs at the point where these interpretative frameworks are irreflexively turned into normative guidelines in sustainability approaches such as technology design and socio-technical system innovation. I want to argue here that such approaches towards social change, however sensitive they are to the practical embeddedness of normativity, neglect the very political core message of STS-research: we are always situated, always in practice, even when we are designing a practice.

In elaborating my argument, I will build on Don Ihde's postphenomenology, which presents a relational ontological framework in which practice-focused STS can be positioned. Here, the relation between human beings and their world takes centre stage and are viewed as mutually constituting each other: human beings are what they are thanks to the ways in which they are situated in their world (Ihde, 2009). In a postphenomenological context, Verbeek has extensively made clear how material artefacts, by mediating our experiences and actions, co-shape the way we live our lives (Verbeek, 2005). The political question of the good life is thus partly answered by the possibilities and constraints contained in the material dimension of human life as convincingly illustrated by Shove's case study on the introduction of the shower and how this has changed our ideas of what a 'normal' level of cleanliness is (Shove, 2003).

Taking this practical turn seriously, several STS-inspired scholars have argued that it is timely to employ these insights in facilitating social change for sustainability. Whereas on the level of individual human-technology relations it has repeatedly been argued that designers should start thinking about deliberately shaping the non-neutral mediating aspects of technology, a new generation of sustainability policy research looks into the idea of innovating socio-technical systems and managing systemic transitions towards sustainability. In advancing such 'steering' possibilities however, it is easily forgotten that one is actually proposing a form of politics, which raises questions of political legitimacy and engagement. In suggesting the existence of an external goal independent of the very practice of 'steering', such steering approaches abruptly shortcut the inherent and always ongoing political struggle that is truly constitutive of 'desired directions'. I will thus argue from a postphenomenological perspective that the necessity for an adequate political space in which alternative and opposing societal visions can be confronted in a non-consensual way constitutes the ultimate political lesson of STS, whatever the sustainability approach proposed.

## **Turning over a new leaf: A practice-based approach to sustainability on the personal and social scales**

*Hards Sarah (University of York, UK)*

For decades, an individualistic behavioural paradigm has dominated thought on how and why people engage in (un)sustainable activities. However, recent years have seen increasing interest in an alternative approach, in which individuals are conceptualised as the “carriers” or performers of practices that evolve on the social-historical scale. This paper addresses the question of what a practice-based approach means for the study of “sustainable behaviour” within STS.

This paper is based on on-going empirical research which examines individual action on climate change and its development throughout the life-course. The research concerns the mobilisation and stabilisation of “sustainable” practices both in individual lives and within the socio-technical system, and the interactions between processes on these scales. Drawing on the theories of Theodore Schatzki (e.g. Schatzki, 2001) and Elizabeth Shove (e.g. Shove and Pantzar, 2005), the project explores the configurations of understandings; procedures and engagements, and of images; skills and materials that are implicated in practices of sustainability. Taking two areas of practice; activism and mobility, as case-studies, it charts how these elements and their configurations have evolved over time. It then analyses the consequences of these shifts for the development and maintenance of practices of sustainability on the personal and social scales.

The paper draws on this research to illustrate how a practice-based approach differs from a conventional behaviourist approach when applied to research on engagement with “sustainable” activities. It describes how a narrative life-course methodology can be used to elicit rich, contextual and chronological accounts of individual paths or careers of practice. This approach privileges participants’ own words, providing insights not only into how sustainability is enacted, but how it is constructed and understood by its practitioners. The paper highlights advantages and disadvantages of this approach, and reflects on issues around validity and normativity in practice-based work that aims to influence policy.

The paper also highlights findings of the project that are of particular relevance to STS and the study of sustainability in socio-technical systems. Results illustrate the central importance of the material dimension of practices of sustainability, especially mobility, and the role of technology in how they are perceived and performed. A further key finding concerns the role of community in sustainability practices, and how social learning operates as a strong driving-force in the careers of practitioners. The paper concludes that practice-based approaches may shed new light on problematic issues such as the Value-Action Gap (Blake, 1999), and could play a major role in advancing our understanding of “sustainable behaviour” as a multi-dimensional, contextual and dynamic process.

**Can practice make behaviour change perfect? Using social practice theory to interrogate and improve pro-environmental behaviour change interventions**

*Hargreaves Tom (University of East Anglia, UK)*

This paper applies the insights of social practice theory to the study of pro-environmental behaviour change through an ethnographic case study (9 months participant observation and 38 semi-structured interviews) of a behaviour change initiative – Environment Champions – that occurred in a workplace.

In contrast to conventional, individualistic and rationalist approaches to behaviour change, social practice theory de-centres individuals from analyses, and turns attention instead towards the social and collective organisation of practices – broad cultural entities that shape individuals' perceptions, interpretations and actions within the world. By considering the planning and delivery of the Environment Champions initiative, the paper suggests that practice theory provides a more holistic and grounded perspective on behaviour change processes as they occur in situ. In so doing, it offers up a wide range of mundane footholds for behavioural change, over and above individuals' attitudes or values. At the same time, it reveals the profound difficulties encountered in attempts to challenge and change practices, difficulties which extend far beyond the removal of contextual 'barriers' to change and instead implicate the organisation of normal everyday life.

The paper concludes by considering the benefits and shortcomings of a practice-based approach emphasizing a need for it to develop a greater understanding of the role of social interactions and power relations in the grounded performance of practices. It also highlights key implications for continued attempts to encourage pro-environmental behaviour.

### **Dialectical designs: stability and instability in hair care routines**

*Hielscher Sabine (Nottingham Trent University, UK)*

*Fisher Tom (Nottingham Trent University, UK)*

The paper discusses women's hair care routines – 'ordinary' routines which impact on resource consumption and are therefore implicated in environmental sustainability. These routines are complex and difficult to change through approaches that only consider people's attitudes towards the environment and the choices they might make to change their behaviours (Shove 2004). A practice-orientated approach to designing offers a way forward, but if design is to work with routines to produce changes that benefit sustainability it is necessary fully to understand those routines and the practices they are part of (Fisher 2008).

In this paper hair care is figured as a network of activities which together with cultural knowledge, embodied skill and objects, form a particular set of practices (Shove et al 2006). The cycles of their enactment rely on the co-evolution of these interconnected elements (Reckwitz 2002; Schatzki 1996; 2002). A reconfiguration of these elements may lead to the practice changing because it is destabilised. Drawing from an ethnography of women's hair care routines at home and interview with hair care 'experts' at Boots the Chemist, the paper reflects on how an understanding of the practice is able to identify factors that stabilise and destabilise women's hair care practices.

The paper highlights the routinised nature of the practice that determines how often women do things with their hair and exactly how they deal with it. What emerges clearly from the research is that factors that influence the stability of the practice work dialectically in some circumstances they may destabilise aspects of the practice but in others they may reinforce them. Factors that impact on the stability and instability of a practice are interrelated and their effects are context-dependent and relational. The paper discusses the consequence of this insight for the design of interventions into practices that seek to enhance their sustainability.

## **Indoor addiction and ways of making more sustainable offices**

*Hitchings Russell (UCL, UK)*

Many people in the west now spend a great deal of their time within relatively standardised indoor environments. In view of this situation it is surprising that we know quite little about how the prolonged experience of being cocooned within air conditioned spaces is subjectively experienced. Some authors have talked about the idea of indoor addiction. Others have described delightful periods of temporary escape. The research presented in this paper sought to add some empirical depth to these discussions by using theories of social practice to examine how a sample of city professionals could be recruited into certain habits of staying within climatically controlled spaces. Anecdotally this group occupies the vanguard of new forms of indoor existence since they seldom need descend to the lobby as others come and cater to their various immediate needs in terms of food or laundry. Though it can be quite beneficial to organise leisure time outside, they often preferred the comparatively private indoor comforts of the gym. Our initial discussions also revealed how they generally spent only a matter of minutes outdoors during the standard working day. My aim was to see if they were happy to turn their backs on what was happening to the environmental conditions outside their offices, examine why this was so, and consider what this said about outdoor relations of the future. By thinking more holistically about the combinations of infrastructural and personal factors that effectively foreclose the possibility of making the simple decision to step outside the building, the study sought to identify the best means of promoting more sustainable office behaviours. This paper discusses my findings and particularly what a practice based analysis of indoor addiction can reveal.

**“Wanted! Research Partner with Problem”. Transdisciplinary Research between Normative Imaginations and Practical Realisation**

*Igelsböck Judith (University of Vienna, Austria)*

*Felt Ulrike (University of Vienna, Austria)*

*Schikowitz Andrea (University of Vienna, Austria)*

*Völker Thomas (University of Vienna, Austria)*

Over recent years numerous national and international research programs have focused on transdisciplinarity as the central research paradigm, a fact, which also holds for a major Austrian research program on sustainability research. In these programs knowledge production is based upon the assumption that participation of extra-scientific partners during all phases of a research process would improve the quality and enhance the robustness of the outcomes. However, the practical realisation proves to be complex and cumbersome. Neither did citizens or stakeholders necessarily strive for a joint research but rather prefer to get expertise “delivered to their doors”. Nor did they see necessarily the same “problems” as essential to their lives and thus did not see an obvious reason to engage as research partners. Finding partners to do transdisciplinary research thus proved far from being obvious.

In our contribution we want to critically explore the reasons why this ideal of engagement of extra-scientific actors was notoriously difficult to realise. Scientists on the one hand saw this type of epistemic work as complex to reconcile with classical inner-scientific norms (e.g. assessment structures) and with more recent developments like temporalisation of academic work or rigid disciplinary assessment exercises impacting on their lives as researchers. On the other hand also stakeholders were — for multiple reasons — not eager to be active partners in research.

This raises a number of questions: How are such projects aiming to engage citizens or stakeholders embedded in local knowledge cultures, both within science and in society? How do broader national techno-political cultures frame such engagement processes? And in whose interest are such transdisciplinary knowledge production enterprises? Hence, we are going to investigate the tensions arising between the normative imagination of an open innovation through integrating extra-scientific actors, and the practical realisation within the specific techno-political context on the basis of different transdisciplinary projects within an Austrian sustainability research program.

The presentation will be based on interview material and observations from a project studying the culture and practice of transdisciplinary approaches in sustainability research in the Austria context.



## **Performing environmental data: public space and citizen skill**

*Lamireau Clara (Orange Labs)*

Quality of life in public space is presented as a major concern in urban environments. Recognizing this as a serious issue, town councils are tempting new approaches for the management of the city. Numerous international reports (for instance the Principle 10 of the Rio Declaration on Environment and Development) have expressed the importance of public participation in moving towards a sustainable development. But so far participation was only promoted at the decision making level. Since some years, new propositions are appearing, allowing citizens to also participate in the assessment of environmental issues. The user-generated content practices, commonly used in the digital world, are reaching city management practices and citizens are now invited to produce data about their environment. In this paper, I will present an ethnography of a rising change in mobile phone usage, used as networked mobile personal measurement and warning tool. In France, a project supported by the French government will propose a mobile phone application allowing every citizen to notify public maintenance services of defects noticed in the street and requiring an intervention (waste on the public highway, defects of public road networks, damages, inappropriate street furniture, defective lightings). This application invites citizens to be actively involved in the maintenance of their city, by producing information about their environment. Following the conception and the implementation of this project helps us to understand how several protagonists agree to promote a sustainable behaviour in the public space.

Star (1999) develops an analysis of the informative structures through which individuals and groups build a shared knowledge. The wealth of her proposition is to open the way towards a consideration of the “abstract” infrastructure (taxonomies, classifications, standards) and the material one (grips, networks of machines, cables, sensors). She displays an ethnography attentive to the way individuals and groups produce and manage information, including the material base of activity as a central mediation in the construction of knowledge.

Information and communication technologies hold a singular place in the urban sustainable development paradigm. Integrated into the technical processes of conception and maintenance of the urban infrastructures, they also ensure the means of a large distribution of environmental data. Yet, studies dedicated to the sustainable city neglect this challenge for the benefit of questions on local politics or town planning. By contrast, the study of production and circulation of environmental data within the urban space can underline how the equipment of this space builds up a common place for debates and confrontations. Employing Isaac Joseph’s notion of “quarrel”, I will develop an approach which integrates the analysis of socio-technical devices and the concrete practices of the urban space.

## **Between the State and the Individual: The role of 3rd sector organisations in shaping sustainability practices**

*Liff Sonia (Appleby Research, UK)*

Attempts to understand what would encourage more widespread adoption of sustainable practices tend to focus on the legal and economic measures available to government (such as taxes, fines, financial incentives, and regulation) and their impact on the psychological processes which are commonly thought to explain individual behaviour changes. STS accounts have, in contrast, focussed on the social and cultural contexts within which un/sustainability practices develop and are performed. State actors can operate at this level but there is also space here for different kinds of actors who may play a distinctive role in the de-stabilisation / stabilisation of practices which affect sustainability.

This paper focuses on 3rd sector / not for profit organisations which applied to NESTA's Big Green Challenge (this was a UK-based £1 million challenge fund open to 3rd sector organisations proposing an innovative way to involve their community in reducing carbon emissions). An analysis of 355 initial applications to this challenge (Steward, Liff & Dunkelman, 2009) identified a number of distinctive innovative capacities available to organisations operating at this level which could make a contribution to low carbon living. These include familiar forms of community action such as holding events to share ideas and learning through 'support groups' where private pledges can be maintained at a community level, to providing a 'test bed' for novel technologies and social practices. These made distinctive contributions to low carbon goals not simply by targeting particular areas of emissions reduction but also in the way in which they engaged with known barriers to the widespread take up of changed practices such as the feeling that there is little point in acting if others are not doing likewise, or of good intentions slipping back into established 'habits'. As such these organisations are doing something more significant than simply acting as a conduit for government messages.

However the widespread tendency to believe that such activities can be spread via the distillation of 'best practice' examples usually misses the complexity of engaging with established practices. Organisations doing apparently similar things found distinctive ways enrolling members of their community and of disrupting their practices. These often involved (different ways of) resolving tensions between, say, the 'breadth' and 'depth' of participation. It will be argued that an STS-based understanding of practices would provide a better basis for exploring the distinctive ways in which 3rd sector organisations can contribute to disrupting current practices and establishing more sustainable alternatives.

**Technologies for sustainability, practices and power: water technology and social dynamics in a village in India**

*Mathur Vivek (University of Leeds, UK)*

This paper examines how the use of a technological artefact is shaped by social dynamics at the local level. Drawing from ethnographic research in a water-scarce village in North India, this paper attempts to analyse how the interaction between 'practices' and power shapes the access to, use and effectiveness of a technological intervention for sustainability. In the absence any other reliable source of water, Kotri village in Rajasthan depends heavily on groundwater which, in addition to being in short supply, is brackish and contains fluoride. A reverse osmosis plant has been installed in the village to convert the brackish groundwater into clean drinking water for the villagers. Since the electricity supply to the village through the grid is erratic and unreliable, solar panels have been installed to provide energy for the reverse osmosis plant. The solar powered reverse osmosis plant in Kotri can be seen as an example of a 'technology for sustainability' that combines social (human development) as well as environmental (renewable energy) objectives. Informed by Elizabeth Shove's practice approach, this paper attempts to understand the technology's interaction with the society in terms of the behaviour related to its use; focusing on how everyday life, habits, expectations and social/cultural norms interact with the technology. This paper further argues that social interactions in everyday life cannot be understood without engaging with the various forms of subjective power that are always present in the society. Following Foucault, this is the form of power that makes individuals into subjects; their identities imposed on them through establishment of certain knowledge claims as truths. This paper explains the interaction between the technology and its users through adopting this conceptualisation of power where people's behaviour can be understood in terms of their becoming subjects to certain 'truths'. Developing on this, it examines how an understanding of the interactions between 'power' and 'practices' is valuable in developing an in-depth understanding of the interactions between technology and society.

## **Final flourish or green shoots? Reflections on signs of sustainable consumption in communities**

*Middlemiss Lucie (University of Leeds, UK)*

In sociology and related disciplines, the concepts of consumption and community are often set up in opposition. Mary Douglas, for instance, would frame the flourishing of one as a cause of the withering of the other. As a result, much of the research activity around the concept of community has been to document its death, as consumerism takes hold. In both the study and practice of sustainability, however, the link between consumption and communities has been portrayed as a more productive one. In recent years, a host of community initiatives that address sustainability practices have emerged in the UK. Recent empirical work, including my own, has shown that through these initiatives, communities can be places or spaces in which different forms of consumption are engendered. In this paper, I take a theoretical approach to this topic, drawing on a wealth of sociological literature. In doing so, I ask: how can we explain such a mutual relationship between consumption and community? How do sustainability practices coexist with and contradict consumerist practices? Finally, does the relationship between community and consumption in this context represent a final flourishing of community before it ultimately surrenders to consumerism, or the green shoots of new community life?

## Constructing practices in imaginary futures

*Murphy Pádraig (Dublin City University, Ireland)*

How can future-orientated technology assessment work for unsustainable cultures? New forms of technology assessment, such as Arie Rip's constructive technology assessment (Schot and Rip, 1997) or Guston and Sarwewitz's (2002) real-time technology assessment involve non-expertise publics to develop some form of 'product', however successfully, whether this is a tangible object for consumption or a set of practices. These products tend to be developed on the conceptual level using well-organised public engagement events where 'futurescaping' scenarios are created, using the discursive and media/mediated practices of dialogue, inclusiveness, and imaginaries. They are talking shops, as well as workshops, but they are effective insofar as they use forms of talk as practice.

Further work is needed in the technology assessment area to optimise how we 'do' sustainability in terms of social sustainability. This means stretching the meaning of sustainability to extend technology assessment to doings and sayings across vast networks of social order. At a time when climate change science is under threat and consumption is increasing, there is of course, no value, not even for media controversy anymore, in pitting 'deniers' against 'fundamentalists.' Some fractured 'thing' needs to be arrived at. In the context of Schatzki's (2001) and Reckwitz's (2002) ideas of practice theory, this paper revisits two perspectives:

1) The positions taken in social presentation (strategies, sustainable action talk) in dialect with the flux of everyday practice (tactics of making do, unsustainable action) in the manner that De Certeau (1984) proposed in the *Practice of Everyday Life* (which is more complex than what people say they do versus what people do); and 2) Thevenot's (1984) forms of investment, which places consumption practices in the context of a immanent moral structures

The paper also asks quite directly for all of us in this sustainable STS area: is it enough that we social scientists and part-time ethnographers merely eavesdrop on conversations about future sustainability in these new technology assessment methodologies, where global catastrophe becomes science fiction, experienced as Boltanski's (1999) 'distant suffering'? Must we ourselves, be more social? These (science) fictive devices are the very discursive practices we need for shared future imaginaries, where future generations also enter the Parliament of Things (Latour, 2004).

The paper draws on the author's current work on new methods of negotiating futures that involve methodologies for public involvement, as well as a recently-completed project that demonstrated how identifying practice-orientated discourse sites of nanotechnology could be the most effective for a meaningful and action-orientated public engagement, working towards socially robust, and socially sustainable technologies.

## **Sustainability as a localised performance: the production of carbon credits in a developing country site**

*Ninan Anup Sam (Bremen International Graduate School of Social Sciences, Germany)*

One of the underlying objectives of the climate change regime under the aegis of the United Nations Framework Convention on Climate Change (UNFCCC) is to facilitate sustainability with a special focus on atmospheric resources. The regime, through its instruments like Clean Development Mechanism (CDM), clearly aims to have a sustainable development trajectory particularly for the countries those lagged behind the industrialisation process. While specific provisions to further sustainable development are incorporated in the definition and functioning of the climate regime, the very understanding of sustainability or sustainable development is contested both at the theoretical and empirical levels (example, Redclift 2005; Luke 2005; Baker 2006; Olsen 2007). It is also often found that the instruments like CDM function in an unsustainable way despite their laid objectives. The aim of the current paper is to observe this inherently conflicting process, of having the set objectives at one end and achieving a set of completely opposite outcomes at the other end, and how it is made happen institutionally. It broadens the present discussions about the practices of sustainability by positing institutions as a network of interrelations differentially integrated to knowledge production, regulatory mechanisms, consumption etc.

Based on an Actor Network Theory (ANT)-inspired ethnographic study on a CDM project in India, the paper looks into the performance of sustainability wherein the self-contained localised practices produce different and sometimes conflicting meanings on governing and consumption behaviours through its different linkages to the climate regime. Sustainability becomes a network effect of an array of not so intermeshed self-contained technologies of practices. These institutional mechanisms as sites of performance negotiate the local and the global often in a seamless manner. It also functions as the sites of producing unsustainable consumption practices elsewhere (in the developed world) by the virtue of producing carbon credits that allows the developed world counterparts (the buyers of the carbon credit) to sustain their unsustainable practices. Thus, the site of carbon offset is a space where different sustainable and unsustainable practices are performed and negotiated.

## **Institutionalising human practices in sustainable energy research: a new venture for STS?**

*Pauwels Eleonore (Woodrow Wilson International Center for Scholars)*

This paper intends to highlight some of the remarkable and interesting changes within recent Science and Technology Studies (STS) research practices and cultures. As they become more and more relevant for understanding the co-production of science and technology with policy and the management of sustainability goals, among other institutional matters, STS researchers might become increasingly involved with practices of technology development, policymaking, legal decision-making and governance in different fields, such as sustainability technologies. These opportunities for STS research might also produce entanglements such as a resulting contribution to the development of technoscientific promises related to sustainability and an increasing involvement in cross-institutional practices among which policy and decision-making practices are most salient. Such engagement is likely to have consequences for research methodologies, for researchers' obligations toward different publics, and for the kind of knowledges STS-researchers deliver.

This contribution will explore these consequences on STS research cultures and practices using as a case study, the recent involvement of STS researchers into the governance of synthetic biology. There are two main reasons that make the governance of synthetic biology an interesting window through which to look at potential entanglements confronting STS. First, synthetic biology has been staged in scientific discourses as the solution to a range of environment ills, including the problematic sustainable development. Secondly, synthetic biology has witnessed the development of what has been called "lab-scale interventions" – synthetic biologists, ethicists and STS researchers working together in the lab and sharing related funding. The collaborative Human Practices model directed by Paul Rabinow within the NSF-sponsored SynBERC project might serve as field work.

The Human Practices Lab intends to invent and implement a distinctive form of collaboration among and between synthetic biology, anthropology and ethics adequate to identifying and responding to the challenges and opportunities presented by the production of synthetic biofuels in real time. This collaboration will consider the norms and practices in play in two inter-connected salient domains: the public-private bio-energy conglomerate including SynBERC and the Energy Biosciences Institute; and civil society networks concerned with the production of synthetic biofuels. In the first case, the Human Practices Lab studies the dynamics of synthetic biofuels' design as a domain of practice through which corporations anticipate and configure human futures. In the second case, the Human Practices Lab focuses on the work of civil society activists as an array of truth claims, affects and social orientations through which these activists anticipate potential futures of newly developed capacities for bio-engineering and rhetorically frame the stakes of such capacities.

Such a collaborative Human Practices model proceeds from an interdependent division of labor on shared problems. But how will this co-evolutionary research impact STS research practices? And what does this approach mean for doing STS, especially in terms of the balance between normative dialogue and analytical-distance? What might the impacts be, beyond STS, on the ways of thinking about and doing public engagement? These are the reflections that our contribution intends to initiate.

## **CHARM: Integrating the social norm approach with a practice perspective**

*Rettie Ruth (Kingston University, UK)*

This paper attempts to integrate the social norm approach from social psychology into a sociological practice perspective. We contend that social norm approach is empirically established but lacks theoretical foundation, whereas practice theory approaches are theoretically well developed, but have proved difficult to apply.

A practice perspective avoids the dualism of individual/society by treating social practices as the primary form of analysis; most practice theorists conceive of practices as arrays of embodied activity, mediated by things, and dependent on shared understandings (Schatzki, 2001). In contrast, the social norm approach adopts an individualist approach, social norm messages shape individual behaviour by informing people about what most other people do (or think). The social norm approach has been successfully applied in sustainability contexts including recycling, forest conservation and energy consumption.

We explore different ways to theorise the social norm approach from a sociological practice perspective. First, social norm messages can be treated as part of the practices they attempt to change, material artefacts that ostensibly voice reflexive norms and understandings relating to the practice. Thus, the social norm approach can be understood as communicating 'doings' and 'sayings' within practices (what most people do) and/or as communicating normative aspects of practices (what most people think ought to be done). This corresponds with the distinction social psychologists draw between 'descriptive' social norms and 'injunctive' social norms. However, we argue the distinction is not clear cut, because practice regularities have normative connotations, that it, 'most people do this' is often heard as 'people should do this'.

Secondly, we use the concept of salience to explain the social norm approach from a practice perspective. Practices are arrays of different interconnected elements; theorists differ, but typically include understandings or meanings, rules or norms, material things, skills or know-how. These elements are often taken-for-granted by those who enact the practice, but their salience will differ between participants. Thus elements of the practice of tennis would include scoring procedures, appropriate court etiquette, serving techniques, tennis equipment, etc.; these are likely to be more salient to those new to the game or to those who are professional players. Salience will also vary during performance; for instance, Garfinkel's (1967) breaching experiments reveal the taken-for-granted aspects of greetings, similarly, the failure of the door-closer highlights its role (Latour, 1992). Social norm communication increases the salience of practice elements which participants may overlook.

We relate the theory developed here to our research project, CHARM, which combines a social practices approach with the social norm approach. In one of three studies, we monitor participants' electricity usage, giving participants feedback about their individual and neighbourhood consumption. We argue that this feedback increases the salience of: 1) energy (often an invisible element in energy-consuming practices of energy (Shove, 2003), 2) of practice norms of energy consumption, and 3) of normative expectations of reduced energy consumption, 4) taken-for-granted practice details. This increased salience may stimulate practice changes.



## **Co-evolution of everyday life and ICT – environmental implications**

*Røpke Inge (Technical University of Denmark)*

*Haunstrup Christensen Toke (Technical University of Denmark)*

In previous publications we have highlighted the integration of ICT (information and communication technology) in everyday life and the immediate environmental impacts. ICT is integrated across all kinds of everyday practices, and in consequence, the ICT-related residential electricity consumption has risen dramatically. In addition, indirect energy consumption for providing the equipment and running the ICT-related infrastructure increases as well, and many other environmental problems are related to the extraction of raw materials and to waste handling.

In this paper, we intend to look beyond the immediate impacts and explore the wider transformations of everyday life and ICT in an environmental perspective. Surely, this venture must be more speculative, and the paper is just a first step towards finding approaches to deal with the issue. To organize the discussion we need to conceptualize “activity patterns in everyday life” as well as “environmental impacts” in ways that allow for such broader reflections.

Inspired by practice theory, our previous work explores how various specific practices co-evolve with the integration of ICT, but for the purpose of this paper, we need to conceptualize connections between practices and to characterize patterns in everyday life. Inspiration is drawn from the concepts of path and project from Hägerstrand's time geography, as applied by Pred to describe patterns in time and space and the interplay between practices and social and material structures.

Environmental implications may be considered in terms of a large variety of impacts, but we concentrate on the aggregate categories of energy and materials and focus on two core links between everyday life and environmental impacts, related to time and space. First, the more materials and energy people mobilize per unit of time, the larger the environmental impacts. Second, the more mobile people are in everyday life, the higher their resource consumption. These two links seem to be particularly relevant in relation to ICT.

Based on the conceptual ideas, we discuss the co-evolution of ICT, everyday life and environmental implications from two different perspectives. First, we identify some of the connections that can be made on the basis of available empirical studies, and discuss what an extension of present trends would imply. Second, we venture upon a thought experiment: if the seriousness of the environmental predicament becomes so widely acknowledged that radical policies are implemented, how could everyday life and ICT then co-evolve to ease the transformations to a more sustainable society?

**Practising 'environmental citizenship' in the context of energy-related community projects: An exploration of relevant institutional and personal resources**

*Schreuer Anna (Inter-University Research Centre for Technology, Work and Culture, Austria)*

Transition processes that are taking place in the energy sector towards more sustainable systems of energy provision not only include the diffusion of new technologies but also open up new forms of social organisation. In particular, multiple roles have now emerged for individual end-users or 'the general public', e.g. as active consumers, deliberately choosing the utility company they purchase energy from, as energy providers in micro-generation at the household level or in energy cooperatives, as financial investors buying shares of renewable energy companies or as initiators of local or regional energy projects (Devine-Wright 2007; Walker and Cass 2007). However, recent research on citizen engagement also suggests that some critical reflection is needed on the inclusiveness of existing forms of participation and engagement, and efforts may be needed towards overcoming new exclusion mechanisms (Heitzmann et al. 2009).

Against this background, this paper investigates practices of civil society engagement with energy technologies and asks what concepts of 'citizenship' they relate to and what institutional and personal resources are required to enable these forms of engagement. It is based on an ongoing research project focussing on case studies in the area of renewable energy cooperatives, a green electricity trading platform and an 'eco-region' (an association of committed citizens of six villages with the main goal to contribute to climate protection in the region).

In a first step the paper examines different concepts of 'citizenship', in particular also looking at concepts of 'environmental' or 'ecological citizenship' (Barnett et al. 2005; Dobson 2003; Seyfang 2006), 'technological citizenship' (Saretzki 2000) and 'energy citizenship' (Devine-Wright 2007). Building on this general exploration, it will be asked what these concepts imply with respect to necessary resources at the institutional and personal level for practising civil engagement, in particular in relation to sustainability issues (e.g. opportunity structures, social capital, etc.). Turning to the empirical material of the case study, the paper then outlines the actual practices constituting engagement in the community projects studied, and briefly explores the understandings that people involved in these initiatives have of these practices. In a next step the social resources for engaging in these community projects will be analysed empirically and these results will be compared to resource understandings derived from the analysis of different concepts of citizenship. Empirical results are based on semi-structured face-to-face interviews and qualitative content analysis.

The paper ends with (preliminary) conclusions concerning the empirical valuation of the concept of 'environmental citizenship' in the community projects studied and concerning important enabling factors for citizen engagement in such projects. As this is an ongoing research project, an outlook on further research to be conducted within the project will also be provided.

## **Reconfiguring the flushing toilet: a case study of environmentally aware citizens in the lower Lea river basin, London**

*Teh Tse-Hui (University College London, UK)*

*Bell Sarah (University College London, UK)*

Flushing toilets are both a symbol and a part of the everyday practices of modern life. For the last 150 years, this type of sanitation technology has predominated as the paradigm of human waste management. However, this model needs to be reconsidered because it simultaneously disposes good quality water and fertilizer, both of which are necessary for human health but are of an increasingly short supply globally. In the UK today, flushing toilets are on average the single largest proportion of personal drinking-water use. It is approximately 30% (45L/person/day) of total household drinking-water use (Butler and Memon, 2006). Even though the large quantities of drinking-water used for flushing toilets cause multiple areas of environmental harm, it is also a fixture of everyday life with its associated co-evolution of cultural practices and technologies, which make it hard to imagine alternative forms of sanitation (Shove, 2004). To uncover the possible paths of co-evolution towards sustainable sanitation alternatives, the daily water use of environmentally aware citizens living in the lower Lea river basin in east London were investigated through interviews, group discussions, water diaries and design proposals. The methodology and analysis use an actor-network-theory framework (Latour, 1993, 2005, 2009; Callon, 1986; Law 2004), therefore it examines the network of effects between humans and nonhumans to identify the paths of co-evolution.

The first set of interviews, group discussions and water diaries centre on the daily use of water. This found that even though the technology of the flushing toilet remained the same, some environmentally aware citizens had made changes to their toilet flushing practices. These changes ranged from installing new technologies such as dual flush toilets and saver flushes, to behavioural changes including flushing only for faeces expulsion, and using grey-water instead of drinking-water to flush. The changes to flushing toilet behaviour became more pronounced when participants were asked how they would behave in a water scarce situation. In this altered environment, seven people of the twenty-nine individually interviewed considered a complete change of toilet infrastructure. Five people mentioned composting toilets; a chemical toilet, the reversion to nightsoil collection, and the use of waterless urinals were also mentioned.

These existing and imagined changes imply that there exist pathways of co-evolution of the flushing toilet. These pathways are extended through a series of compounding design suggestions that will be workshopped with the original interview and group discussion participants. The initial results of these workshops show a greater enthusiasm for a complete technology and behaviour change of human waste management rather than an alteration to existing behaviours using the flushing toilet. This research examined how flushing toilet practices could potentially co-evolve to reduce drinking-water consumption. It uses actor-network-theory to find several co-evolution pathways based upon the existing and changing practices and technologies of environmentally aware citizens in the lower Lea river basin in London. Preliminary results imply that the reduction of drinking-water use for toilet flushing requires a step change of technologies and practice rather than the co-evolution of the existing infrastructure.

## **Sharing knowledge procedures to overcome diverging sustainability perspectives?**

*van der Windt Henny (Groningen University, The Netherlands)*

*Swart Jac (Groningen University, The Netherlands)*

Current approaches to sustainability encounter serious problems. Inappropriate knowledge, weak governance arrangements, and conflicting perspectives often lead to a lack of legitimacy and poor management. Improvement efforts include multi-stakeholder decision-making, new ways of knowledge production and integrated modes of sustainability management, but it is unclear under what conditions these are successful.

Several experiences with new integrated approaches have been carried out. Some innovative sustainability-oriented practises seem to be promising, including sustainable agriculture, fishery, and wildlife management. In this paper we will focus on several of these experiences and highlight some problems, illustrated by cases of sustainable management in the Netherlands.

In general, at least four problems can be identified. First, different actors may use different perspectives concerning sustainable yield, use and ecosystems. Often, it is hardly tried to understand or to overcome these differences. Second, sustainable practices and sustainable technology are poorly connected to governmental frameworks and market conditions. Third, many actors regard science an independent source of information that can bridge viewpoints and interests, although in many cases disagreement among stakeholders with respect to sustainability is accompanied by disagreements among scientists. This causes by a lack of adequate data, problems with predictability, competing paradigms and strong interconnections between science and stakeholder's positions. Fourth, despite many calls to change it, academic science is still poorly connected to other types of knowledge such as practical knowledge of stakeholders as fishermen, naturalists and farmers.

Some successes can be reported from newly established regional networks related to sustainability practices. Within these networks, involved actors try to improve the production of knowledge and to include different visions and interests. Such networks are supported by knowledge-producing institutions, e.g. universities, CSOs and governmental institutions. The ability to work together during a considerable period is regarded a success factor, the willingness to respect, share and combine knowledge, values and aims another one. In addition, reflexivity and the readiness to learn from each other are considered to be important. These networks might be seen as an operationalization of new concepts for science in practice as developed by Nowotny et al (2003) and Functowitz et al. (1993).

We will analyse how these networks deal with problems of different visions, linkages to governmental institutions and the inclusion of science and other knowledge traditions.

**Framing sustainability in the context of renovation of single family detached house: sustainable technology or sustainable users?**

*Vlasova Liudmila (Danish Building Research Institute)*

As it follows from earlier research, the sustainable housing systems should be designed in a way, to accommodate environmentally preferred behavior, make it the most logical and easy choice so to speak. But are such considerations actually a part of the processes of design and planning of renovation of single family detached houses? Whether and how such considerations are incorporated in design and planning of renovation processes, is the question of the following study.

The question here is whether the implicit and/or explicit understandings of sustainability are reflected in the design and planning of renovation of the house, which understandings of sustainability and how are they reflected? And to the extent sustainability considerations are incorporated, how is sustainability divided between human agency and technological system of sustainable buildings?

The theoretic framework of the study will be found on the crossroads of The Theory of Practice and Science and Technology Studies, and more generally on the tradition of post phenomenological pragmatism. In order to study developmental phase of emergence of new socio-technical systems of sustainable housing, the mapping of key actors, structures and processes will be undertaken, with the special attention to their interrelatedness in the process of framing of sustainability concepts, with regard to both users and houses. Empirical material will include cases of renovation projects, background material on planning and design processes, and possibly interviews with main stake holders.

## **The difficulty of using a mobile phone in a sustainable way**

*Westermayer Till (Albert-Ludwigs-Universität, Germany)*

Why is it so difficult to behave sustainable? Practice theory is helpful for exploring this question in two ways. Firstly, following Bourdieu, Giddens, Schatzki and Reckwitz, practice theory shows that our daily doings more often than not are not the results of conscious decisions. Everyday routines are repeated, as long as social and material contexts stay “normal”. Social structure arises, enabling us to do these doings and enforcing their collective normality at the same time. From this point of view, only when the results of our doings fall short of our expectations, breaking normality, relearning and reshaping of practices can begin. The other important input from practice theory is the interweaving between sociality and materiality in systems of doings, as shown by Hörning, Michael, Latour, Shove and others. Even if we do not follow Latour’s symmetry principle, it becomes clear that human action is not only the result of human actors, but also of hybrid networks, involving various non-human co-actors who bear our practices. Here artifacts come into play. Seeing practice as result of hybrid networks also helps as now the unintended consequences of long causal chains can come into view, dragging hidden socio-ecological impacts of our doings with them, if and when we reel them in. In conclusion, one can assume that it is difficult to behave sustainable because we normally do not see the socio-ecological consequences. We do not see the hidden failings of our practices: normality is not threatened, so there is no reason for changing and re-building habits. Also, we are not the only ones to decide – our doings happen in socially structured contexts and depend on hybrid networks.

The helpfulness of practice theory for environmentally enlightened sociology and STS becomes clear by putting theory into practice. For this, I looked at the appropriation and usage of mobile phones in German “milieus of sustainability”, i.e. with people with a lifestyle that emphasizes environmental “consciousness” and self-identification with the aims of the policy of sustainability. Mobile phones are connected to a public discourse on electromagnetic radiation and health hazards, and also on breaking the etiquette of public communication. Other socio-ecological impacts of the mobile phone (e.g., the working conditions in coltan mines in Africa and factories in Asia, the globally integrated production circuit, the energy consumption of broadcasting networks or the problem of rare metals used for what essentially has become a throw-away-product) remain mostly hidden to the public discourse. Nevertheless, market-research data shows virtually no difference between these milieus and other groups in regard to the ownership and use of mobile phones. With the help of interviews and observations, the reshaping of practices to include the mobile phone – and to conceal the socio-ecological consequences – can be unrolled (using a Grounded theory approach, Strauss). The narrations show how the mobile phone becomes – slowly – an important node in the hybrid network of everyday doings. Especially enlightening are cases of non-use and of (failing) attempts to contain the use of the mobile phone, e.g. for occupational contexts only.



## **TRACK 37**

# **System Innovations and Transitions to Sustainability**

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## **Credible Expectations – the US Department of Energy's Hydrogen Program role as enactor and selector of hydrogen technologies**

*Bakker Sjoerd (Utrecht University, Innovation Studies Group, The Netherlands)*

The importance of expectations in sociotechnical transitions is widely recognized. However, there are many competing transition paths and even more competing visions and expectations, while only a limited number of paths can be supported. In the literature so far, not much attention has been paid to the actual assessment of expectations and their role in the selection of promising technologies; what makes one expectation more credible than another and, furthermore, who voices the expectations and who assesses them?

The divide between enactors, those that develop and advocate a certain technological option, and selectors, those that choose to support one or more of the proposed options, can help our understanding of expectations assessment. However, in practice it is not always clearly delineated who the enactors and selectors actually are and how they perform their 'expectations work'.

In our paper we hypothesize enaction and selection of emerging technologies as roles that an actor may perform simultaneously, rather than as fixed positions for specific actors. That is, in an emerging sociotechnical system, an actor can be a selector for a specific component and at the same time be an enactor for a subsystem or the emerging system as a whole. From this hierarchical framing we investigate what constitutes credible expectations from both the enactor's as well as the selector's perspective. For that purpose a case study was performed on the US Department of Energy's (DOE) Hydrogen Program. The program takes a central position in the development of hydrogen technologies for vehicular applications. The case study is based on DOE documents, observations during meetings, meeting minutes, and interviews with DOE staff members.

We found that the credibility of expectations is assessed in three ways. First, the DOE Hydrogen Program acts as a selector for specific technological options such as for hydrogen production, storage and end use. The selection of technologies that remain in the program's R&D portfolio is done on the basis of specific targets that the technologies should be able to meet in the future. Developers of such technologies need to convince the DOE that 'their' option is capable of doing so, based on current performance and ability to progress further to meet the targets.

Second, in its role as enactor of the hydrogen vision, the Hydrogen Program staff and its advisory committee HTAC continue to stress the future potential of hydrogen technologies in general. Especially since the passing of the hype, the vision is in need of repair and this requires renewed expectations work that counters recent disappointments. The expectations that are voiced are based on actual technological achievements, and the lack thereof for competing options, as well as strategic considerations with regard to choices made in other countries and industries.

Third, the roles of enactor and selector are very much interrelated. A credible vision builds on positively selected promising technologies. Increased pressure on the hydrogen vision has resulted in more stringent selection of enabling technologies based on their growth potential and the 'losers' are dropped from the vision's portfolio.



**Exploring the micro level of technological innovation systems: Expectations as a key to understanding actor strategies in the field of 'green' vehicles**

*Budde Björn (Austrian Institute of Technology)*

The mobility system is increasingly under pressure, primarily due to its tremendous environmental impact. The challenges to cope with – climate change, problematic air quality, depleting fossil resources – raise new requirements for the current transportation system. Therefore, innovation at several levels is necessary to transform the current automotive based transportation system into a more sustainable one. In recent years innovative alternative propulsion systems, like fuel-cell, battery-electric or hybrid vehicles were proposed, as green alternatives to the fossil fuel based mobility system.

In order to understand the contribution new technologies could make to such a transformation and the instruments by which they could be supported, a number of theoretical concepts have been developed. In particular the technological innovation system (TIS) approach promises to provide novel insights for the design of strategies and instruments to support innovation activities. Especially the functional strand within the TIS literature was designed to support the building up of sustainable innovation systems. The functional strand has improved our understanding of the processes of change within TIS, by explaining its dynamics on the basis of cumulative mechanisms of causation ("motors of change"). Virtuous and vicious cycles are triggered by certain events and contribute to the emergence or the stagnation of a TIS (Hekkert et al. 2007). However by applying this framework we still do not fully understand the causes which start and reinforce these cumulative processes, due to the lack of a micro foundation. It remains to be clarified why actors responsible for certain events respectively the further development of a TIS engage/disengage in the building up of a TIS. As a consequence, the underlying causes of the dynamics remain vague.

The proposed paper aims to contribute to a micro level foundation of the functional approach by focusing on the actors strategies within a TIS. In order to understand the strategies, which eventually pre-determine their activities (Chandler 1962) it is argued that strategies have to rely on expectations about the future, since strategies are always future oriented. This perspective is similar to concepts from management science, which explain the performance of companies basically due to their abilities to develop adequate expectations (Barney 1986). Even though the functional approach to TIS does not provide an explicit actor model, expectations seem to be at the heart of virtuous/vicious cycles as well (Hekkert et al. 2007). For that reason it is argued that an analysis of the behaviour of the actors within the TIS should concentrate on the expectations the actors base their strategies on. More specifically the paper puts forward the hypotheses that different types of actors relate their strategies to different types of expectations and that the interplay between expectations and (strategic) actions represents the main trigger to the TIS dynamics. Therefore, this paper will analyze the strategies and expectations of major actors in the TIS on mobile fuel cell technology. In order to systematize our analysis of the different types of expectations, we will make use of the multi level perspective of transition theory (see Budde and Konrad 2009).

## **Critical reflections on the performativity of transition frameworks in the making and remaking of places experienced as urban**

*Cook Matthew (The Open University, UK)*

To be successful, to have power and influence, urban strategies must reflect images of the urban which are viewed as legitimate by and resonate with key actors. In response, new conceptions of the urban implying new place qualities, meanings and identities may be enrolled within planning policy frames. Normative goals such as the need to develop sustainable urban environments are now prominent within these and may lead to the enrolment of transition frameworks. This is likely to have profound effects on space-time dynamics of places experienced as urban. However, notions of space and place are largely absent from transition frameworks and research associated with these.

Transition frameworks are generally aspatial and tend to privilege differences in time over space. One way to address this limitation is to draw on a Euclidean conception of space. This would enable the analysis of impacts of transition frameworks and the management methods these imply (e.g. strategic niche management, design experiments) on objectively knowable entities spread across an environmental surface. Changes in among others, social, technical and cultural variables associated with such entities would be identified, enabling local particularities to be taken into account when transferring findings of for example strategic niche management experiments across space.

To complement emerging research founded on the Euclidean view, this paper draws on relational geography and planning to critically reflect on the performativity of transition frameworks and associated management methods on the making and remaking of places experienced as urban. Seen in this way, place is constructed through a multiplicity of relations, including those between the natural, social, political, economic and cultural. New relations between these are constantly made and remade, therefore places are never complete. Places appear to be unchanging but are often provisional achievements. Spatial strategies play a key role in reinforcing existing configurations and relationships which generate certain place qualities, meanings and identities. Along with other new concepts, once enrolled in urban policy frames, transition frameworks and associated methods are likely to create new configurations and relationships which challenge and change existing ones. This paper presents a critical reflection on such processes, with particular reference to the role of transition frameworks in the relational politics of urban planning policy frames and thus the performativity of these in the making and remaking of urban places. The paper is largely conceptual in nature and draws on contemporary literatures from relational planning and geography to develop an alternate perspective from which spatial aspects of transition frameworks and management methods can be considered. To demonstrate the potential of this approach, it also draws to a limited extent, on a small number of case studies of strategic niche management in urban places, designed to assist in among other things, transition to sustainable mobility.

**Ontologies, socio-technical transitions (to sustainability), and the multi-level perspective**

*Geels Frank (SPRU, University of Sussex, UK)*

Using recent criticisms and suggestions regarding the multi-level perspective as stepping stones, the article aims to enhance the reflexivity in transition debates regarding social theories. To that end, the article discusses seven social science ontologies (rational choice, evolution theory, structuralism, interpretivism, functionalism, conflict and power struggle, relationism), their assumptions on agency and causal mechanisms, and their views on socio-technical transitions and environmental sustainability. The second goal is to position the multi-level perspective on transitions with regard to these ontologies and to identify directions for theoretical extensions. The MLP is characterized not as a grand or unifying theory, but as a middle range theory that makes crossovers to some ontologies and not to others.

## **Exploring the rise of motors of innovation in Danish and Dutch wind power innovation systems**

*Kamp Linda (Delft University of Technology, The Netherlands)*

This paper aims to contribute to the insights in dynamics within emerging innovation systems. Recently, within the field of technological innovation systems, research has particularly focused on analyzing interactions between system functions. These interactions turned out to form feedback loops between systems functions, which Suurs (2009) calls 'Motors of innovation'.

These results were, so far, mainly based on case material on innovation systems for renewable energy technologies in The Netherlands and Sweden. Most of these innovation systems were highly policy driven and, more importantly, they were generally not successful in delivering renewables to the market. The question arises whether innovation system dynamics for successful innovation systems may turn out to be quite different from what has so-far been hypothesized.

For this reason, this paper further investigates the notion of 'Motors of innovation' – now relating it to an innovation system that is widely regarded to be successful, namely the wind turbine innovation system in Denmark in the period 1973-2000. This innovation system has resulted in both a world-leading industry and a large implemented capacity of wind power in and outside Denmark (see e.g. Kamp, 2008). For comparison, also the (far less successful) wind power innovation system in The Netherlands in the period 1973-2000 is analyzed.

Suurs (2009) formulates four specific 'Motors of innovation' for the case studies he investigated: the Science and Technology Push motor, the Entrepreneurial motor, the System Building motor, and the Market motor. Furthermore, he found a specific order in which these motors occurred over time: first the Science and Technology Push Motor, second the Entrepreneurial Motor, third the System Building Motor, and fourth the Market Motor. This paper will examine whether these same 'Motors of innovation' were somehow present in the Danish wind turbine case too, or whether other interactions were present that could explain the success. Furthermore, the paper will answer the question whether these motors indeed emerge in the proposed order.

First insights in the innovation system dynamics for the two wind turbine cases indicate some interesting preliminary findings. The Dutch wind turbine case seems to confirm findings in previous studies by Suurs. Preliminary findings for the Danish wind turbine case, however, indicate some important deviations. The interactions between the innovation system functions do not fully resemble Suurs' motors. Moreover, the order in which the motors occur is different. Most strikingly, in the Danish wind turbine case the System Building Motor, with a large influence of both entrepreneurial activities, market formation and policy measures, appears to be important already at an early stage in the Danish wind power innovation system.

Based on the analysis, the paper will reflect on the theoretical insights into the interactions between system functions within innovation systems and formulate recommendations for practitioners who aspire to understand or support the development of emerging technological innovation systems around renewables.

**How to manage organizational innovation towards sustainability: Team up the Strategic Niche Management (SNM) with the institutional and boundary theory**

*Karadzic Vanja (New University of Lisbon, CENSE, Portugal)*

In this work we examine the idea of organizational innovation, as transition experiments. The main objective is to understand how innovation in organization practices, services, products and technologies interrelates with its social environment and if this influence is sufficient for initiating a wider change/transition to sustainability.

This paper presents a conceptual model for understanding micro-level dynamics of the organizational innovation and its contribution towards sustainability.

The adopted conceptual model combines the Strategic Niche Management (SNM) framework with the organizational sociology theories: institutional and boundary theory. More specifically, the SNM, designed originally for monitoring of single technology experiments, is used for describing the organization process (management of organization evolution and adaptation through articulation of initial expectations, creation of the social networks and learning process). Institutional and boundary concepts are employed to reveal the most important factors that determinate organization structure and behaviour.

We argue that the combination of these insights is beneficial for twofold reasons. First, it may result in a framework on how to evaluate organizational innovation in terms of its effectiveness (success and influence). Second, it may provide a useful set of guidelines/orientation for innovative organizations practitioners on how to enhance organizational innovation while contributing towards sustainability.

## **Connecting neo-Schumpeterian theory and Transition Theory: The next Kondratiev Wave and Sustainability Transitions**

*Köhler Jonathan (Fraunhofer Institute for Systems and Innovation Research, Germany)*

Drastic reductions of e.g. 80% in global greenhouse gas emissions (GHGs) compared with present levels by 2050 are now becoming a policy goal. In order to understand how such widespread changes in society and its technology might come about, a theory of long run technological, economic and social change is necessary. We argue that the neo-Schumpeterian literature provides the most convincing historical analysis of long run technological and consequent social change (Freeman and Louçã, 2001). The argument is that since approximately 1750, a series of fundamental changes in technology and therefore in society – the ‘industrial revolution’ have characterised socio-economic development. The economic processes of long term growth and structural economic change have been called ‘Kondratiev waves’. These Kondratiev waves embody changes in economic structures that have major impacts on the forms of energy use and hence climate change. The current wave is identified as being the Information and Communications Technologies wave (Perez, 2002). However, these Kondratiev Waves do not demonstrate a trend towards GHG emissions reduction, rather the reverse. Furthermore, neo-Schumpeterian theory remains explanatory – Kondratiev Waves come about as a result of combined technological developments and therefore this theory has little to say about how a directed large scale change to low GHG emissions technologies might occur. It also remains a ‘large scale’ theory of broad social change, when applied to analysis of the future.

On the other hand, transitions theory, in particular the transitions management, is being widely applied to try and achieve directed social change towards sustainability. It is also more detailed, with the ‘landscape’ top level determining environmental factors which condition a transition, while the transition approach concentrates on developments within a particular industry or region – at the ‘meso’ and micro levels.

The two literatures are therefore different, both in their scope and in the role that directed social action (including policy) plays. What the two approaches have in common is that they address ‘radical’ technological and therefore social change. The theories are self-consciously dynamic and seek to provide explanations of patterns of change through time and the features (e.g. speculative bubbles, take-off of a new socio-technological paradigm, a shift to a new technological and institutional structure) of such changes. They are therefore dealing with similar social phenomena.

This paper considers the potential contribution of Kondratiev Wave theory to the analysis of sustainability transitions. The ‘general purpose technologies’ of the current (ICT) Kondratiev Wave and the possible next waves are assessed using neo-Schumpeterian theory for their possible influence on transitions to sustainability. The analysis is applied to the case of possible transition pathways to sustainable mobility. The ICT wave could have a significant impact on the provision of sustainable mobility, partly through making new forms of more convenient public transport possible. A future Kondratiev Wave in nano-technologies and materials has the potential to dramatically reduce energy requirements through lightweight construction.

## **Governance of and by expectations**

*Konrad Kornelia (University of Twente, The Netherlands)*

In recent years, various studies have examined how expectations create shared and contested socio-technical futures, coordinate innovation actors and contribute to shaping technologies and socio-technical systems. In particular, expectations have been shown to play a decisive role in transition processes, be it in the form of guiding visions as an essential part of transition management or more specific expectations at the level of niches and local projects.

At the same time, expectations are themselves continuously coordinated and shaped in public discourses, in professional communities and in organizations. Furthermore, policy and corporate actors are increasingly initiating dedicated attempts at systematic envisioning and assessment. In parallel, professionalization and commercialization of expectation-building has taken place with experts and organizations such as consultancies and other forecasting agencies playing a decisive role in organizing expectations in specific fields. Hence, expectations play a decisive role in 'governing', that is, coordinating and shaping innovation and transition processes and they are themselves 'governed' in distinct ways.

The paper proposes the concept of governance of and by expectations, in order to capture a) the different modes of producing and coordinating expectations, ranging from the seemingly 'unbound' expectations in societal discourses to expectations 'tamed' in dedicated foresight, forecasting and technology assessment processes, and b) the different modes of how expectations coordinate and shape socio-technical developments. The concept is based on a broad understanding of governance including intentional governance, that is, intentional attempts at shaping and coordinating expectations, as well as de-facto governance referring to the patterns and structures of coordination that emerge largely non-intentionally from the interaction of many actors.

This conceptualization builds the ground for investigating the relationship between governance of and governance by expectations and for examining the specific modes and arrangements of governance of and by expectations in different societal settings as technology fields, societal spheres and organizations. To what extent differ the roles of specific governance modes of expectations in coordinating and shaping socio-technical developments and how are different governance modes related? For instance, what is the specific role of collective expectations in public discourses compared to expectations shaped in foresight or TA processes and how do both 'governance modes' influence each other? Furthermore, how does the governance of and by expectations evolve and change over time? Partly these changes will be a result of the reflexive relations between the expectations and the actors and institutional arrangements within an innovation field, since the expectations which emerge within a given societal domain may feed back on the structure that shaped them.

The paper will elaborate the conceptual framework, and integrate findings from the different literature strands and studies which have tackled specific aspects of the topic (e.g. sociology of expectations, governance studies, foresight and technology assessment literature). It will specify idealtypical governance modes of expectations, and examine their interdependencies and their specific role in the governance by expectations. Furthermore, we will illustrate hypotheses with findings from fuel cell innovation and nanotechnology.

## **Exploring the eco-innovation journey in a firm from the uk food processing context**

*Langendahl Per-Anders (The Open University, UK)*

Food and sustainability is an emerging field of research that seeks to analyse environmental (and socio-economic) impacts arising from patterns of food production and consumption. Many authors suggest that technological changes provide opportunities to move society away from unsustainable food systems and improve among other things resource productivity. Stimulus for environmental innovations is in general thought in terms of economic and regulatory factors. In contrast, systemic views of food systems and innovation that might lead to a sustainability transition address impetus factors of trends in market conditions and power relationships between supply chain actors such as retailers, food manufacturers and farmers. However, little is known about the micro-level dynamics of environmental innovation process within food sectors. This paper draws on results of a research project situated within a UK food processing firm. The theoretical background draws on innovation and organization literatures to frame a concept of 'eco-innovation journey' as a socio-technical, messy and non-linear process. The method identified to explore the construction of eco-innovation process within this firm was a longitudinal case study undertaken through action research. An ethnographic approach was adopted, involving participant observation and data were collected via reflective diary and semi-structured interviews. Findings were analysed using coding and clustering methods to make sense of data sets. Provisional results suggest that learning around eco-innovation is an iterative process of information, knowledge and measures, which is shaped by enacting environmental factors. More specifically, it was found that the cost of factor inputs and environmental regulation provide a rationale for eco-innovation activities, which often encompassed techno-centric and ad hoc solutions to identified issues. Moreover, the politics of enrolment, power relationships and fluid participation of actors have great influence over the nature and direction of the eco-innovation journey in the firm.



## **Creating collective resources in emerging technological fields: The case of stationary fuel cells**

*Musiolik Jörg (Cirus - Innovation Research in Utility Sectors, Eawag, Sweden)*

Technological innovation systems and the multi-level perspective are two major conceptual frameworks that have been applied for the study of technological change and transitions in existing sectors such as energy supply or transportation (e.g. Bergek et al., 2008; Kemp and Loorbach, 2005; Konrad et al., 2008; Raven and Verbong, 2009). A strength of these approaches is the analysis of dynamics at the level of technological fields or systems but they have also been criticized for a rather simplistic conceptualization of processes and strategic decisions at the organizational level (Genus and Coles, 2008; Geels and Schot, 2007; Markard and Truffer, 2008b; Smith et al., 2005). Due to the important role of firms and other organizational actors in transitions it is a worthwhile endeavour in our view to address this gap and to explore the micro-meso level linkages in greater detail (Markard and Truffer, 2008a).

In our contribution, we address the emergence of technological innovations as alternatives to established, non-sustainable technologies. For new technologies and the underlying organizational fields to mature, it is of key importance that institutional structures and collective resources develop which stabilize, shape and legitimate the new field (e.g. Aldrich and Fiol, 1994; Van de Ven et al., 1999). Some of these structures, or resources, are consciously created and shaped by firms and other actors as a collective entrepreneurial endeavor (Garud and Karnoe, 2003; Garud et al., 2007; Van de Ven, 2005).

In our paper, we take a closer look at the role formal innovation networks play in establishing collective resources such as common technological guidelines, knowledge platforms, R&D funding schemes or technology-specific educational programs. From empirical research in the emerging field of stationary fuel cells in Germany, we provide insights into the different resources that were produced and how these collective resources (and their properties) relate to the skills and capabilities of the organizations involved in the underlying processes. We found that it matters which organizations (and what kind of resources) come together and how they collaborate in shaping the structures and collective resources of an emerging field. In order to successfully lobby for increased public support on fuel cells, for example, the IBZ network had to establish reputation and develop ties to policy makers. These, again, critically depended on the continued collaboration of the IBZ member firms bringing together different stocks of knowledge, social networks and organizational reputation. We conclude that for understanding - and actively shaping technological transitions - it is crucial to have a closer look at the role different organizations play (or can play) in establishing collective resources and thus influencing the development of new technological fields.

## **Seven typical system failures that hamper the diffusion of sustainable energy technologies**

*Negro Simona (Utrecht University, Innovation Studies Group, The Netherlands)*

Sustainable innovations are needed in order to achieve the transition towards a sustainable energy system. However the process of diffusion and implementation of these innovations is slow and tedious due to the carbon lock-in our current energy system resides in. In the past years a lot of research has been done in order to understand the success and/or failure of the development and diffusion of sustainable energy technologies. Several theoretical approaches have been developed such as the Multi-level perspective and Strategic Niche Management or the Technological Innovation Systems approach in order to provide insight in the dynamics of transition processes. Both the Multi-level model and the Technological Innovation Systems studies highlight the long time periods that are usually required to 1) build up a critical mass of motivated actors who do research in the new technological field or who perform entrepreneurial activities in the new field, 2) realise a well functioning technology that enjoys a sufficient level of legitimacy, 3) realise a good alignment between institutional structures and the new technology. Different actors fulfil different roles in this build up process leading to many actions, sometimes in a coordinated way and sometimes not.

For example, entrepreneurs should pack together in order to provide more critical mass and formulate a common message when lobbying to the government. However one reoccurring failure observed in several Dutch cases is that entrepreneurs carry out their activities in a scattered, individualistic way and strongly compete with each other in an early stage of development. Instead of counteracting together the incumbent industry and lobby to the government for structural changes of the institutional setting, each entrepreneur tries to lobby for his specific case. Therefore the government only provides sporadic changes and support, which leads to a lot of uncertainty for entrepreneurs and eventually they stop their activities which hampers the Innovation System build-up. In Germany we see a successful Innovation System build-up where entrepreneurs form a union which continuously lobbies to the government for the whole sector and manages to install a feed-in tariff system which is revised several times in favour of renewable technologies. Here we see the benefits of packing together instead of competing or 'doing-it-alone'.

The final outcome of all these actions is very often a problematic build up process of the new TIS which results in low diffusion rates of the new technology. In this paper we identify seven typical failures that hamper the development and diffusion of sustainable energy technologies based on a scrutiny of a large number of case studies (different technologies and countries). These failures are related to a poor build up of sustainable energy innovation systems. The insights will provide handholds to formulate an appropriate policy view that can help to transform the current energy sector into a more sustainable one.

## **Transition management and its influence on existing policy arrangements: explaining the dynamics of policy change**

*Paredis Erik (Centre for Sustainable Development, Ghent University, Belgium)*

Transition management (TM) processes aim at influencing the speed and direction of societal transitions. Recent research, in particular into TM processes in the Netherlands, indicates however that the results of these efforts are somewhat disappointing. Although TM processes succeed in creating a new discourse around the need for system thinking and transitions, and although they stimulate learning and experiments with new forms of governance (Rotmans and Kemp 2009), they also wrestle with problems of power and political choices, and with a policy context that is adverse to 'reflexive governance' (Voss et al. 2009).

In parallel to what happened in the Netherlands, two TM processes were set up in Flanders (Belgium), one in sustainable materials management (in 2006) and one in sustainable housing and building (in 2004). Until now, these processes have not been widely reported upon, in particular not in terms of whether and how they succeed in innovating policies in their respective domains and whether they are confronted with the same problems transition management faces in the Netherlands.

Our proposed paper builds on a combination of the multilevel perspective (MLP) (Geels 2005, Geels and Schot 2007) and the policy arrangements approach (Arts and Van Tatenhove 2004, Arts et al. 2006) to analyse the results and the influence of the Flemish TM processes in their policy context. The MLP serves as a heuristic to chart the systemic context in which these processes are developed and the regimes they challenge. The MLP is however not very helpful for analysing the dynamics of policy change and this is where the policy arrangement approach comes in. A policy arrangement is the temporary stabilisation of the content and organisation of a policy domain. To understand change (and stability) of policy arrangements, four dimensions are analysed: actors and their coalitions, policy discourses, the division of power and influence, and the current rules of the policy game. The driving forces behind changes in these dimensions follow from the interaction between actors involved in daily policy interventions and structural processes of social and political change.

The Flemish TM process in sustainable materials management (called 'Plan C') is used as a case study. This process, which was initiated by the Flemish waste agency OVAM, aims at renewing waste policy by switching its focus from efficient waste management to a much broader management of materials in a highly material-efficient cyclical economy. The paper tries to show how the combination of MLP and policy arrangement approach can serve to understand the role and influence of such a TM process in relation to the broader policy context in which it has to find its way: do actor coalitions change under influence of TM? What is the influence on the discourse around waste and materials? Does Plan C influence power relations in the waste domain? Are the rules of policy-making influenced by the more reflexive kind of governance TM wants to be? The paper also includes some methodological reflections on the combination of the MLP with the policy arrangement approach.

## **The Role of societal pressures in transitions: the issue of air pollution and the American automobile industry (1943-1985)**

*Penna Caetano (SPRU, University of Sussex, UK)*

Introduction – An under-investigated topic in the literature about transitions to sustainability is the role of societal pressure. Sustainability is essentially a normative issue, although factors such as technology and business play a crucial role in achieving it. However, as the social costs associated with normative issues are not reflected in the market, private actors have little immediate incentive to address them. Pressure for change initially comes from civil society, and subsequently spills over to policy, markets, and industry.

Conceptual framework and case study – To understand the influence of societal pressure in purposive transitions, insights can be drawn from issue life-cycle theory, which follows the evolution of social problems from a public policy perspective. Yet, this theory pays limited attention to technological change and market processes. In this paper, I propose a framework that combines neo-institutional with issue life-cycle theory to explain the co-evolution of issues, industries, technologies, and institutions.

The framework is applied to the empirical analysis of how the American automobile industry responded to the issue of air pollution from 1943 to 1985. Although this is not a case of comprehensive transition to sustainability, it is a case of 'greening' a technology: in 1985 cars had become significantly less polluting than they were forty years before, and pressure from civil society played a key role in the process.

Case summary – In the 1940s, the first group to voice concerns about air pollution was the printed media of Los Angeles. Yet, the auto-industry succeeded in framing the issue as non-related to cars. In the mid-fifties automakers recognized the problem after a research organization connected to the industry pointed to cars as key sources of smog. The industry announced a joint-venture to speed up the development of pollution control technologies. However, this turned out to be another framing strategy to avoid regulations. In the 1960s, the environmental movement succeeded in influencing public opinion, and so congressmen raced to be identified with the cause. The process culminated in the *Clean Air Act* of 1970, which restricted emissions from new vehicles. In the mid-seventies, the issue began to fade away of the agenda due to economic reasons. Public opinion (and policy-makers) accepted the explanation that regulations were harming the economy. New amendments passed in Congress, postponing emission standards. For a while economic issues overcame normative concerns, but the definitive rollback of environmental regulations faced strong opposition from the environmental movement. In the early 1980s, three-way catalytic converters were at last installed in automobiles.

Discussion – Based on the analysis of the case, I propose a heuristic model that distinguishes four phases in a transition process. (1) Agenda-setting and framing contest; (2) Problem recognition and conservative response; (3) Regulatory struggle and defensive hedging; (4) Institutionalization of regulations and compliance. In each phase civil society plays a distinct role: from bringing the issue onto the public agenda, through influencing policy-makers, to monitoring compliance. Lessons from this historical case are relevant not only for the transition in the transport domain, but for transitions to sustainability in general.

## **A network perspective on sociotechnical transitions: the print-on-paper sociotechnical system**

*Piterou Athena (Policy Studies Institute, UK)*

The sociotechnical system of the printed paper text prevails for the diffusion of textual communication in the form of the bound volume despite concerns on the environmental effects of paper consumption. Information technology is identified as one of the generic technologies that has the potential to address the unsustainability of the incumbent regime. The electronic book is perceived as those applications of Information Technology that provide an alternative form of textual display to printed paper. According to sociotechnical transitions theory the electronic book can be perceived as a niche in relation to the print-on-paper regime.

An alternative conceptualisation of transitions as the reconfiguration of sociotechnical networks is suggested. Although the multi-level perspective has been effective in the analysis of historical case studies, it can be less adequate for the examination of transitions in progress as the distinctions between the levels are less evident. In the MLP sociotechnical change results from the interaction between three delineated levels out of which the niche is defined as the source of radical innovation. The MLP is informed by a combination of structuration and quasi-evolutionary theories. Instead, the suggested network approach draws on relational concepts of agency and the distributed nature of innovation. Unlike the nested hierarchy of the MLP, sociotechnical networks are flat representations of reality. Yet, the emphasis remains on long-term, systemic innovation. Niches and regimes are viewed as networks of organisational and technological actors enacting practices. Sociotechnical change emerges through diverse forms of interaction between incumbent and emergent organisations and technologies. The MLP levels can be identified as retrospective constructions rather than as the starting point of analysis. In addition, the concept of societal functions is problematised to illustrate how the boundaries of sociotechnical systems are evasive.

On the basis of a relational approach, Social Network Analysis (SNA) techniques are used for the visualisation and analysis of the emergent electronic book innovation network and its links to incumbent actors in the print-on-paper regime. The depiction of sociotechnical change in the form of networks can contribute to transitions research as innovation concepts become expressed through SNA measures. It has been argued that a balance between diversity and homogeneity is required for the emergence and diffusion of innovation. Network heterogeneity measures can help assess the level of interaction between homogeneous and heterogeneous actors and thus indicate factors that enable or inhibit innovation. Transitions research seeks to identify patterns of sociotechnical change. The MLP transition pathways are defined by the nature and timing of interaction between levels. In a network perspective, patterns can be identified through network structure. Network substructures on the basis of cohesion can be indicative of potential sociotechnical trajectories as actors located in cohesive areas of a network are more likely to share a similar understanding of innovation. The role of pivotal actors in transitions has also been addressed in the literature. There are a number of SNA measures that identify actors occupying gatekeeping positions and the relative importance of gatekeeping roles in the context of different networks.

**Does backcasting lead to system innovations? From vision to niche in the case of meat alternatives and novel protein foods**

*Quist Jaco (Delft University of Technology, The Netherlands)*

Participatory backcasting may lead to considerable follow-up and spin-off after five to ten years at the level of niches. However, we do know still quite little about the mechanisms involved, what the role of guiding visions might be and what is needed to facilitate the system innovation to sustainability envisioned in the backcasting experiment.

The aim of this paper is to evaluate the impact of a backcasting experiment after almost 10 years using the Novel Protein Foods (NPF) and meat alternatives as an example. This backcasting experiment in the Netherlands was completed in 1996. It focused on vegetable protein foods as a future sustainable alternative for meat, while also aiming at follow-up and implementation.

The paper develops a framework to conceptualise and analyse the impact of backcasting experiments. The framework elaborates and builds on the industrial network concept, the Leitbild concept from German sociology of technology, and uses the concepts of institutionalisation and institutional resistance. Next, it describes and analyses NPF related activities and dynamics in the Netherlands in four domains: (1) research, (2) business, (3) policy, (4) public and public interest. Results are evaluated in terms of networks, Leitbild characteristics, how these mutually influence each other and how this relates to the governance issues.

It is concluded that the effects in the four domains can be summarised as from 'nothing to niche', but can also be seen as a potential seed for a system innovation towards sustainability. It also concludes that the visions play an important role when spin-off and follow-up emerges; visions provide both guidance (where to go) and orientation (what to do) and need to have flexibility and stability at the same time in order to facilitate diffusion. Spin-off takes the form of networks that influence the visions and vice-versa. Conclusions are also related to the Multi-Level Perspective (niche-regime-landscape).

## **Managing transition towards energy efficient housing at the local level**

*Quitza Maj-Britt (National Environmental Research Institute of Denmark)*

The energy standards of housing are currently locked-in, since a deadlock persists in terms of supply and demand of energy efficient housing in the building sector. Although incremental escalation of energy standards of buildings are taking place, especially through tightening of building regulation in several European countries, the general picture remains that existing regimes in the building sector are withheld and that little innovation in terms of new radical energy efficient solutions is taking place. In order to dissolve such a deadlock in the building sector, there is a need to target a wider number of systemic factors at different levels of society, as argued in transition theory, in order to overcome the co-evolving barriers for diffusing energy efficient housing at a more radical and larger scale.

The aim of the paper is to look into the formulation of local policies that have the capability to coordinate and facilitate this complex transition process. The local scale of policy-formulation has been chosen in this paper in order to describe transition processes from the perspective of practitioners, who are hands on the specific building projects. The local scale provides an in-depth study of how specific practitioners, such as local planning authorities, building firms, building developers, technical experts and suppliers, interact and coordinate their efforts in the local arena of a specific building project (within a more general framework). The focus on the local scale allows a theoretical discussion of the significance that the interplay of practices in real time has for conditions for managing transition processes.

The study is based on a specific case study, where the Danish municipality of Egedal has engaged in a process of managing a transition towards more energy efficient housing in a new urban development area. This initiative is just one example of a new wave of initiatives among Danish municipalities, who make serious efforts to mobilise local stakeholders to implement energy efficient technologies through new forms of strategic planning practices. The study describes the framework in which the different actors manoeuvre, and how the initiatives of the local planning authority impacts the coordination and catalysing of more or less radical changes in the specific building projects in the area. Through this case study, the transition management strategies of the local planning authority, and the challenges encountered through the facilitation process are laid out and discussed. An international perspective is added to the discussion based on similar cases of initiatives of local planning authorities in Italy, France, Estonia and Romania.

The paper shows that local planning authorities may play an important role in managing the transition towards more radical energy efficient housing standards, and lays out some of the challenges in terms of necessary competences among these authorities in order to manage such processes successfully. The paper also argues for the need to consider transition processes specifically at the level of practitioners, since the local framework and patterns of interaction among local stakeholders is shown to play an important role for the conditions for transition management.

## **Understanding the role of civil society in energy transitions**

*Rohracher Harald (IFZ - Inter-University Research Centre for Technology, Work and Culture, Austria)*

Transitions towards more sustainable low-carbon energy systems without doubt require radical innovations, with new and innovative arrangements of technologies, institutions and social practices implemented at different scales - regional, national and global. Dealing with such system innovations means to be aware of the complex processes of social learning involving a multitude of actors (e.g. energy utilities, developers, end-user, etc.) and levels (from social networks and broader societal contexts). The active political and social shaping of such transformations depends on the ability to realize three key functions, namely the development of shared visions about possible 'futures' of the energy system (orientation function), the ability to generate and diffuse novel solutions for energy supply as the main engine of change (structural function), and the continuous monitoring and adjustment of developments, strategies and actions to move the energy system into the desired direction (adaptation function).

The Austrian research project E-Trans 2050 aims at contributing to this ongoing transformation process with a two-pronged strategy. In a first step a set of three socio-technical scenarios for the future of the Austrian energy system was developed based on a review of existing energy scenarios and two stakeholder workshops (system optimization and ecological modernization; radical change towards a sustainable energy system; 'break down' – what can go wrong?). From these scenarios 'key action fields' with a high potential for system innovations towards more sustainability in the energy sector were derived and further explored.

This paper will particularly deal with one of these identified key action fields, namely the potential of an increased role of civil society in energy transition processes. Especially in the 'sustainability scenario' a salient feature was that the required radical, systemic change would not only comprise new technologies and regulatory improvements, but as a core element also a change of social practices, attitudes and lifestyles which would not be achievable without broad public support and participation. In order to facilitate and enable such social changes to improve on sustainability in energy systems, a new quality of collaboration between government at different levels and civil society initiatives is called for.. Such transformations of governance at the intersection between government and civil society would not only be required at the national level, but also internationally where co-operations and treaties would have to be complemented by supra-national civil society networks, co-operations and initiatives. Central questions raised by such aims are how increased participation of civil society can be facilitated and balanced with state activities so that they can mutually enhance each other, and how the interests of individual actors can be made coherent with such a collaborative strategy.

The aim of this paper is to provide a systematic overview of the wide range of already existing civil society activities in the energy field, and to analyse the framework conditions and forms of governance at different levels to support and extend such activities in the future.



## Identifying and unravelling persistent problems

*Schuitmaker Tjerk Jan (AISSR, University of Amsterdam, The Netherlands)*

Persistent problems feature prominently in transition management and system innovation literature. They serve both as a point of departure and as a legitimization for the contention that a system innovation is needed. The concept itself is not explicitly defined though. As a result, identified problems can be extremely diverse in nature, ranging from concrete, tangible problems, like the cost of hybrid cars, to more fundamental problems, like a systemic technological bias in possibilities for problem solving. Because of the broad definition of what could be labelled as a persistent problem, the way this persistency actually works is obscured. More insight into how to delineate a persistent problem, as well as how to unravel its mechanisms of persistency, will help actors that try to overcome them.

I conceptualize persistent problems as enduring problems, in coherence with the pathways and mechanisms by which these problems are reproduced — i.e. the systemic features that make them persistent. Building on this, I propose a method to identify and unravel persistent problems.

The iterative method I work out consists firstly of a historically informed system analysis; features that can be seen as exactly the strongholds of the current system, but which have negative side-effects, can be identified. Secondly, in concurrence with that, the systemic reproduction of these negative side-effects can be unravelled by analysing how new practices give shape to their agency in relation to their direct environment.

Besides clarifying how persistent problems can be identified and unravelled, I illustrate this conceptual framework by analyzing how a new practice tries to attack longer standing problems in health care. The practice in focus deals with patients who suffer from so called medically unexplained physical symptoms, like 'chronic fatigue syndrome', or a functional impairment without traceable physiological abnormalities. These patients are generally being bounced around between several institutional settings in Dutch health care, without receiving adequate treatment. By iteratively combining a historical system analysis with firstly the further researched problem definition of this new practice, and secondly the systemic support and hampering it experiences, pathways of reproduction of enduring problems in health care are explored.

**A political study perspective for better understanding of the location of the political in system innovation**

*Seibt Claus (Austrian Institute of Technology)*

This paper will reflect the location of the political in system innovation and transition theory. For this the regime concept from a political study perspective will be exploited. The regime concept in policy studies is different from the regime concept used in transition theory and different from the notion in innovation system approaches. The term regime from a political study perspective focuses mainly on authoritative regulatory regimes. A starting point for the respective contextual use of the term in policy studies was the experience with changing actor constellations in the US-American debate on telecommunication regulations (Jannings 2009). Not alone in this sector, but in several other large infrastructure sectors new actor constellations and interplay among the actors emerged in the past years including changing authoritative regulatory regimes. Political reforms were shifting competences among actors and in particular among policy levels: from the national to the European, and from national to federal states. The political traversed to other locations.

Interest in investigating this particular issue started by observing, that transition theory and innovation system approaches often oversee the power of regulatory and political regimes and in particular the current re-constellations of these regimes. The location of the political is the place where antagonisms and conflicts have to be negotiated (Mouffe 2001) and is never the place of a broad consensus, but of negotiation and balancing of power and authority.

The aim of this research is identifying the changing locations of the political relevant for particular system innovations and transition areas. Location changes are due to political and policy reforms and an ongoing re-shifting of competencies and authorities among policy levels and actors in the European multi-level. multi-actor policy arrangement. Research results will be illustrated along several changing authoritative regulatory and political regimes in the past years.

## **What is 'protective space'? Towards a politics of niche development in sustainability transitions**

*Smith Adrian (SPRU, University of Sussex, UK)*

Theory for transitions to sustainability emphasise niches as sources of path-breaking systems innovation. A defining characteristic of niches is that they afford temporary 'protective space' for developing vanguard sustainable practices currently disadvantaged in more mainstream, market settings. Niche protective space enables improvements to the social and technological innovations that (hopefully) make it practicable (and profitable) to 'power one's home from the sun', say, or 'move about in a low carbon way'. It is therefore surprising that the dynamic concept of 'niche protection' has received little systematic attention to date. Even criticism about the desirability of protection has not prompted serious reflection on where protections come from, how they perform, and how they transform and decline. As sustainability becomes big business, so a greater variety of advocates will argue for support for their niches. The first part of our paper argues why 'protections' will be a key site in the politics of sustainability transitions and must become a component in research agendas.

Empirical research implies various forms of protection. The most common is economic: the provision of a subsidy compensates for higher costs. Grants or price support creates proto-markets and draws in other resources necessary for furthering niche practices and assessing what levels of continued subsidy (if any) are worth maintaining. However, evidence suggests responses to economic protection can be sticky and inelastic. Indeed, the rationale for socio-technical niches is to emphasise 'non-market' processes, and which require additional forms of protective space. Our paper categorises these other protections as: institutional (suspending and re-ordering norms and rules); socio-cognitive (space for new knowledge production); cultural (the symbolic meaning and social value that the alternative signifies); geographical (locations provide important resources advantageous for niche-innovations); and political (technologies embody political programmes). The second part of our paper characterises systematically this multi-dimensional protective space.

The third part of the paper develops our framework for analysing the dynamics and consequences of niche protection from a political perspective. Our hypothesis is that (prospective) niche advocates engage politically to try and secure variations of these protections. We draw upon analytical approaches in political science that focus on narratives, networks and institutions in order to study how niche advocates go about securing protections, and the conditions under which some of their strategies are more successful than others. In this way, we deepen our framework for studying the politics of niche protection. The various combinations of protection secured help shield an experimental socio-technical configuration from its selection environment. Not only are we interested in how that protection arises; but also how it is woven into niche development processes deemed central to niche theory, notably social learning, expectation dynamics and actor network formation. Demonstrating a declining need for protection can put a niche at a comparative advantage to other niches, and feeds back into the politics of niche advocacy, and influencing forms and degrees of protection over time. Empirical studies from the transitions literature will illustrate our argument, aimed at prompting discussion at the conference.

## **From «alternative» to «advanced»: changed visions of designing sustainable technologies**

*Sorensen Knut (Norwegian University of Science and Technology)*

When the environmental movement emerged in the late 1960s, it was fuelled by a critical attitude towards the technologies of the industrialized world. These technologies were seen to be imbued with features that threatened the environment not just by through polluting and wasteful practices but also by creating a centralized, machine driven society. Thus, a radical shift was needed to promote alternative or appropriate technologies. Today, such voices are seldom heard. Rather, most environmentalists join in the conventional chorus that asks for new technologies to abate the problems. The prevalent strategy is to search for technical fixes to the problem, like better renewable technologies or CO<sub>2</sub> sequestration. The call for alternative technologies has been replaced by a demand for more advanced alternatives. Clearly, the visions for how to design for sustainability have changed.

This paper tries to explore these changes by looking at some examples of technologies that once were thought of as alternative and now are pursued as high tech challenges: wind power, electrical cars, and ecological buildings. Rather than interpreting the shift in terms of a changed political climate or the weakness of the environmental movement, I shall show how the process is related to a kind of socio-technical mainstreaming of the alternatives. The will to do something about the large environmental problems is still a driving force, but this will has been relocated from the margins to the centers of technological development.

Concepts like alternative and advanced are notoriously unclear. The paper will revisit the discourse on alternative or appropriate technologies to see what these concepts were intended to convey, namely a sociotechnical political program critical of mainstream technologies. «Advanced» signifies in this context the mainstream program of pushing for what relevant expert communities perceive as front-end solutions.

**The destabilisation of existing regimes in socio-technical transitions: A multi-dimensional framework and case study of the British coal industry (1913-1970)**

*Turnheim Bruno (SPRU, University of Sussex, UK)*

This paper addresses a neglected topic in the debate on socio-technical transitions, namely the destabilisation of existing regimes and industries. The first aim is to show that destabilisation does not necessarily follow the breakthrough of technological discontinuities, but may also precede it. The second aim is to develop an interdisciplinary and multi-dimensional understanding of industry destabilisation, which incorporates economic, technical, political and socio-cultural processes. The third aim is to develop the role of agency in destabilisation. To achieve these aims, the article develops an inter-disciplinary co-evolutionary framework that conceptualizes industries as embedded in task and institutional environments and in industry regimes, which mediate perceptions and strategic actions of firms towards these environments. Destabilisation arises from three interacting processes: 1) various economic pressures that weaken the financial performance and slack of industries, 2) various institutional pressures that weaken the legitimacy of industries and external support from policy makers and the wider public, 3) decreasing commitment (loss of faith) of firms to industry regimes. The article subsequently investigates the usefulness of this analytical framework by applying it to a historical case study: the destabilisation of the British coal industry between 1913 and 1970. It investigates how important various external pressures were, how these interacted via spillovers, and how industry actors navigated the destabilisation and decline of coal.

## **A new socio-technical scenario method applied to Plug-in hybrid electric vehicles in the Netherlands**

*van Kouwen Peter (Delft University of Technology, The Netherlands)*

System innovations and transitions towards sustainability call for new scenario and foresight approaches to explore conditions, impacts and possible pathways. In this paper a novel method is developed and tested that uses insights from socio-technical scenarios and constructive technology assessment to gain insight in possible transition paths of a technology that is in a relatively late stage of development, but which hasn't been introduced yet. In socio-technical scenarios, the importance of the co-evolutionary interaction between technology and society during a transition period is emphasized. The strength of socio-technical scenarios is that it allows exploring why certain linkages and developments could occur during a future transition pathway. Our assumption is that by actively involving a broad range of relevant actors, socio-technical scenarios can be improved. We report on a relatively quick method to analyze the niche technology and provide actors with information, which enables them to better understand barriers and inducing mechanisms during the introduction of the novel technology. This method is applied to the case of Plug-in hybrid vehicles in the Netherlands. Interviews were used to gather technological, economic, socio-cultural, and political expectations regarding this technology. Results were fed into a stakeholder workshop to further elaborate on circumstances that may lead to different development pathways. The results give insight in the dynamic interaction between social and technological factors that may influence the transition pathway of Plug-in hybrid technology.

## **Scaling up or embedding niche innovation? Transition experiments, policy environments and institutional context**

*van Sandick Emma (TNO Innovation and Environment)*

To curb the looming energy and climate crisis, system innovation towards low carbon systems is considered necessary in energy supply, distribution and use. This calls for transitional changes not only on a technological level but also in economic, socio-cultural and institutional terms. The term transition entails the broad, system-wide interaction and co-evolution of new technologies, changes in markets, user practices, policy and cultural discourses, and governing institutions.

Policy guidelines laid out for transition governance concern interactivity, pluralism, multilevel focus and social learning to induce system innovation. In more concrete terms, long-term visions and pathways to system innovation are translated to practice by concentrating on search and exploration processes in which firms, research institutes, universities and governments are navigating and negotiating their way forward, gaining knowledge and experience along the way. This puts a premium on real life experiments that address the technological, economic, social, cultural and institutional dimensions of the envisioned transition from a carbon fuel to a sustainable energy society. To highlight the locally emergent yet potentially transitional character of these experiments, the term niche experiment is often used.

A recurrent challenge for transition experiments concerns the difficulties to upscale towards broader and more widespread application in society or, phrased differently, to accelerate the process from the initial 'niche' to a large scale transformation. But while scaling up of experiments may be the perceived challenge, there is a risk that policy aimed to scale up a particular niche experiment unidirectionally into the mainstream falls short of the expected results in a similar way as much technology push policies have done. Following Markard and Truffer (2008) there is a bias towards facilitating bottom-up niche upscaling which has come at the expense of more structural reform of socio-technical regimes. This means that the crux does not only lie with the experiment as such but also with the socio-technical context in which the niche is supposed to become embedded.

Even though there is an increasing interest by analysts of transitions into the role of differing contexts in which the co-evolution of technologies, actors and institutions are shaped, context is often treated as a passive background variable providing little causal explanation.

Drawing on a meta-analysis of various casestudies, this paper compares different emergent niche technologies. The niches are analysed drawing on a framework that combines the technological innovation systems approach with institutional analysis. In this way we explore the relationship between (energy related) niches and their institutional context. More specifically we seek to contribute to the literature by showing how upscaling of transition experiments and niche technologies may depend on the broader policy environment in which they are (geographically) situated.

## **Rainwater Harvesting in the UK: Socio-technical Theory and Practice**

*Ward Sarah (Centre for Water Systems, University of Exeter, UK)*

There is currently a window of opportunity in the UK, with respect to sustainable water management (SWM). Periods of alternating drought and flooding have brought water management issues to the fore of UK media coverage and policy development. Unchallenged reliance on the historic legacy of piped infrastructure is declining, as its resilience and adaptability in the face of climate change becomes increasingly questioned. However, unlike the field of energy management, the journey of SWM is just beginning. Although widely accepted at an academic level for at least a decade, it is only now beginning to break through into practice. This has been facilitated by the UK Government's drive to reduce the impacts of flooding, maintain security of water supply and reduce carbon emissions (by beginning to highlight the water-energy nexus). In relation to maintaining security of supply, current strategies focus on reducing demand by promoting and implementing water efficiency programmes.

Other SWM techniques, such as greywater reuse (GWR) or rainwater harvesting (RWH) are receiving more attention, as alternatives to the centralised water distribution system (WDS) are increasingly sought for a number of reasons. At the institutional level drivers include a number of sustainability agendas and at the individual stakeholder level a desire to achieve a level of independence from the WDS or to make financial savings on water charges. Despite its prevalence in other countries (Germany, Australia, Japan) and a recent surge in sales, RWH has yet to transition from niche to mainstream in the UK. The research described in this paper has identified that possible explanations include dissatisfaction with the quality of installations, the limited suitability of conventional products to the UK context and a lack of commitment to the provision of support services.

This paper presents research that explores the application of a range of social research theories (multi-level perspective, transition theory, receptivity theory, diffusion of innovation, ecological modernisation, self-efficacy, social identification and social representations theories) to the current status of RWH in the UK. Consequently it has been established that it is in a pre-transitional acceleration phase. However, the outlined issues appear to undermine the current acceleration and have the potential to result in the failure of RWH to transition, resulting in it remaining a niche. Using the social research framework outlined combined with socio-technical evidence gathering, a strategic framework for supporting the implementation of RWH in the UK has been developed.

The framework identifies the actors involved and actions required to achieve the overall 'vision' for RWH, determined as being an increase in successful implementation of RWH projects. The actors identified include institutions, implementers and end-users. Actions relate to building the technical relevance of products, building capacity to increase the receptivity of different stakeholder groups and building institutional commitment to RWH. Practical 'on the ground' recommendations have also been derived. This paper describes the theoretical, methodological and analytical origins of the strategic framework, its relevance to operational practice and its value in supporting RWH's transition from niche to a mainstream part of the SWM approach.



## **Transformative RTI Policy. A Difficult Transition. The Case of ProductionConsumption 2.0**

*Warnke Philine (Fraunhofer Institute for Systems and Innovation Research, Germany)*

During the last years, research and innovation (RTI) policy has taken a „normative turn“. Many countries as well as the EU are orienting RTI programmes towards the „grand challenges“. In particular sustainability has become a major innovation policy issue. „Eco-innovations“ and „green technologies“ are expected to pave the way to future lead-markets, the race for the „green jobs“ of the future is in full swing and green technology funding programmes abound.

However, as sustainability researchers have long been pointing out (e.g. Tukker & Butter 2005), in order to achieve the order of magnitude in reduction of ecological footprint required to preserve the earth's eco-sphere, technological innovation within today's socio-ecological paradigm is not enough. Rather, transformative socio-technical innovations (Steward 2008) that underpin transitions towards sustainable patterns of production and consumption are required.

Using experience from the recently finished BMBF-Foresight-Process we argue that putting transformative socio-technical innovation on the agenda of RTI policy is crucial but extremely challenging.

Unlike other policy domains like transport or infrastructure RTI policy is little accustomed to seriously investigate the social side of socio-technical co-evolution beyond questions of „acceptance“ or risk assessment in a few outstanding cases. Accordingly, even though system innovations are explicitly included in the „eco-innovation“ concept (Bleischwitz et al 2009), many RTI funding programmes are mainly targeting individual „green“ product or process innovations in a „picking the winners“ manner. Introducing transformative innovation thus requires a cultural change towards reflexive approaches not only in the policy arena but throughout the RTI landscape. Often this will involve challenging established power constellations such as the organisational structure of ministries and directorates, research organisations and universities.

To pursue sustainable system innovations diverse RTI strands including social science and humanities need to jointly explore different socio-technical pathways. Discursive, experimental approaches such as transition management, foresight and living labs need to be deployed. Analytical concepts from STS and innovation studies such as socio-technical scenario building, multilevel framework, actor network theory, TIS analysis as well as creative methods from design and engineering will have a role to play.

The recently finished German BMBF-Foresight-Process raised this challenge. As a long-term priority for German RTI policy it suggested „ProductionConsumption2.0“ which is focussing on transformative innovation of production-consumption patterns towards sustainable resource flows. The core of the approach is to integrate research perspectives from production technologies, environmental technologies, service science as well as social science and humanities around critical bifurcations of socio-technical pathways. In parallel, the setting-up of methodological capability for modulating transition processes is foreseen. Even though many actors from the RTI landscape and BMBF welcome the proposal, the implementation is encountering many of the difficulties outlined above.

In the paper we will outline the emergence of „ProductionConsumption2.0“ within the BMBF-Foresight-Process and sketch the current implementation efforts. We will draw tentative conclusions on the main challenges for putting transformative innovation on the RTI policy agenda and discuss theoretical implications for reflexive RTI governance.

## **A systems approach to transition dynamics: providing a foundation for legitimizing goal-oriented policy strategies**

*Weber Mattias (Austrian Institute of Technology)*

The multi-level perspective on long-term transition processes has attracted quite some interest in academic as well as in policy circles over the past years. At the same time, the innovation systems approach is still the dominant perspective when it comes to devising research, technology and innovation policies, which are a crucial element on any transition agenda. More recently, innovation systems approaches have adopted a more differentiated perspective on the specificities of individual technologies and sectors, and also taken into account the influence of broader sectoral policies.

The respective strengths and weaknesses of both perspectives are well known. Whereas the transition framework is stressing the long-term and multi-level character of sectoral transformations, the innovation systems perspective is very explicit in terms of the role of actors and institutions for the shaping of innovations, and with respect to the legitimization of policy interventions on the basis of system failure arguments. In addition, innovation system oriented policies are focusing on the improvement of organisational or institutional infrastructures to enhance innovative capabilities, while transition management approaches aim at supporting transformation processes of sectors of provision towards particular socio-political aims such as a more sustainable generation and use of energy. This dichotomy of structural innovation policy strategies on the one hand and thematic ones on the other has been a major source of controversy in research and innovation policy over the past decades. In spite of obvious complementarities, a closer conceptual integration of the multi-level transition perspective and innovation system approaches is still missing. Such integration, however, would be important to theoretically enrich our understanding of sectoral transformation dynamics and increase the practical policy relevance of sustainability transition perspectives by enhancing their compatibility with current dominant policy discourses and framings and thus providing a systematic foundation for designing and legitimizing policy strategies for transitions.

With this paper we want to make a step in this direction and explore the synergies between the multi-level and innovation system approaches. On the one hand we will more explicitly introduce system concepts to our understanding of sustainability transitions while on the other hand making better use of a multi-level understanding of transitions for mainstream national and sectoral innovation policies. More specifically, our aim at a conceptual level is to make the main types of mechanisms driving the dynamics of system transition more explicit. This will be achieved first of all by putting greater emphasis on the crucial roles of actor strategies and of the orientating function of institutions as captured in the innovation systems perspective, and secondly by explaining transition dynamics on the basis of key concepts from complex systems research, i.e. from the theory of Complex Adaptive Systems in particular. At the policy level we will then suggest how current national and sectoral innovation policies could be extended and adapted to make them more amenable to the consequences of long-term oriented transition thinking.



## **TRACK 38**

# **Towards Zero Emission Buildings, Settlements and Cities**

### **Convenors:**

**Susanne Balslev Nielsen (Technical University of Denmark)**

**Thomas Berker (Centre for Technology and Society, Norwegian University of Science and Technology)**

**Translating sustainable development to the domain of a local public authority – reflections on the use of indicators for sustainable urban development**

*Balslev Nielsen Susanne (Technical University of Denmark)*

Purpose: The paper discusses indicators of sustainable urban development as a tool to ensure integrated thinking and avoid too uncoordinated sectors planning in a local authority.

Theory: The theoretical framework consists of literatures from ecological modernisation, new public management and research in the build environment.

Design/methodology/approach: The paper is based on empirical studies of Danish local authorities in the process of negotiating new strategies for urban planning and facilities management. This includes interviews with technical directors, observations of meetings with representations from different departments within the same local authority as well as dialogue with NGO's.

Findings: The findings are: a discussion of the lack of sustainable practices within the organisation of a local authority, and the potentials and barriers of using sustainability indicators as a tool for integrated thinking at organisation, building and city scale.

## **The disconnect between mobility-as-plan and mobility-as-practice**

*Buhler Thomas (INSA, Lyon, France)*

This abstract aims at presenting a research work focused on the rationalities of resilient car-driver's social mobility practices in the metropolitan space, compared to the rationale of urban mobility masterplans in order to underline the disconnect between the design of mobility systems and their actual use in the context of targeted modal shift. "Resilient" refers to the ecological concept and is applied to social practices of mobility that remain stable in spite of urban environment changes (parking policies, public transportation alternatives, development of intermodal solution). We consider here the urban environments (in the plural form as many of them are different) as the subject of urban planners and designers (broadly referred to as architects, urban planers, elected officials together with engineers) [Toussaint, 2004]. In the new paradigm of the so-called sustainable city, these planners and designers now target a modification of social behaviour, which is particularly obvious in the urban mobility field. Among other minor targets (such as lowering car-mobility or isolated attempts of car-free neighbourhoods, which are far from sustainable planning practices) the issue of modal shift seems to gather consensus in the planning community in a majority of European metropolitan contexts. Having said this, the majority of French metropolitan cases show no decline in the modal-share in favour of private cars but only stagnation in some of the most volunteer cities. This situation leads us to our first hypothesis assuming that mobility-as-planned is developed in a different rational context than does mobility-as-practices'. To establish this hypothesis we refer to several recent works from the French-speaking urban planning research community [Kaufmann, 2002]. This approach of identifying the disconnect between rationalities in planning and rationalities in social practices in the urban mobility context is aimed to extend to the complex perception of urban environments by car-drivers, to identify the target of modal-split policies. This perception will deal with several issues in the urban fabrication (time, space, distances, social context, prices, and constraints for parking).

The second main issue of this conceptual framework deals with rationalities of user's mobility practices. The axiological rationality [Boudon, 1995] seems to be heuristic to question values and practices, searching for the rationale behind the conclusions that users draw when making mobility decisions (for example, "the car is faster"). This justification process needs to be finely analysed in combination with several concepts, norms and values that "make sense" for the individual. We propose the hypothesis that the combination of perception biases and axiological rationalities could helps to explain behaviours defined as "irrational" for urban mobility planners.

### **METHODOLOGY AND RESULTS**

Assuming that the best experts in usage are the users themselves, we developed a user-oriented methodology for the first and most important field-work survey of my PhD. This survey will be organized in three phases and will follow the key-issues and concerns of 50 individuals with car exclusive modal practices throughout metropolitan Lyon.

**Track 38**  
**Towards Zero Emission Buildings, Settlements and Cities**

- “In action” survey giving hand held recorders to private-car drivers to describe their urban environments and their choices during their mobility practices
- After the synthesis and analyse of practices, half-guiding clarifying interviews with drivers
- Comparison to “real” environments (price, distances, time...) and their planning rationale

This survey will start next week making allowing for the presentation of first results during the conference. The objective is to focus this presentation on the role of “parking” and “sustainability” in the axiological register of justification by resilient drivers.

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## **User participation in future carbon-neutral settlements**

*Löfström Erica (Norwegian University of Science and Technology)*

It is generally acknowledged that end-users are an important factor in the creation and maintenance of a long-term sustainable resource use. How and when resources are consumed obviously determines the ability to create long-term sustainable systems. Users are also ultimately the ones who profit or suffer from the successful or failing transformation of socio-technical systems, which increases their importance as a key component of the system.

Taking on the challenge of global warming, carbon-neutral settlements, low-energy dwellings and sustainable land- and water use become key issues. To develop sustainable energy systems, users need to transform their behavior and start reflecting on their energy use. The aim with this paper is to discuss different methods to achieve and maintain user participation in the building of new residential areas with ambitious goals for environmental sustainability. Every method has its drawbacks, but combining different energy- and resource visualizing methods could be one way to highlight households' energy use and their possibility to energy conservation. By using the results from the introduction of such methods when developing information campaigns and in energy guidance, as well as including energy- and resource visualizing equipment in the building of carbon neutral settlements, we can find strategies that appeal more closely to peoples' behavior, hence making it easier for households to put the advice into practice in their everyday lives.

## **Towards a sustainable energy system in Stockholm – a study of the regional planning of the district heating system between 1978 and 2010**

*Magnusson Dick (Department of Thematic Studies, Technology and Social Change, Linköping University, Sweden)*

Stockholm is by far the largest city region in Sweden and has a long history of regional planning. Since the region has the highest and most dense population, regional cooperation is important in many aspects, for example by finding regional solutions for the infrastructure and for energy systems. By cooperating to create regional supply systems it is possible to create more robust and ecologically and economically sustainable systems that use the land as efficiently as possible. An example of such cooperation is the regional district heating systems in the region. The energy consumption for heating and hotwater in buildings is a major share of the Swedish energy balance, and in Stockholm 13 of 55 annual TWh energy use is consumed by district heating. Great potential for climate friendly solutions therefore lie in the system. The individual district heating systems have gradually been interconnected and through these interconnections a better optimized system can be created where peak loads can be evened out, and thus using less fossil fuel. District heating's economies of scale can be used advantageous and makes it possible to build combined heat and power plants for more efficient and environmentally friendly energy production. During the last decades a transition into renewable fuel in the system also has been done, and today approximately 60 % of the fuel is renewable. However, such development does not happen by itself. The municipalities in Sweden have planning monopoly so the creation of a regional energy system requires a shared vision and long-term planning. The regional planning authorities may have visions, but the municipalities are the ones that realize them. The aim of this study is therefore to study and compare the municipalities' comprehensive plans from a regional perspective regarding district heating. By studying Stockholm region's 26 municipalities' comprehensive plans between 1978 and 2009, and comparing these with the regional plans, it is possible to understand their perception of the importance of regional cooperation regarding energy systems and district heating. Furthermore, the aim is to study how the view towards energy and district heating has changed over the time period chosen. What general differences between the municipalities can be seen, how does this change over time and how can this be explained?



## **Zero emission living – architectural strategies**

*Støa Eli (Faculty of Architecture and Fine Arts, Norway)*

The idea of architecture as a tool for social change is not new. The understanding of the relationship between the built environment and its users has however shifted during history from rather simplistic beliefs in deterministic correlations to strong doubts of the impact of architecture. Today however, there seems to be a renewed interest within the architectural profession of the idea of architects and planners as agents for change as well as of architecture's capacity for agency. Parallel to this, the theoretical basis for the understanding of the dynamic and mutual relationship between humans and material objects has developed. Within this context architecture constitutes one dimension of a residential culture regarded as a socio-technical network involving dwelling, design, humans, artifacts and meanings of home.

The climate crisis and the established fact that the built environment play an important role in dealing both with mitigation and limiting climate change is one reason for this interest. It is generally agreed that there is a need to not only the refine technological properties of buildings, but also to create architectural solutions that affects the way people live, their everyday habits and even their values and attitudes.

These issues were the topic for the master course in Housing Design at the Faculty of Architecture and Fine Arts at NTNU in the fall 2009. A group of 15 architect students were given the task to design a multifunctional neighborhood at Brøset in Trondheim, which by architectonic means should support residents to make environmental-friendly choices in their everyday lives. The students were free to choose if the focus should be on area layout, design of common outdoor areas, public space or other kinds of common properties, or on a more detailed architectural design of a group of buildings that may involve 20-30 housing units, perhaps together with other functions.

The paper will, on the basis of the student's design projects, discuss how architecture may be regarded as a strategy to support "zero-emission" living. It will present proposals on various levels, from neighborhood design and housing typologies on one hand to practical and aesthetic solutions on the level of architectural detailing on the other. The projects exemplify how architecture on different levels could to create opportunities for a more environmentally friendly practice and even make this kind of practice attractive. They thus provide statements of an architectural framework for moving Norwegian residential culture in a more sustainable direction. Aspects of this framework are diversity and abundance (aesthetical as well as functionally and socially), comfort and functionality, community and privacy, identity and place attachment and robustness and changeability.

Presenting these architectural proposals may open up for elaborations of future living and as such contribute to the shaping of renewed understandings of ideal homes and thus in itself affect residential culture even if they are not yet built. Discussing them within the theoretical framework of socio-technical networks may also share light on the possible role of architects (or architectural students) as shaping agents of residential futures.

## **Resources and built form. One focus, different approaches**

*Wågø Solvår (Faculty of Architecture and Fine Arts, Norway)*

Increased focus on buildings environmental effect and energy-consumption has caused a development of new building concepts. This may imply new possibilities in architecture as well as new architectural expressions.

The aim of this paper is to discuss how different approaches regarding energy efficient housing deals with architectural quality and housing quality and how different ideologies are expressed in the design concept. The paper will be based on analysis of two built projects that use significantly different technologies and design principles for reduction of energy use. The two projects are BedZed (London, U.K.) and Løvåshagen (Bergen, Norway).

The design-concept has considerable consequences for energy-consumption. On the other hand buildings' energy-consumption may have implications for architectural quality and housing quality. Form understood as volume, zoning and orientation, the building envelope in terms of how tight and compact it is, if it consists of more layers (single or double facades), how daylight, heating, water and ventilation is taken care of, is of great importance in the design concept and will have great impact on energy demand.

The question that is going to be raised in this paper will be how the choice of energy concept and technology influence the architectural solutions and the housing solution.

The purpose of this study is to develop knowledge that will contribute to a better understanding of the necessary interplay between energy-concept and design.

Løvåshagen is a passive house project and is representing the present "state-of-the-art" in Norway when it comes to energy efficiency and how this is implemented in energy efficient architecture in Norway today. Finished in 2009 it was the first passive house apartment block in Norway and it is often mentioned as a reference and an ideal to follow by The Norwegian State Housing Bank, Enova and researchers in this field. The passive house concept is based upon simple solutions; It is a robust, compact and air tight building volume. The concept may involve both low-tech and/or high-tech solutions.

BedZed represents an alternative approach regarding the use of materials, orientation, active and passive systems and technology versus natural systems. It also represents a different approach regarding the expectations to residents' involvement and responsibility. Living at BedZed implies a holistic approach to sustainability in terms of transport, food and consumption in general. It was designed as a demonstration project to create a thriving community in 2002, and is by many regarded as the largest mixed use sustainable community in the UK.

The paper will qualitatively evaluate total resource use, i.e. resource use both for production, operation, and demolition of the buildings and discuss what are the most important resources to consider in these cases.

Key-points to be considered in the study is what impact the used energy design principles has on general housing qualities as daylight, usability, indoor climate and comfort, and what main differences it makes when it comes to the focal point; reducing emissions and the use of energy.

## **Net Zero Energy Solar Buildings at High Latitudes: The Mismatch Issue**

*Widén Joakim (Department of Engineering Sciences, Uppsala University, Sweden)*

*Wäckelgård Ewa (Department of Engineering Sciences, Uppsala University, Sweden)*

Net zero energy buildings (net ZEBs) have recently gained more attention as a means to reduce, and reinforce local control over, energy use and greenhouse gas emissions in the built environment, also in high-latitude countries. In a net ZEB the total amount of on-site generation matches the total demand on an annual basis. Renewable energy sources typically fluctuate on a number of different time scales – often in negative correlation with the demand – which means that there will at many times be a mismatch between on-site renewable generation and the local demand: either a surplus has to be delivered to the local distribution grid or there is a net demand that the grid has to supply. Because of this interaction with the distribution systems, a net ZEB should never be considered as an isolated system.

Indeed, the significance of the mismatch, and how it should be valued, depends on both local and ‘global’ energy system properties. For example, if there is on-site overproduction during times when the local distribution grid is heavily loaded the mismatch is essentially beneficial for the distribution system, while at low load occasions it might not be. Similarly, local mismatch in a building or a group of buildings might coincide differently with the demand on a regional or national energy market. For example, local overproduction mismatch at times with low market prices also shows a mismatch with the total demand on the market, which for the building owner is reflected in the low value of the delivered surplus.

This paper quantifies the energy mismatch for a Swedish domestic building with solar photovoltaics (PVs) on different time scales and discusses the significance of the mismatch from an energy systems perspective. Sweden is a high-latitude country, which means that solar energy availability varies heavily between seasons, besides the diurnal fluctuations. The paper builds on an interdisciplinary project on distributed photovoltaics in Sweden, where detailed domestic load models have been developed, matching between domestic power demand and the generation profiles of PVs have been investigated and the impacts on the local power distribution system have been simulated. In the paper these approaches and results are applied to the special case of net ZEBs.

The specific goals of the paper are to:

- (a) Summarise our previous research that is of relevance for net ZEBs,
- (b) Apply previously developed models and approaches to net ZEBs with PVs, and
- (c) Present a comprehensive view of the mismatch issue from different viewpoints; the local building, the distribution grid and the energy market, both in terms of energy balances and economics.

The mismatch for buildings equipped with PV systems and with representative modelled and measured power demand is evaluated at different aggregation levels (one house / a net zero energy area) and on different time intervals. The mismatch, and the difference in mismatch between households, is also discussed with respect to the habits of the members of a few case households. The mismatch is further valued with respect to the distribution grid and to the national power system/market. The economics of the mismatch for a house-owner is also discussed.



## **TRACK 39**

# **Practices on the Move: Dynamics, Circulation and Diffusion**

### **Convenors:**

**Allison Hui (Lancaster University, UK)**

**Elizabeth Shove (Lancaster University, UK)**

**Nicola Spurling (Lancaster University, UK)**

## **The evaluation society? The translation of the evaluation conceptual category**

*Ambrosino Katia (ISTAT – Italian National Institute of Statistics, Italy)*

*Abbatino Giuseppe (University of Rome “La Sapienza”, Department of Innovation and Society; ISTAT – Italian National Institute of Statistics, Italy)*

The aim of the paper is to describe the first results of an ongoing reflection and research experience on the trajectory followed by the conceptual category “evaluation” in its translation within the different disciplines of the socio-economic and legal-administrative fields; the study is carried out by paying particular attention to the way the evaluation theme moves from “cultural need” to law and norms, from norms to practices, and from practices to practices and to culture and norms over again.

As many other recent “very popular” conceptual categories, such as knowledge management, total quality management, new public management, the category of evaluation is rich of multidisciplinary approaches; it is crossed by different heterogeneous contributes and studies, and it is applied by different actors.

Concerning studies, the starting point is the literature on new public management and total quality management; the evaluation conceptual category is also fed by studies on the valorization of knowledge such as knowledge management, intellectual capital, and intangible asset evaluation; another point of view is also offered by accountability practices and organizational and socio-technical system reliability.

When considering the actors involved, reference studies and points of view increase. As actors, there are research groups of and within the different disciplines (each with its own in-depth examination branches), there are those who concentrate on the editing of norms and laws, there are technicians and technocrats, there are bureaucracies, “cultural lobbies” and policy makers. In fact the issue of evaluation during the past years has actually become a public policy in itself and, as such, it could be studied using a policy analysis approach.

Among all the actors involved, a bouncing process of various concepts, practices, instruments, material and symbolic objects, questions, creative intuitions and incremental solutions, problems, explanations and relapses, has started and forces to continuously revise the evaluation category. With its different approaches and its various definitions, which are constantly integrated and updated, the idea of evaluation has translated, having crossed different fields and disciplines, driven by different inclinations and interests, applied with different instruments, processes and artifacts, declined for different purposes, deepened by different authors; enriched and renewed it has been influenced by just anything and has influenced back the spheres that have come across it. Evaluation, in the past twenty years declined according to various scientific, normative and practical needs, has travelled, through time and through the different disciplines, in a continuous bouncing, like a ray of light, refracted and reflected by the levels and the context crossed, nourishing and transforming itself each time according to a translation trajectory.

Besides, after the age of information, from Castells on, and Foray's knowledge economy, and many other authors' knowledge society, something had to be done of all this information and knowledge...evaluate it!

This research tries to focus on the trajectory followed by evaluation specifically within the Italian public administrations. In the study both qualitative and quantitative approaches and instruments are used. In particular, in order to reconstruct the translation of evaluation from concept to public administrations reforming laws, and from reforms to practices (actually a cycle that started over again), the research uses the public policies analysis approach, reconstructing the net of actors, the political attributes, the legislative level (also from a semantic point of view), etc.. Evaluation is also studied as an individual and a collective "learning" phenomenon, taking place in practice both in single organizations and in organization groups considered from an institutional point of view, through the analysis of case studies carried out using organizational and institutional documents scouting, the study of structure and of material and immaterial objects linked to evaluation, interviews with actors and talks with key figures, and when possible, through participant observation.

## **Invasiveness: the construction of a category and its impact for wildlife management practices**

*Boonman-Berson Susan (Forest and Nature Conservation Policy Group, Wageningen University, The Netherlands)*

*Turnhout Esther (Forest and Nature Conservation Policy Group, Wageningen University, The Netherlands)*

Last years, invasive species are considered as the second cause for biodiversity loss after climate change. Defining species as invasive has important implications for how they are treated; attributing the label 'invasive' to a species can result in its eradication or denial of access to a certain territory.

As all classifications and categories, the category of invasiveness does not stem from nature itself; it is made. Furthermore, invasiveness is a contested category. Some argue that invasiveness is about species who are non-native, or alien, to an area. Others argue that invasiveness is about ecosystem effects. In that case, any plant or animal species, regardless of their origin or nativity, can be invasive when their overall environmental impact is high. Clearly, this issue is one in which science and scientific data have a crucial role to play in determining the nativity of species and their ecological impact. However, the contested nature of the issue also makes clear that the question of how to define the category of invasiveness and which data will be relevant are not yet resolved. Not in science and neither in policy and societal practices. The different prevailing definitions that circulate through and between the four practices under study: Science, policy, society and management, makes it a diffused concept. To understand this diffusion and the corresponding dynamics between practices, we studied the wildlife management practice of the wild boar in the Netherlands in more detail. We explored the manageability of invasiveness. Which categories are used for the management of the wild boar, how are they interpreted and what are the implications for the wild boar? Together with the different meanings and definitions of invasiveness that are currently present in debates about conservation science, policy, management and in society, we clarify the different positions and dynamics in the debate of invasiveness.

**Where ‘water disappears’: Methodologies for moving beyond household water demand as resource abstraction, behaviours and economics**

*Browne Alison L (Lancaster University, UK)*

*Shove Elizabeth (Lancaster University, UK)*

Water demand management is increasingly been viewed as a robust, low regret adaptation option in the face of climatic change. Water demand and consumption is often simply treated as a location where ‘*water disappears*’ – a place that requires water; demand as a form of detached abstraction. As common is the ‘*price + information = water savings*’ equations that dominate the psychological and economic literature on water demand. These perspectives miss the spatial and temporal dynamics of practices that use water; and fail to reflect the potential for transitions in practices, as well as misrepresent ingrained water-using practices as potential sites of behaviour change. They reflect little of the current intersections between technologies, institutions, infrastructures and everyday life, let alone the intersections that may emerge in the future. Current water management frameworks render invisible the synchronised choreography required by diverse disciplines in replicating this circular waltz between supply and demand as appropriate responses in the context of climate change. In this paper, we explore the translation, adaptation and evolution of practice theory perspectives to multidisciplinary water settings in the UK and Australia. We explore a range of potential methodologies that could provoke new understandings of water demand – methodologies that ‘stop the talk’ about water (resources) and reflect instead traces of practices and the provision of services, capture the links between supply and demand, reflect negotiability of practices in households, and begin identifying potential practice oriented interventions. This paper reflects upon diverse methodologies that could be used to study paths of socio-technical transition, and the processes of negotiating and provoking new understandings about water demand and the dynamics of social change in diverse science and policy settings.



## **Doing citizenship. Ritual practices on the move**

*Damsholt Tine (Copenhagen University, Denmark)*

Citizenship ceremonies are forms of ritual practices emerging in several old European nation states. Intended to create a sense of belonging, they are part of increasing problematizations of migrant loyalties, transnational and hybrid identities. Taking its empirical point of departure in the situated socio-material enactments of citizenship at the ceremonies this paper will explore the trajectories of these 'laboratories' for articulating and materializing new practices of belonging in all their ambiguity and heterogeneity.

The 'laboratories' for making loyal citizens are not equipped in the same way and both new and old. Some countries, such as Australia and Canada, continue to practice older traditions of naturalisation, which have inspired to the invention of new citizenship rituals in Europe i.e. UK and the Scandinavian countries. These new rituals draw (implicitly and explicitly) on the overseas forms and might be interpreted as re-inventions or circulated practices; as ritual practices on the move.

The rhetoric at the ceremonies in different countries is strikingly alike. Thus analysis must be completed by investigating how citizenship is enacted in sociomaterial practices; citizenship is co-configured by material artefacts like flags, gifts, certificates, medals, food and beverage. Though these objects are enacted in multiple versions (cf. Mol 2003) and though rituals are not classic sociotechnical practices it will be discussed whether the recognizable patterns in the way these objects interact with people and practices as mutually constitutive can be understood in terms of 'ritual scripting' (following Akrich 1992). This will be one of the examined theoretical resources in the investigation of dynamics in the spatial diffusion, persistence and transformation of ritual practices.

As another analytical strategy to understand the temporal dynamics will serve the foucauldian notions: 'history of the present' and genealogy (Foucault 1971). Why choose ritualization as means for making citizenship more important and staging it as an emotional 'life-defining moment'? Haraway argues from the perspective of cultural history within an STS approach (i.e. 2003) that heterogeneity and complexity are not only constituted by contemporary diversity, but interrelationships are also historically shaped. Thus, following a genealogical approach, with focus on the heterogeneous 'kinship' of cultural phenomena the multiple citizenship enacted in the rituals also involves historical forms of ritual and political practice. Past as well as present is implicated in the development, persistence and disappearance of ritual patterns and practices.

The third theoretical discussion examines the question of agency in the diffusion of ritual practices and the (historically) embedded expectations to their emotional effects. The ceremonies are not simply the results of the organizers intentions. They are also a result of expectancies, agency and auto-choreography of the new citizens and their relatives. The ceremonies transgress instrumentality, as they are matters of distributed agency, enactment and 'doing'. These ritual practices on the move engage an 'ontological choreography' (cf. Cussins 1996) involving distributed agency, materiality, performativity, history, structural constraint, and the co-dependence of the performers in the desired transformation of the self from immigrant to citizen.

## **But how did the elements get here? The affect of technologies of circulation on practices**

*Hui Allison (Lancaster University, UK)*

By focusing on processes of doing – how people integrate elements such as objects, meanings and skills together – theories of practice provide a complex and evolving frame for understanding performances of the social. Limited attention, however, has been devoted to the spatial and temporal aspects of these performances. This paper goes beyond thinking about the things involved in performances of practices to ask how they got to the time-space of performance in the first place. The elements of practices are only available to be used after having circulated, and in order to circulate they require various technologies – containers and carriers that move them about. A television or other home appliance, for example, requires not only a box and possibly a trolley, but also a person and motor vehicle to get from a shop to the home where it becomes part of practices. Thinking then about how the things of practices move about and become available for performances is a necessary step in extending an understanding of practices over multiple times and spaces.

After briefly introducing the role circulation plays in making particular performances possible, this paper will move to focus on a higher scale of analysis, considering how the movement of things can change the practices they are part of. Drawing in part on examples from a study of four leisure practices – bird watching, patchwork quilting, yoga, and hiking – I argue that a practice is defined by not only its performances, but also its technologies of circulation. That is, the technologies that shape possibilities for moving elements around ultimately affect the composition of a practice. As a consideration of the introduction of the internet into bird watching will illustrate, new technologies can, by re-configuring the possible circulation of elements, change the meanings of elements and open up new ways of performing a practice.

The paper closes with a consideration of the implications of this close relationship between practices and technologies of circulation. For one, this relationship raises questions about the boundaries of practices – if technologies of circulation shape the form of practices and performances then should they be considered part of practices? The importance of circulation to practices also suggests that the endurance or death of particular practices could be intertwined with the portability of things. There are also political implications, as this relationship suggests that interventions to change practices could focus not just on elements but on technologies of circulation.

## **The evolving practices of bicycle commuting**

*Jalas Mikko (Aalto School of Economics, Finland)*

Bicycle as an object appeared in its present material form well over 100 years ago. Yet the practical constellations of bicycling keep evolving into varied forms. This paper focuses on bicycle commuting and on the ways that such routine and everyday journeying change. As empirical material it uses Finnish daily newspaper articles and popular technical magazines starting from early 1970's.

Bicycling in competitive sports, in touring and leisure and in communing share many material elements and images. Yet, this paper argues that these different forms of bicycling do not present a single hub of changes in bicycling. Rather, bicycle commuting hinges on other diverse issues such as alternative systems of transportation, urban planning, changes in work practices and work places, the increasing legacy of climate policy, and gendered and social power positions. Bicycle commuting also has a bearing on our bodies through the evolving understandings of safety, and the concerns over healthy population and social costs of obesity. Hence, bicycle commuting as practical activity has plural connections that are widely distributed but nevertheless participate in the change and realignment of the commuting practices.

Material specialization and discrimination is a reflection of such plurality and external determination of bicycling. Foldable frame is as unconceivable for the racing community as is the weight reduction of few grams of a carbon fibre saddle for the commuters or the notion of motorized or battery-powered bicycling for the touring cyclists. It seems that bicycling often includes incompatible technics and technologies which set commuting apart from other practice of bicycling, and furthermore that the convenience and effectiveness of bicycle commuting is defined by very specific external conditions: for example the low physical strain of riding a battery-powered bicycle proves a problem in cold temperatures whereas in hot climate it matches with other ways of avoiding sweat and perspiration, the importance of which is defined by further elements in particular social reality. The obvious material elements of bicycling are simply indecisive and open-ended and reflect various other social and material forms of determining, assembling and integrating the different practices of bicycling.

With such a background, the paper seeks to elaborate on the instances and locations in which bicycle commuting as a social practice has been assembled, negotiated and promoted, as well as the key ingredients that form bicycle commuting across the period that starts from the oil crisis in early 1970s to the emergence of climate policy in 21<sup>st</sup> century. It asks when and how pedaling is a possible, effective and accepted routine of commuting, and what the social, material and cognitive stays of this practice are.

## **Travelling practices: how boundary objects account for situated practices in virtual communities of practice**

*Jarke Juliane (Lancaster University, UK)*

The purpose of this paper is to discuss how practices may travel and circulate in virtual communities, and how technological artefacts facilitate their circulation. Starting point is the concept of communities of practice (Lave & Wenger, 1991) not as an analytical tool, but as a prescriptive one.

The concepts of communities of practice, communities of knowing (Boland & Tenkasi, 1995) or thought collectives (Fleck, 1985) describe examples of people working together co-located and sharing a work practice in its very situated context, and thereby learning from each other. In recent years geographically-distributed organisations have been studied in order to investigate to what extent communities of practice can be virtual, and how knowledge sharing in these virtual communities may take place. Mainly two strands are followed in these case studies: knowledge sharing across communities of practice and the process of knowledge transformation in order to enable knowledge sharing.

What has however drawn less attention upon it was the notion of practice itself. The paper argues that in order to make situated practices travel around they are transformed into objects. The concept of boundary objects (Leigh Star & Griesemer 1989) gives an example of objects that have “lost” their situatedness and are employed by various communities based on differing perceptions.

The paper is based on interpretive case studies of two virtual networks, firstly the European Commission’s ePractice<sup>27</sup> project aiming to further and facilitate the exchange of practical experience and the sharing of knowledge among European eGovernment practitioners by establishing a community of practice. The second case study is about the Thematic Network: eGovMoNet<sup>28</sup> funded by the European Commission to exchange good practices in the field of eGovernment benchmarking.

The two communities vary in size and scope. ePractice had over 32,000 registered users by the end of February 2010. eGovMoNet which is also part of ePractice consists of 43 European partner organisations. Key to ePractice’s endeavour to further good practice exchange amongst eGovernment practitioners are “good practice cases”. These are written summaries of real-life projects compiled by eGovernment practitioners. Until now over 1,300 good practice cases have been uploaded to the ePractice database and thereby made available widely. eGovMoNet’s endeavour to exchange practices is based around the notion of benchmarking. Practitioners in ePractice as well as eGovMoNet are working in regional and national government, in universities and in private sector companies. Hence their work context differs.

The paper introduces and discusses good practice cases and benchmarking as two boundary objects around which the virtual communities are being created. It discusses how the ePractice team and members of eGovMoNet make these objects travel around in the community and try to ensure that they do not simply die off. The objects are described as accounts of a shared practice, hence accounts of membership to the virtual communities and accounts of the very existence of these communities.

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<sup>27</sup> [www.epractice.eu](http://www.epractice.eu)

<sup>28</sup> [www.egovmonet.eu](http://www.egovmonet.eu)

## **A geography of knowledge brokering**

*Meyer Morgan (MINES Paris Tech, France)*

Over the past two decades there has been a proliferation of knowledge brokers and spaces dedicated to knowledge brokering. The human actors involved in these brokering processes are individuals who are constantly in movement. And it is by moving around that they accomplish their threefold task: distributing knowledge, translating and transforming knowledge and, finally, rendering knowledge more robust. Some argue that this knowledge brokering is a fundamental characteristic of 'post-modern professionals'.

However, despite signs of an increasing professionalisation and institutionalisation of knowledge brokering, this is a practice that still tends to be unrecognised and unplanned. There is a lack of support and training for knowledge brokers. It is said to be an activity that is usually not acknowledged nor recognised in institutions, an activity that tends to be invisible and take place "back stage". Therefore, knowledge brokers are in search of credibility, capital, and legitimacy and identity-work is a constant issue for those engaged in brokering activities. This might be especially difficult within the value system of the academic world, a world that rewards and prioritises disciplinary training, journal papers, research grants as well as monopolistic organisational linkages. One of the challenges, both practically and theoretically, is to examine how knowledge brokering travels, in other words, to look at how disparate practices and people are mobilised in conferences and practical guides about knowledge brokering, and/or how the experience of knowledge brokers might end up as a recommendation in policy documents or in guides destined to "increase the impact" of research undertaken at a particular university.

The usual way of conceiving the movement and positioning of these knowledge brokers is to imagine them "in-between", to see them as occupying an interstitial space between two worlds. But brokers do not only move between two worlds. Their movements are much more varied, multidimensional and multifaceted. We detect at least four kinds of trajectories: first of all, the will and the work involved to engage in a brokering project (moving into), then, the moving between different worlds and the moving alongside actors and, finally, the detachment and getting away from these actors (moving away). Knowledge brokering is, in fact, based upon a very particular participative connection: a connection that is necessarily temporary, transient and flexible.

## **Packages, translations and anxiety. Notes on the Global Travel of Ideas in the Field of Patient Safety**

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The paper discusses the global travel of ideas with reference to the international patient safety movement. We focus in particular on a specific approach to incident investigation (Root Cause Analysis) and its journey from the United States, Australia and the United Kingdom. We argue that the continent spanning circulation of this set of practices was sustained and facilitated by the construction of an ‘anxiety-reassurance’ package. This worked to support the spread of the approach through, first, raising public and professional anxiety about the performance of pre-existing management practices around patient safety, and second, creating reassurance by proposing a new management solution to the counter and solve this problem. By playing together these two seemingly opposite discourses, the innovation generated a wave of interest and urgency that it then rode and that allowed its fast global circulation. In the study we show how this powerful “package” actively translated the new approach in the double sense of circulating and profoundly reconfiguring it. At the end of its journey the method had changed so much that what was originally aimed at engendering organizational learning from incidents became, in practice, a system oriented toward consensus, closure, and control.

Root Cause Analysis (RCA) is the name of a family of structured methodologies for investigating the systemic causes of adverse events in complex settings. Stemming from the engineering and system tradition, it suggests that in order to prevent accidents from recurring an interdisciplinary team has to inquire not only how the event happened, but what are its underlying systemic causes to formulate recommendations and action plans (Carroll et al. 2002). From about two years in 2008-9 we conducted an in depth ethnographic study of how RCA has been translated into practice in two acute large hospitals in England. As part of the study, we conducted several semi-structured interviews in the USA, Australia, and UK used the notion of travel of idea (Czarniawska and Jorges, 1995; Czarniawska and Sevón, 2005) to chart the travel of RCA and the process through which it was adopted as the main approach to improving safety in the UK and try to learn from incidents.

As expected, we found that the circulation of the new practice was facilitated by its theorization (Greenwood et al. 2002), its relative ambiguity and interpretive flexibility (Scarborough and Swan 2001), and specific dynamics in the social network that sustained it (i.e. brokering, bandwagon effect) (Abrahamson and Rosenkopf 1997). However, in this particular case, we found that the success RCA can also be explained with reference to its content, e.g., its being specifically framed as an “anxiety-reassurance” package (Fujimura, 1988). Our field work indicated in fact that in all the countries we examined what travelled was not only a structured methodology for investigating incidents (RCA), but a more complex discursive package. This package concomitantly highlighted and amplified the uncertainty and dangers of the medical practice and offered a reassuring solution in the form of a set of techniques that could offer some form of control of uncertainty and produce safer healthcare services.

We build our argument in two steps. First, we describe how RCA amplifies the perception of risk and danger of clinical practice in order to legitimize itself. It does so, for example, by feeding on the broader discourse of the ‘risk society’ through a number of moral entrepreneurs and

reiterating the dangers of the healthcare service. We show how the very anxiety created by the discourse around RCA finds its resolution in the methodology itself: RCA reassures that if correctly implemented, hospitals will learn from clinical incidents and healthcare services will become safer. To this end, RCA mobilises the discourse of engineering and its “modernist” focus on controllability through rational deliberation and technique.

In a second part of our argument, we discuss how this discursive combination of anxiety and reassurance is far from a mere marketing exercise as it significantly retroacts on the innovation itself. On the one hand, the aspects of RCA approach which travelled from country to country were those which can guarantee the biggest reassurance. These include claims of simplicity and ease of use of the method, the overt use of engineering terminology, and a number of tools that produced tangible outcomes such as reports and stats. On the other hand, the focus on reassurance has a significant effect on the implicit goals of the method, that is often used more to produce reassurance and closure than learning.

We conclude by discussing our findings in view of Fujimura's (1988) idea of a “standardised theory-method package”. The idea of a standardised package combined some of the intuitions behind the notion of “boundary objects” (Star and Griesemer, 1989) and “translation” (Latour, 2005) in the attempt to explain the emergence of scientific bandwagons. We suggest that the idea of standardised package is especially useful to make sense of how ideas travel in highly regulated contexts and that the notion of “mutual enrolment” (Fujimura, 1992) is particularly useful to shed light on our case. We add, however, that particular attention needs to be paid to the rhetoric nature of the package itself, and to its capacity to mobilise local interests and connect these to wider circuits of accountability (in our case, the wider phenomenon of the global shift towards the risk management of everything).

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**“The supply side of ART”: Translating free drugs into a therapeutic option in Uganda**

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The paper examines practices in the technical domain of drug distribution and asks how free access to antiretroviral therapy (ART) is translated into a therapeutic option in Uganda. It draws on an ongoing collaborative research project on the “supply side of ART in Uganda” that follows the circulation of technologies, models, and drugs in the regulation of free access to treatment. How is free access to treatment creating new “regimes of living” in the Ugandan HIV/AIDS epidemic (Collier and Lakoff 2005). How are novel therapeutic dilemmas emerging. How are science and technology expanding its reach through crises and emergencies in the supply of these life-saving drugs (Nguyen 2009).

The main part provides a case study on the constitution of a supply side of ART in Uganda and deploys the notion of translation to analyze the ways drugs and actors are assembled to novel dilemmas and new networks. Unlike other drugs, anti-retroviral drugs (ARVs) are exceptional objects, which were in the beginning highly expensive and controversial in the developing world. The recent advent of free access to treatment in Uganda has in addition rendered the distribution of drugs into a complex entanglement of sites and supply channels. These distribution channels differ significantly in their technical stability, depending on the source of funding, which leads to various forms of improvisation and rationing of drugs to manage the much higher needs. Moreover, persistent drug shortages reinforced the concerns on all levels of the health system, giving rise to audit and research technologies to provide a more accurate picture of the “gaps and challenges” in order to render better interventions in the supply side of ART in Uganda.

The case study argues that the translation of pharmaceuticals into free treatment requires an analysis of the processes through which these technical objects inscribe a vision of a particular world into clinical and social practices. The materialization of free access to these drugs is shaped by visions of a universal human right to health, which constantly oscillates with a political economy, where “pharmaceutical power” is unequally distributed between the global North and South (see also Akrich 1992). In this regard, ARVs are paradigmatic examples for the way how the global circulation of discourses and technologies articulates with the emergence of new “regimes of living”.

The analysis deploys the idiom of translation to account for the dynamics in creating new relations between distant sites, incommensurable registers, and between technical objects and human actors in the institutionalization of free treatment. In this sense, the paper wants to make a contribution to the themes in track “practices on the move”, through a discussion of scholarly work in anthropology, STS, and ANT on “translation” to untangle the spread of technologies in processes of social change.

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## **Modern Martial Arts: On a practice that has moved in space, time and culture**

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Generally practices are considered to be situated, not to be moving in space or time. Looking closer however we might notice that some of them can be found where they have not been expected. Elaborating on the idea of practices on the move, I discuss empirical data from a study on Modern Martial Arts, which were (re)invented from medieval warcraft.

As a first step I am interested in historical and geographical movement. Various modern martial arts styles are traced back to different (often Far East) warrior collectives: Capoeira to the forbidden and therefore hidden fighting practices of Brazilian slaves or Kung Fu to Chinese warrior monks, who were not allowed to carry weapons, Ninjutsu to clandestinely operating warrior clans in Japan. While the European knights' warcraft mainly disappeared within the centralising processes of modernisation, particularly in Japan at the end of the 19th and the beginning of the 20th century quite a few "traditional" Japanese warrior styles were re-invented and summarized as "Budo". They can, following the Japanese sociologist Innoue Shun (1998), be understood as "invented tradition" (Hobsbawm 1992) as they were set against "imported sports" for political interests, proposing that they embody "wakon", that is Japanese spirit.

In light of the question of practices in move, it is noteworthy that these martial arts do not only produce a historiographic traces, i.e. a discourse about ancient warriors, but they are passed on (also to western cultures) as a bodily practice, that often includes the handling of weapons. As an analogy to the term "oral history", this phenomenon can be described as "corporeal history". Thus the question arises: How can the practices, or at least elements of them, move to other cultures?

As a second step of the paper I will address this so far macro-level oriented question following empirical traces by a more micro-level oriented analysis of knowledge-transfer-practices. The latter consist, as I will argue, in interlacing discursive products (like books, manuals or movies) with practices like reading, pointing or moving a body or a thing. I will focus on two such interlacings: "praxeological reading" and "verbal markers".

As a conclusion I will propose that there are four types of knowledge transfer: verbal, visual, somatic and technical. While the first two seem to be clear, the third addresses knowledge transfer by moving a body like guiding a child's hand while she/he intends to learn writing; the fourth one considers learning by using technical objects like learning how to roller skate while moving with these shoes on or understanding software while clicking through the task menu. These can interlace and can thus make practices move.

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## Tracking 22 degrees C: characterising the multiple geographies of sociotechnical regimes

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This paper focuses on the theoretical and methodological challenges of conceptualising the development and global circulation not of individual technologies but of entire sociotechnical complexes. The notion that sociotechnical innovations take hold in 'niches' that are shaped by and constitutive of 'regimes' and 'landscapes' is well established (Rip and Kemp, Geels). Work of this kind is generally organised around the problem of understanding how specific innovations make their way from niche through to landscape, over time. In such accounts, regimes are either placeless (as in discussions that focus on abstract processes of embedding/normalisation) or implicitly national (as in many case-studies of innovation). As a result, little attention is paid to the careers or to the geographies of regimes viewed as complex configurations in their own right. What are the boundaries of a regime, how are these edges formed and how do they change?

In order to address these questions we consider the diffusion of 22 degrees C, a temperature that has become 'normal' for indoor environments around the world. This is a revealing case in that 22 degrees C is not a single 'object' but an outcome of multiple socio-technical systems – including conventions of comfort, heating and cooling technologies, engineering codes and regulations - the details of which vary between countries, regions and built environments.

Methodologically, we take the normalisation of 22 degrees C to be indicative of an increasingly shared regime: "a rule set or grammar" embedded in institutions and infrastructures, that is both an outcome of earlier changes and an arrangement that "structures subsequent change" (Rip and Kemp 1998).

With this example as a point of reference we consider the diverse routes through which air-conditioning has taken hold in the UK, USA, Australia and Japan. Despite important differences of timing, historically and culturally diverse trajectories appear to be coalescing around the delivery of standardised, mechanically cooled conditions indoors. The globalisation of specific material innovations does not automatically generate a correspondingly uniform set of conventions, meanings and patterns of demand but in configuring ways of being indoors air-conditioning constitutes a vector for convergence *between* regime-level configurations that are locally enacted and reproduced but at the same time increasingly standardised.

Analytically, this leads us to suggest that the geographical scope of a sociotechnical regime is defined by the institutions and infrastructures in which it is embedded: as one might expect, some are more narrowly bounded than others. Equally, areas of overlap relate to the fact that certain regime-shaping features evidently do diffuse. Since material, institutional and practical aspects interact, dominant technologies like air-conditioning have the potential to re-script and redefine the regimes of which they are a part, along with possible pathways of future development.

In developing these ideas we attend to the multiple geographies of sociotechnical regimes and to their implications for the range and pace of change towards and away from more sustainable ways of life.

**Studying Individuals and Institutions: Academic careers, universities and everyday practice in processes of change**

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The key premise of practice theories, that social structure is reproduced and transformed in the everyday enactment of mundane practices, marginalises several social facts. In the context of my research about changing practices of academic sociologists these marginalised aspects include: that individuals' practices emerge across a career and at any given moment those engaging in practices are at various points in their careers; that practices are enacted in (and at the same time constitute) institutional settings and require resources, including economic resources to be sustained; that the commitment of individuals and the allocation of economic resources to practices can be political, as is access to practices and the goods they produce.

Such observations suggest that understandings of reproduction and transformation (in this case of the practice of Sociology), might be usefully deepened by exploring the intersections of everyday activities, individual's careers, institutions and government policy, yet studying these intersections presents many methodological challenges. For example, to what extent is it possible to obtain detailed retrospective accounts of previous everyday practice? how can the relationship of everyday practice and government policy be understood within a diverse field of universities that mediate policy in different ways? How can processes of reproduction and transformation in practice be investigated via informants who have woven their careers through different periods of institutional and policy history, whose commitments biographically wax and wane, and who have developed their practices via experiential learning along the way?

This paper draws on my PhD research of the careers and practices of academic sociologists to discuss the methodological challenges of incorporating current and retrospective accounts of practice, individuals' careers, institutional histories and shifting government policies in studies of social reproduction and transformation. The paper offers one solution to these challenges, and invites discussion of alternative approaches that might incorporate these aspects in empirical research.

## **Travelling standards: enactment, friction and alignment in the case of the Forest Stewardship Council certification scheme**

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How does the global impact on the local? This question has bothered anthropologists, political ecologists and policy scientists alike. It refers to the implementation (or lack thereof) of global agreements, the effects of development interventions, as well as the subjugation and destruction resulting from global Capital. Often debates take the form of top-down versus bottom-up approaches or structuralist versus agency-based perspectives. This paper unpacks the interactions between both sides and uses the FSC<sup>29</sup> certification scheme to sketch the contours of an approach to address this based on the concepts enactment, friction and alignment.

FSC promotes sustainable forest management by standard-setting, controlling compliance through audits, and granting or withholding certificates. The FSC-standards can be conceived as 'universals', which are effective without fully prescribing how to act according to them<sup>30</sup>. They mobilize people and are mobilized by them in practice. FSC's standards travel through the FSC-network and are mobilized by various different actors: decision makers who decide on standards and criteria; communities who manage their forests according to the standards; and auditors who use the standards as yardsticks to evaluate compliance.

Throughout their journey, the standards are confronted with existing practices and preferences and this leads to friction<sup>31</sup>. Such friction is not necessarily problematic: it may trigger creativity and pragmatism. The standards are renegotiated and reinterpreted according to different local needs: they are enacted in practice<sup>32</sup>. FSC encourages the tailoring of the standards to local needs to ensure that the standards are 'fieldworthy'<sup>33</sup>. However, this also poses a risk. FSC has to guarantee that certified products comply to their standards. Alignment practices ensure that the standards' meanings are harmonized and that the boundaries of their interpretative flexibility are stabilized. Auditing plays a crucial role in this as it connects the standards and their application on the ground. Auditing shapes the governmentality of forest management and the

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<sup>29</sup> Forest Stewardship Council

<sup>30</sup> Lowenhaupt-Tsing, A., 2005. Friction: An ethnography of global connection. Princeton University Press

<sup>31</sup> Lowenhaupt-Tsing, A., 2005. Friction: An ethnography of global connection. Princeton University Press

<sup>32</sup> Law, J. & Mol, A. 2002. Complexity in Science, Technology and Medicine, Duke University Press

<sup>33</sup> Eden, S. 2008. Being fieldworthy: environmental knowledge practices and the space of the field in forest certification. Environment and Planning D 26.6: 1018-1035

performativity of the FSC-standards: it transforms the world into closer approximation of abstract models, thereby aligning the meanings of the standards<sup>34</sup>.

Using the concepts enactment, friction and alignment to conceptualize how universals travel and impact on the world, directs attention to their structuring and disciplining effect as well as to the actors' agency in interpreting and tailoring them to their local settings. This makes clear that the FSC standards do not have a pre-defined script that directly 'tells' actors what to do<sup>35</sup>. Rather than imposing a definition of sustainable forest management, standards constitute sites of negotiation of what the standards mean and how to apply them and of boundary work<sup>36</sup> to demarcate and define what does and does not constitute sustainable forest management.

Understanding the complex workings of standards requires detailed investigations<sup>37</sup> of practices of travel and movement, friction, alignment and enactment: "universal claims do not actually make everything everywhere the same. [...] As soon as we let go of the universal as a self-fulfilling truth, we must become embroiled in specific situations. And thus, it is necessary to begin again, and again, in the middle of things"<sup>38</sup>.

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<sup>35</sup> Orlikowski, W.J. (2000) Using Technology and Constituting Structures: A Practice Lens for Studying Technology in Organizations. *Organization Science*, 11(4), pp.404-428.

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<sup>37</sup> This abstract is based on a research proposal which will include such investigations.

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## **Enacting standards in organic agriculture: an account of a distributed element of practice**

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Although standards have been used for a very long time, the independent certification of practices and object properties falling outside of regulatory control is a much more recent phenomenon. The dominant discourse embedded in these devices presents an image that they standardise practices and objects to achieve uniformity (e.g. accounting practice), technical compatibility (e.g. interfaces between ICT devices) and/or commensurability (e.g. of different medical treatments). As such, compliance with standards is framed as providing a convenient technology for organizing and governing markets. The required conformity is achieved by changing specific elements of practice to a prescribed form, which often is claimed to be 'best practice' in its field. In other words, standards are presented as global, context independent bodies of knowledge through which local practices can be regulated and made homogenous with a universal ordering.

Such standards are usually developed and maintained by organisations that present themselves as advocates for particular ways of performing activities, organisational forms or even entire lifestyles, and therefore positioned as principally voluntary schemes for potential adopters. As such, their circulation is framed as depending on the technical and economic advantages that compliance brings to potential adopters. A number of studies in the STS field have problematised this perspective by illustrating how standards, as thoroughly social objects, incorporate social, political, economic and technological interests. More importantly these studies show how the embedded interests in standards shape social and material relations, with important political and ethical consequences.

However, as accounts of how standards circulate and relate to local sociomaterial practice they are incomplete (mostly necessarily so due to the focus on the social shaping of technology). Some performative aspects of standards have been studied (e.g. Timmermans and Berg, 2003; Zeiss, 2004), but I argue that there is a need for accounts of how standards are enacted so as to understand the way in which standards circulate as an element of practice. Drawing on my empirical work on organic certification in the UK, I suggest that multiple actors are involved in enacting a standard, and therefore that the enactment is distributed over multiple sites.

In my study I explore how the organic standards come alive through the coordinated activities of different social groups. In particular, I analyse how everyday activities and objects are assembled in a sociotechnical arrangement which constructs and maintains boundaries between conventional and organic markets, boundaries that make organic produce fundamentally incompatible with conventional produce. Because conventional and 'sustainability labelled' produce appear the same, I suggest that maintaining this incompatibility requires constant work on market, institutional and operational levels.

My research illustrates that this leads to the simultaneous reproduction of different versions of a standard and indeed to a multiplicity in 'organics'. I conclude that the circulation of a global standard as an element of practice is constituted in the distributed enactment by different social groups. This leads not to uniform practice, but to a multiplicity in the concept it supposedly homogenises.

## **Situated in systems? On the dissemination of bodily practices of a lifestyle sport**

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The question of how practices travel touches upon an important theoretical issue and in a certain way it re-examines the questions that have driven the 'micro-macro discussion' Ethnomethodology once triggered (Alexander et al. 1987): How can we move beyond the strict situational focus of EM without falling back on structuralistic simplifications? The contribution suggests that a possible answer does not require us to abolish EMs central concepts altogether since situated practices can be understood as situated not only in situational contingencies (skillfully overcome by artful practitioners) but also in a locally reproduced cultural context of figural preconfigurations.

The argument is developed on the basis of empirical findings gained in a multi-sited ethnographic study of the distinctively bodily practices of a global lifestyle sport and its various (and often mediated) subcultural manifestations. Building on observational and 'naturally occurring' data from Freeride skiing, the study identifies three modes of form dissemination apart from verbal, semantic practices.

First, certain ways of doing a practice can be inscribed into material artifacts (i.e. a way of walking in a high-heel shoe). The role of materiality and the design process of objects will thus be examined building on the notions of oriented objects by Garfinkel (2002) and material memory by Luhmann (1997).

Second, visualizations of practices – mediated or in face-to-face situations – abound in extreme sports, aiding the (highly demanding) reproduction of its practices, i.e. through mimesis. In this regard, the appropriation and reproduction of visualizations of practices will be conceptualized as situated practices of seeing (Goodwin 1995) which can become part of technological scopic systems (Knorr 2003) as an integral part of such subcultures.

Third, the freeski subculture (like probably all cultural forms) regularly draws on a set of abstract aesthetic ideals. Those can be seen as a code or frame of reference that orient an evolutionary selection-process of systems of practices in that it governs mediated idealizations and provides criteria for style judgment and thus hierarchical distinctions within the subculture.

In order to grasp the dissemination and evolution of such preconfigurations in a way coherent with praxeological presuppositions, the paper expands on the diagnosis of a structural symmetry of Luhmannian systems theory and EM in that both conceptualize the emergence of social order as a processual achievement. Since Luhmann's preoccupation with verbal and textual communication results in a restriction of his evolutionary model to semantic structures, the contribution intends to broaden his conceptualization towards other patterns recurrent in material and bodily practices.

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## **TRACK 40**

# **Science, Technology and the North/South Divide**

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## **STS and the Public Private Partnership: A Case of Agricultural Innovation in Uganda**

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Collaboration between universities, research centres, commercial companies and other partners is usually conceptualised within the framework of Mode 2 knowledge or Triple Helix. A concept that is less common in STS but more prominent in development studies is that of innovation systems. This paper reflects on these concepts and their use for studying science and technology in a development context. The case presented is of a public private partnership (PPP) in Uganda involving the National Agricultural Organization (NARO), the National Agricultural Advisory Services (NAADS), farmers, Nile Breweries Limited (NBL)-subsidiary of Africa and Asia brewing giant SABMiller and other actors in the sorghum value chain. The partnership was built around public (NARO) support in generating an agricultural technology in the form of improved seed, the Epuripur sorghum variety. In a program to support smallholder farming, this variety, was multiplied by small scale farmers, purchased and processed by the private sector (NBL) in industrial production of lager beer. The interest in the PPP came from the assumption that it offers public organizations access to private sector resources including cutting-edge scientific expertise and technologies. NARO's partnership with other actors was analyzed through (extended) interviews with researchers, farmers and extension workers, supplemented by literature review.

The case study shows that the PPP mechanism led to a reorientation of the clientele of NBL, allowing smallholder farmers to produce one of the main ingredients of beer. In terms of research and support delivered by NARO, this was primarily in the form of training and assistance to those farmers multiplying the seed and the farmers growing Epuripur. Moreover, the organisations together monitored the quality of the sorghum delivered to the brewery. NARO and NBL identified an agricultural technology for production that would become profitable for several actors along the sorghum value chain. When examined against the traditional welfare analysis, public and private sector intervention in the sorghum value chain induced a social welfare impact for farmers. Additionally, transactional and risk management costs were shared by different actors involved. The public research institute NARO successfully facilitated the interactions and linkages between different actors in the sorghum value chain. However, given the research orientation of NARO, the key question is what effects the PPP enterprise has on research? This case study suggests that most of the research within this project consisted of routinised experiments for variety testing and improvement of growth conditions. Moreover, within the NARO research organisation the project resulted in some evaluations but did not lead to any significant changes in its research activities and organization. Although the case fits very well within the notion of innovation systems, it can be questioned what the concept really offers for understanding research and innovation. From this case it can be concluded that much of the critique on Mode 2 and the Triple Helix is applicable to the innovation systems concept as well.

## **Performing community-oriented technologies after catastrophe. The case of Sri Lanka**

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Community-oriented tools and technologies have become a strategic focus within humanitarian interventions after catastrophe, when thinking about how supporting residential groups in their efforts of learning to survive. In this paper I examine how the approach of “cultivating” community-of-practice has provided a new paradigm for reconstruction work during the humanitarian relief in post-tsunami Sri Lanka. The reconstruction of around 100,000 houses for people left homeless by the seaquake in Sri Lanka is one of the most impressive and controversial humanitarian response introduced under the slogan *build back better*, both in terms of allocated funds (2 milliard and 200 millions of dollars only in the first year) and in terms of the astonishing number of organizations involved (more than 150 international NGOs and, at least, 1000 local NGOs, part of them created ex novo after the tsunami). The paper describes how different interacting social groups involved in the process of resettlement in Sri Lanka perceive, perform and translate into practice the goal of “community design”. Some ethnographic examples will be introduced in order to show how community-based activities has become a space of friction, negotiation and hybridation among different sets of knowledge and practice, coming from various sites, times and actors. In these local arenas, performing community-oriented technologies is a critical task that promotes inside and outside competing perspectives of what the “community” is about. Instead of developing what is expected, a common sense of purpose and a collaborative desire to share work-related knowledge and experience, participants manipulate, distort and reconfigure meaning and identities, both on local and global scale, in order to strategically adapt themselves to the post-disaster circulation of tools, knowledge and practices of social engineering. How residential communities can be designed and cultivated for aliveness? The ethnographic experience on the wave of the seaquake in Sri Lanka shows that the hypothesis of *cultivation*, generated from the community-of-practice approach and used in the humanitarian interventions after disasters, needs to invite the interaction and participation that makes the community alive. But the community architectures fall apart soon after their initial launch if people don’t collaborate on a mutual task and don’t share a concern or a passion for something they do together as they interact regularly. The switch from a community-of-practice concept to an idea of “polity of practices” can help the researcher to describe how people have different levels of interest in the community and these interests are differently performed according to political fields of situated knowledge and practices.

## **Technology in Context: The Influence of Urban Space on the GIS Cartography of the 1995 Israeli State Census**

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In this paper I argue that the content of the 1995 Israeli state census maps was influenced in key ways by the fact that the mapmaking process itself was embedded in the highly differentiated landscape of Palestine/Israel. Specifically, I seek to better understand how urban segregation, professional networks, and relative freedom of movement served to influence the kinds of empirical claims that were possible given the census cartographers' selective access to the territory to be mapped. In addition, I investigate the ways that the use of mapmaking software for the census prompted cartographers to revise their own aims, thereby also helping to shape cartography as a discipline.

The 1995 census marked a turning point in the broader incorporation of digital mapmaking, as it was the first large-scale state project to incorporate Geographic Information Science (GIS) cartography in the region. However, as far as can be determined, the relatively rapid transition to digital cartography in Palestine/Israel has yet to be studied at length. Resolving this lack is especially crucial given that the census methodology differed widely from accepted views of the benefits of GIS, which stress its potential for automation, portability, speed, and ease of use. In particular, the 1995 census relied on thousands of temporary employees to input paper maps into a computer database and to travel to verify data (Bahat 1997; Barak 1997; Benenson and Omer 2000; Ben-Moshe 1997).

Palestine/Israel has long been considered a primary site of innovation in geospatial technology. Therefore, Israeli state mapmaking practices challenge received wisdom that all technological innovation originates in the U.S. and Europe. However, Palestine/Israel's uniqueness is often explained instrumentally in terms of a supposed natural congruence between Israeli state technological practice and related disciplines in the global North. Employing a mixed qualitative methodology including digital, archival, and ethnographic research, this paper challenges this widely held view. It argues instead for a situated understanding which takes into account the varied practical outcomes of the ways that political legacies are inscribed into the landscape. This is particularly true in terms of the effects of earlier demarcations of territory and the complex system of interlocking borders created in the aftermath of the 1967 war.

This study will therefore compliment existing research which analyzes cartography's impact on the creation and maintenance of political spaces within Palestine/Israel (Abu El-Haj 2001; Conder 1998; Falah 1996; Gavish 2005; Khalidi and Elmusa 1992; Kimmerling 1997; Newman 2001; Waterman 2008); it will do so by investigating the effects that those spaces have had upon cartography as a discipline that has its own geographies of practice. Ultimately, it aims to demonstrate the ways that empirical representations of Israeli national space, in the form of computer maps, are reconfigured by political and geographical realities that affect—albeit in different ways and to vastly different degrees—Palestinian, Israeli, and international cartographers (Hanafi 2009).

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## **International Crop Research as a Global Public Good?**

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The status of international crop research as a global public good (GPG) has been widely accepted since the Green Revolution of the 1960s and 1970s. While the term itself was not used at the time of its creation, the CGIAR system that evolved at that time has been described as a 'prime example of the promise, performance and perils of an international approach to providing GPGs' (Dalrymple, 2008:349). This paper uses the case of rice biofortification as a lens to explore contemporary institutional configurations for the delivery of GPG research *for* development, specifically the 'mega programs' of the CGIAR and the 'grand challenge' model promoted by the Bill and Melinda Gates Foundation. It uses STS analysis to highlight aspects of GPG-oriented research *in practice* that are not addressed in the GPG literature. In particular, forms of exclusion and restriction are emerging within everyday practice, and in relations between less than equal institutions, sectors and disciplines, in ways that reproduce pre-existing North-South inequalities (albeit in new ways) and ultimately undermine the ability of these programmes to achieve their stated goals and address the needs of projected beneficiaries.

**Theoretical reflections on Capacity Building as vehicle for knowledge transfer in development cooperation, drawing on the observation of water development projects**

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Present-day development cooperation professionals colloquially use the terms “hardware”, “software”, and sometimes even “orgware”, to refer to the material, the human and the organisational aspects involved in the transfer of technologies from North to South. Indeed, since the late sixties development organisations have increasingly been concerned about adequate methods to transfer scientific-technological knowledge, acknowledging the importance of skills and training over the mere material aspects of technology. However, whether it be the hardware or the software, the transfer of technology and knowledge from North to South is never straightforward since they are confronted with indigenous knowledge and they are moulded by the local cultural context (Harding 2003, Berkes 2010). Therefore, throughout the past decades, various paradigms have been proposed for the transfer of knowledge in development practice (King and McGrath 2004, UNDP 2009). Since the turn of the millennium the buzz word is “capacity building”. UNDP writes that “*there is now emerging agreement in the development community that capacity development is the engine of human development*” (UNDP 2009). With its popularity, the number of definitions of “capacity” has also increased (Baser and Morgan 2008). Some authors even argue that capacity building is nothing more than the latest discourse twist with the mere objective to continue legitimising development aid (Kühl 2009).

Drawing on ethnomethodological observations of “*capacity building*” practices in freshwater development projects and in Integrated Water Resource Management (IWRM) projects in Africa and South-America, the present article makes theoretical reflections about the importance and innovative character of capacity building in the transfer of knowledge in development projects. The present paper argues that capacity building is crucial to human development and a prerequisite for knowledge transfer.

The presented paper has two main sections. First, the article tries to situate “capacity building” in the spectrum of paradigms of knowledge in/for development that have been proposed in the past decades. Typically each paradigm stands for a particular vision of what “development” should be like (Cozzens 2008). Hence, *capacity building*, although a very polysemic concept in itself, corresponds with only one specific sector in this spectrum.

Second, the article proposes, based on the field observations, a model in which “capacity”, “knowledge transfer” and “enabling environment” are articulated as 3 distinct – but interdependent – levels of the same single coherent model. Capacity is presented as the binding layer. The “enabling environment” in this model is similar to the concept of “entitlements” in the work of Amartya Sen (e.g. 1981). Capacity building should aim to contribute to the construction of this “enabling environment”, while the “enabling environment” on its turn allows the further development of capacities and ultimately the transfer of knowledge. In the presented model, capacity is the prerequisite for knowledge transfer.

The current literature on capacity building often conflates the different levels of the proposed model into the single concept “capacity building”, and this is what produces the current polysemy of the concept.

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## Traditional Knowledge Regulation Mechanisms: Learning from the Global South

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It is commonly accepted that traditional knowledge plays a crucial role in noteworthy areas such as food security and the development of agriculture, particularly in the Global South. In this sense, efforts to preserve the biodiversity and knowledge associated to traditional agro-ecosystems should be investigated, particularly the inherent challenges, in which concerns governance and regulation, having in mind the crucial relevance of grassroots interventions and participatory mechanisms to achieve a socially and economically sustainable development.

Thus, the current paper aims to analyze regulation mechanisms of intellectual property rights (IPR) - specially, in which concerns traditional knowledge -, underlying, from one side, the insufficiencies and possible incongruence of the contemporary multilateral spheres and, from the other, the conceivably contribution of alternative mechanisms of regulation of collective rights, at national level, proposed by Southern countries. The analysis will focus on the Brazilian traditional knowledge regulation instruments, underlying the role, the importance and limitations of the *Genetic Heritage Management Council* (CGEN), presided by the Environment Ministry.

Considering that the IPR governance global system does not give an adequate response to the current needs of promoting innovation respecting the different stages of development of diverse countries, several experts are underlying the need to revert the geographical disequilibrium of influence of the IPR international governance agendas. In which concerns the IPR implementation in the Global South, traditional knowledge is been particularly controversial: the IPR regime is apparently based in a bias which tends to protect intangible assets of companies through a predatory protection of inventions derived from traditional knowledge, in detriment of the traditional communities' interests.

In this sense, and starting from an analysis which considers the path dependence in several institutional environments (path dependence which, accordingly with an institutional economics vision, tends to influence and frame distinct dynamics), the paper will also take advantage from a possible interconnection between the theoretical background of science and technology studies and development studies, underlying the links between knowledge / local innovation processes / science and development and justice concerns.

Bearing in mind that the geopolitical configurations' recent changes have a clear effect on knowledge production, management and regulation, the study aims, thus, to address the research gap concerning the draw and implementation of regulation systems made in the South to the South (often by emergent countries), in detriment of the mere "*import*" of northern mechanisms, frequently not adjusted to dissimilar contexts, socially and politically embedded.

A qualitative analysis will be undertaken, based on interviews made late 2009 to relevant actors, which were and are involved in the traditional knowledge regulation mechanisms discussion in Brazil, and based on document and bibliographic reviews. The paper expects to contribute to provide a critical analysis of the role of diverse actors in regulating knowledge and the implications of IPR governance models, and to contribute to jointly build an effective answer to protect and promote traditional knowledges, through alternative and innovative mechanisms, particularly in Southern countries, taking into consideration their inherent diversity and heterogeneously.



## **Mobile Phones, Core Network Expansion, and Political Violence in Kenya**

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Recent data on core discussion networks among Americans show a decrease in core network size over a period of twenty years. In contrast, our quantitative data on urban social networks in Kenya show a large *increase* in core network size over a much shorter period. Network surveys of Nairobi residents conducted in 2002 and again in 2007 reveal (1) virtual saturation in the diffusion of mobile phones among both the professionals and nonprofessionals sampled, (2) an increase in the number of important contacts over the same period of time, but (3) no *direct* effect of technology use. What explains this puzzle is a network effect of mobile telephony in an area that has never experienced widespread connectivity: increased access to existing networks in a context of resource scarcity leads to a strengthening of weak ties and the enhancement of core networks among Kenyans. This interpretation is strengthened through examination of 105 hours of video ethnographic data. During the recent post-election conflicts, mobile phones were viewed as a crucial resource in managing interpersonal networks for instrumental purposes.

## **Technologies for Freedom: re-examining technology towards human development**

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The concept of Appropriate Technology is not new. It refers to small scale, simple and low cost technology that involves community participation, intensive labour force, use of natural resources, respect to local culture and environment, among other characteristics (Schumacher, 1973; Brandão, 2001). Nevertheless, there is a growing criticism about the use of appropriate technologies in development projects in the South (Dagnino, 1976; United Nations Development Programme, 2001; Herrera, 1983; Shiva, 2009; Leach and Scoones, 2006; Chambers, 1997). The critiques focus in two main groups. On one hand, on the replication of the models or products of appropriate technologies: the specific contexts where appropriate technologies are implemented in developing countries complicate the replications of products or models. On the other hand, it is criticised that the communities are seen as the final stakeholder that benefits from a technology designed in developed countries. In this sense, generation of knowledge is not transferred, and it is suggested that enlarging the technological alternatives offered to developing countries is not sufficient to change the nature of the process of implementing technologies. Adopting the Sen's approach (1999), we assume that the main purpose of the development projects is to expand the real freedom of people, and we believe that it is necessary to re-examine the conceptualization of technology throughout the lens of an approach that focuses primarily on the process instead of stressing the results and products of the interventions. To do that, we explore the Capability Approach, which centres attention on the people's capabilities or real possibilities of leading a life that they have reason to value (Sen 1999; Nussbaum 2003). This approach allows expanding the conceptualization of technology towards a new definition that incorporates, from conceptualization to implementation, an intention to promote human development. In the paper we introduce Technologies for Freedom (T4F) as the technological processes, driven by the community, in order to generate real social transformation. After that, we point out some features of T4F community development projects. Finally, we present two different case studies of technology-oriented development aid projects implemented in rural areas of Guatemala and Bolivia, where effects and results are examined taking into consideration the T4F characteristics.

## **Technology and Waste Pickers Cooperatives in Brazil: an approach under construction**

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The increase of mass unemployment and social exclusion is indicated as one of the main causes of economic practices of cooperative and collective nature, such as the creation of solidarity economic enterprises. Workers exposed to unemployment, to under-occupation and precarious or informal kind of works pursue alternative forms of income generation, much more than the pursuit of profit, they are guided by objectives of the expanded reproduction of life and economic and social emancipation.

Among several types of collective enterprises, the solid waste recycling stands out together with other solidarity enterprises as an alternative to humanization and formalization of the picker works. They perform activities that range from collecting, sorting and marketing of solid waste and play a fundamental role to conduce the waste collection that are being implemented in several municipalities. According to the “Atlas da Economia Solidária no Brasil” (BRASIL, Secretaria Nacional de Economia Solidária, 2007), 21,859 solidarity enterprises were identified in Brazil. From these, nearly 500 are related to solid waste collecting and sorting. Waste pickers play an important role in environmental, social and economic sustainability of solid waste management systems. That is because they organize the disposal and incorporation of these materials into the recycling market.

Besides the important role that these cooperatives perform to the society, environment and economy, they have difficulties to move forward on the productive chain due to several reasons. For example: lack of financial resources to invest in technologies of waste recycling, lack of capability to deal with multiple knowledge that are necessary to maintain their competitive ability, absence of rulings taking into account the work conditions of the waste pickers. Also, ignorance of current technologies and of the recycling productive chain added with the inadequacy of such technologies to the waste picker's reality are factors constraining the advance of these enterprises.

Understanding the role of technology on the progress of this kind of enterprise and the inadequacy of conventional techniques to social inclusion is fundamental for the advance of the debates and political decisions. The aim of the present study is to discuss the development and technology appropriation in mutual economic enterprises of Brazilian waste pickers in the light of the fields of Science, Technology, and Society.

To develop this study there was carried out an extensive review in the literature to identify aspects of the difficulties faced by waste picker cooperatives, aspects of the Social Technology and Conventional Technology concepts, and others. This study also presents the practices carried out the deployment of technologies for recycling of plastic with the cooperatives of São Carlos / SP. The results indicate that the Social Technology can make a difference in economic solidarity enterprises of recycling because there is the possibility of building technology collectively, trough the participation of the waste pickers in the development of this process of knowledge prioritizing their actual needs.

## Developing Vaccines for sub-Saharan Africa

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The development and introduction of vaccines into human populations calls for STS attention. The transnational development, regulation and commodification of vaccine during the H1N1/09 pandemic raised our awareness of multinational public-private partnerships, international standards and regulation, and issues related to prioritization, efficacy and safety. Vaccines are special biologics, introduced in usually naïve individuals, connecting people in biological citizenry, and produced and distributed variably and inequitably in developed and developing countries. Immunogenicity counters infection; risk protection counters safety fears. Anti-vaccination movements and public health campaigns alike adopt a wide range of cultural, political, religious, gendered and scientific explanatory models to support their claims. A new meningococcal serogroup A conjugate vaccine, *MenAfriVac*, is the first vaccine developed, manufactured and licensed in the global south for use in developing countries. It is scheduled for introduction in Burkina Faso in 2010. This paper describes the actors and activities involved in the development, planning and implementation of the Meningitis A conjugate vaccine in Burkina Faso. The roles and interconnections of local, national and international organizations, as well as multi-dimensional on-the-ground socio-cultural, technical, historical, economic, and political factors that lead to differential health concerns and responses will be examined, with attention to lessons learned and improvement on vaccine decision-making models.

## **The digital jungle: satellite-based remote sensing and the formation of the Amazonia's environmental policy**

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Different authors have highlighted the role of the mass media (Bendix & Liebler, 1991; Mazur & Lee, 1993), environmental non-governmental agencies (Keck & Sikkink, 1998; Zhouri, 2004), grass-roots movements (Conklin & Graham, 1995; Hecht, 1989), and social imaginaries (Harrison, 1993; Slater, 2002) in the establishment of deforestation in the mainstream political agenda in Brazil and abroad. However, the literature have largely neglected the role of scientific practices and technologies this process. Furthermore, even though some studies acknowledge the discursive power/knowledge dimension of the conservation agenda (Banerjee, 2003; Escobar, 1996), the literature still lacking studies exploring the relation between the appropriation of new scientific practices by developing countries and the acceptance of related scientific claims.

This paper attempts to contribute to this literature by discussing the role of satellite technology and related scientific activities in the establishment of Amazonia's deforestation as an important political issue in Brazil. In particular, it discusses the role of Brazilian and foreign scientists in producing deforestation rates via remote sensing techniques, and how these assessments have influenced the Brazilian environmental policy. Brazil passed through profound changes between the 1980s and 1990s. In beginning of this period the country was coming out of two decades of military dictatorship and had a transition government that reacted aggressively to any critique to the developmentalist policies towards the Amazon (McCleary, 1991). By the end of this period Brazil had taken an u-turn and changed considerably its policies towards the Amazon, which became within Brazil a major topic of political debate (Kolk, 1998).

Based on interviews with scientist and politicians, governmental reports and other secondary sources this paper argues that the introduction of satellite technology was key to the establishment of deforestation in the political agenda. In particular, satellite imagery contributed to this process because it enabled scientists and activist alike to produce deforestation with five important qualities. First, deforestation became more *truthful*, tanks to the superior epistemological status provided to photographic images. That is, an inscription that apparently cannot lie (Law & Whittaker, 1988) or be influenced by human agency (Daston & Galison, 1992). Second, since satellite images are able to cover the entire Brazilian Amazon, the deforestation rates obtained through then can also claim to be holistic, namely, to represent what is happening in the *whole* Amazon. This contrast to the experience obtained by being in the Amazon, which accounts for deforestation only partially (Porter, 1992). Third, by *nationalizing* the remote sensing and satellite technology, the focus of the debates changed from whether the deforestation rates obtained by scientists in USA and Europe were "exaggerated" (and politically motivated) or not, towards what factors may be behind the phenomena. Forth, as shown by Latour and Woolgar (1979) the capacity of science to produce and present series of comparable inscriptions is key to its rhetoric power. In the case of the Amazon, the time series of deforestation rates have been a key rhetoric device by allowing scientists to *predict* the dreadful year that the rainforest be completely cleared (e.g. Fearnside, 1982; Laurance, Albernaz, Fearnside, Vasconcelos, & Ferreira, 2004). Finally, the availability of time series of deforestation data enables construction of models that attempts to show correlations with governmental policies. Furthermore, the possibility of representing satellite-generated deforestation as georeferenced objects in a geographic information systems means that it is possible to obtain correlations between deforestation and other spatial phenomena, such as the construction of roads and the

establishment of conservation areas (e.g. Pfaff, 1999; Soares-Filho, et al., 2006). In this way, scientists offers convincing *causal stories* that shows not only the existence of a certain undesirable phenomena but also suggests how it should be tackled (Stone, 1989).

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## **Europe and (Sub-Saharan) Africa in the Future Multipolar World: Techno-science and Development Cooperation**

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Recent studies have highlighted the rise of China, India and Brasil as global powers. The greater international role of these nations has led many to speak of an emergent multipolar world. In that 'multipolar world' to speak about a North-South divide will be more problematic than ever before and new questions and puzzles about centre-periphery relations, i.e. relations between multipolar centres and the rest of the world, will emerge. The relations between multipolarity, changes in global governance and the role of science and technology in national, international and regional affairs are central to such questions, but the relations between international studies and STS are weakly developed. Yet, in discussions about multipolarity it is assumed that the development of scientific and technological innovation will be not only essential to future growth and competitiveness but also to address new global challenges and problems of poverty, food provision, energy demand and the exploitation of natural resources. What does this imply for international scientific and technological cooperation and competition, in particular when new global links are redefining the traditional North-South cooperation?

In this paper we will explore this question on the basis of an analysis of socio-technical imaginaries entertained in policy documents and policy discussions. We will do so focussing on discussions around current and future relations between the EU and (sub-saharan) Africa.

## **Of Rusticity in the Information Society**

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The debate over the digital divide between developing and developed countries seems unending. While the theoretical constructs become more and more complicated, there is no conclusive evidence about whether the divide is closing, widening or deepening. Nevertheless, the divide has been established as a challenge for both policy makers and academics and is usually understood as a reflection of the north-south differences. However, the extent to which it relies upon the dominant concepts of development and modernity will be clearer once we consider that similar differences has long divided rural and urban areas. It is no accident that the rural-urban divide is the other significant territorial dimension of this divide.

This paper draws on the criticisms of the notion of the rural-urban digital divide to make explicit the very assumptions upon which it is relying and to show that ideological and hegemonic conceptions of development and modernity lie at the heart of this division. A critical edge is added to the existing criticisms by building on the evidence put forward by Sassen who argues that ICTs effectively destabilize the traditional hierarchies of nation-states. This stands in sharp contrast to the common frames used in the studies on rural-urban digital divide which focus on intra-country differences.

Then, by drawing on developments in STS, the author calls for a re-conceptualization of differences in the appropriation of ICTs based on studying the complexities of interacting heterogeneous networks of sociotechnical elements which simultaneously shape the knowledge produced, shared and applied around those networks. The concept of rusticity is defined to capture the set of interacting actor-networks (including cognitive and normative frameworks and its material manifestations) which relate to a specific place and, as a whole, does not travel. Anecdotal evidence is provided to make the argument clear. Challenges implicated for the north-south divide and what STS has to offer is discussed in proposals for future cross-country research.



## **NGOs and the global circulation of bio-innovative drugs**

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This paper examines the role of Non-Governmental Organizations (NGOs) in so-called non-Western world in the circulation of pharmaceuticals in the global market. It is based on about a year-long ethnographic work on patients' rights advocacy groups and professional organizations concerned with fair and equitable access to drugs in South Korea. With focus on an anti-cancer drug developed and marketed by a Swiss-based multinational pharmaceutical company, Novartis, the paper explores the ways in which NGOs contest the (enforced) global flow of patented drugs regulated by the multinational corporation and come up with alternative ways of assessing and articulating democracy (alternatively, civic society) and justice in the global age.

In 2001, Novartis Korea tried to put an innovative cancer treatment on the market by registering it with the government authorities for insurance coverage. In the process, Novartis Korea and the Korean government disagreed on the appropriate price of the drug. Novartis's drug pricing policy was based on the A7 pricing system that is universally applicable to advanced countries, against which the Korean government was strongly opposed. Korea NGOs contended that Novartis's universal drug price hindered local citizens from accessing the drug. They asserted that multinational pharmaceutical companies should take co-responsibility to promote the lives of global citizens instead of protecting interests of corporations. To make their voices heard, they not only tried to network with activists beyond the national border (that is, local organizations situated in neighboring Asian nations), but imported alternative cancer drugs with similar efficacy as that of Novartis from Indian pharmaceutical companies. Thus, this paper follows through the performative actions of Korea NGOs and discusses policy implications associated with the circulation of technological advancements.

### **Between two stools: Vulnerability and Scaling Up**

*Mamidipudi Annapurna (Maastricht University, The Netherlands)*

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In our paper we will compare two empirical cases, where two south Indian NGOs engaged with the vulnerable condition of rural livelihoods differently from mainstream policy makers. Dealing with the case of natural dyeing [non-chemical dyeing] and non-chemical pest management (NPM), we first explicate the mainstream (policy) perspective on what constitutes the vulnerable livelihood conditions of handloom weavers and marginal farmers by means of historical contextualization. We will elaborate how policy makers (together with their contemporaries in science and civil society) have adopted productivity increase in both cases to cope with vulnerability and how they have scaled up such measures. Thereafter, we show how the two NGOs articulated the problem of rural livelihood vulnerability differently through their alternative practices of non-chemical dyeing and non-pesticide management, and how these articulations influenced their conceptualization of the relationship between scaling up and vulnerable livelihoods. Bringing out the differences between these two practices and conceptualizations of vulnerable livelihoods will help us understand how and why one NGO used measures of scaling up to encounter rural agrarian vulnerability, while the other NGO did not. This comparison will also enable us to see how scaling up exercises might relocate vulnerability into the livelihoods of farmers and weavers in rather unexpected ways.

## **Social Learning & Open Innovation: A Socio-Technical Study of the System of Rice Intensification**

*Mitzschke Andreas (Maastricht University, The Netherlands)*

Innovation not only takes place in laboratories and on the drawing boards of engineers and scientists. It also happens on the level of *non-formal innovators* who engage in experimentation, research and innovation practices and explore pathways not sanctioned by the traditional knowledge institutions located in the North, or their epistemic equivalents in the South. This field deserves interest particularly when studying STS and development in the societies of developing countries which are more vulnerable to the risks of global change and where various stakeholders link scientific and technological innovation to claims about economic growth, sustainable technological transition, and social change.

The System of Rice Intensification (SRI) is an example of such a grassroots innovation, a technology that has developed outside formal top-to-bottom agricultural innovation pathways in which technology is disseminated from scientists via extension personnel to agricultural practitioners. Instead, SRI's roots and most of the current extension work lie with civil society actors and agricultural practitioners. A plethora of social groups is dealing with and constructing this technology.

Also, SRI as a set of agro-ecological management practices is not based on a strict set of rules. Rather, SRI is a flexible array of principles that are adapted to local conditions according to locally available capacities and resources. These principles build upon the inherent potentials of the rice plant and the complex relationships with its biosphere and the social components of its environment – they reduce the need for conventional inputs such as fertilizers, seeds, water, and pesticides and induce the claim to 'produce more with less'.

Drawing on innovation studies and theories of social learning, this paper explores the interrelationships between SRI's material and social components to better understand processes of innovation and learning that deviate from classical innovation pathways with their inscribed knowledge hierarchy. Based upon four months of ethnographic research in Orissa, East-Central India, it studies innovation of and within SRI, asking the question: How do processes of learning and innovation look like in the heterogeneous SRI community? The wider socio-technical context of science and technology for development in Indian agriculture finally opens up the agenda to questions such as: 'What kind of innovation is SRI?' and 'What can we learn from challenging classical knowledge hierarchies between and within the North-South axis?'

This work claims that SRI requires more knowledge about the agricultural practice in general and the rice plant in particular when compared to conventional methods of paddy cultivation: It is not an input intensive, but knowledge intensive technology and learning about it requires reflexive practices of knowledge exchange. The particular socio-technical nexus around SRI opens up the field to *non-formal innovation actors* who acquire and disseminate knowledge along alternative innovation trajectories. This necessitates looking not only at SRI as a material reality and the socio-cultural dynamics evolving around rice, but also includes a wider notion of the research 'field', the politics of knowledge in Indian agriculture, and the social relevance of STS research in development contexts.

## **A Tale of Two Technologies: Protocols and Participatory Democracy in a North-South Product Development Partnership**

*Montgomery Catherine (London School of Hygiene and Tropical Medicine, UK)*

The randomized controlled trial (RCT) is constructed as a pure, singular and objective form of scientific enquiry, divested of social contingencies. However, the organizational structures and cultures that constitute clinical trials may present extreme variability: spatially, temporally, institutionally. This is particularly the case with large, multi-site, transnational trials, such as those common in the development of new health technologies. A proliferation of North-South Product Development Partnerships (PDPs) in recent years has come to represent the norm in public health research into new biomedical technologies; it has fallen largely under the radar of Science & Technology Studies (STS). Whilst public health research often focuses on developing countries, it rarely considers the cultural traffic between North and South in research and interventions. Likewise, whilst STS provides sophisticated accounts of technoscientific development, it rarely moves outside of industrialised world settings. In this paper, I bridge the gap in these two fields by exploring the constitution of one such 'partnership' across its sites of practice in the United Kingdom and Zambia.

Findings are based on a qualitative sociological study of the Microbicides Development Programme (MDP). Over two years, I conducted interviews with scientists and key stakeholders in Europe and Africa who were involved in the design and running of this scientific programme. Data were analysed using a modified grounded theory approach. Using the idiom of co-production and a Foucauldian understanding of power/knowledge relations, I interrogated the techniques of power through which transnational scientific networks are mobilised to test new products, such as microbicides, and how these affect scientific practices, knowledges and identities across socio-geographic boundaries.

Here I explore the discourses of democracy and gendered capacity building that united disparate groups across Africa around a protocol largely developed by a core group of scientists in the UK. Programmatic success rested on the participation of the Southern trial sites in their own self-regulation. The form of government that the Partnership instituted presupposed the freedom of the collaborators; rather than denying their capacity to act, MDP harnessed it and shaped it to meet project ends. Therefore, whilst the programme largely retained power in the North in terms of setting the scientific agenda, in comparison to other research models which work by imposing sovereign rule from a Northern 'centre', MDP created an institutional space of regulated freedom (Rose 1999). Rose has discussed technologies of government as 'human technologies', a concept that is useful for understanding the interconnections in large international health research programmes. Using Rose's conceptual apparatus to examine this case study, it is possible to see both new biotechnologies for HIV prevention and the research designed to test them, as human technologies and technologies of government. Such a designation – underscoring the human and the technological in the practice of what is otherwise known simply as 'science' – signals the power inherent in scientific research. It directs us to the discourses, processes, objects, and knowledge of a system that is constitutive as well as reflective, and is not only practised across sites, but practices those sites themselves.

## **The notion of technology within Development Studies- A request for a new theoretical framework**

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The process of social change has been in the past often associated with technological change which corresponds to a technological determinist view of social change. Others (e.g. Bijker & Pinch, 1987) have criticized this view and argued for a social constructivist approach to the study of technology which considers the societal role of shaping technology and technological change.

However, a significant part of these studies tend to be focused exclusively on countries in the North, while in a debate within development studies and particularly the social consequences of technological change has been neglected.

I claim that while technology found its recognition within science studies which led to the occurrence of a relatively young interdisciplinary field of Science and Technology Studies (STS), its important role in a broader development discourse has been widely ignored. Furthermore, I argue that the term technology regarded in a development context is often limited to the dimension of economic development while the meaning of technology for a social perspective of development (e.g. Capability Approach) is neglected. The effects of technologies for social development have been primary based on the study of Information Communication Technologies in developing countries while other types of technologies have not been taken into account.

The article argues for the need of a theoretical framework which combines approaches within Science and Technology Studies and Development Studies in order to acknowledge the interconnection of technology and development and strengthen both research fields.

## **Unnatural histories: care, regulation and experimentation in Dakar**

*Poleykett Branwyn (London School of Economics, UK)*

The Senegalese state have closely regulated commercial sex work since the 1930s, women who are registered with the state have the right to legally sell sex provided that they present themselves at the state clinic every 15 days and undergo a compulsory blood test and physical examination. My doctoral research tells the story of Senegalese regulation from its inception as a classic, colonial high-modern intervention, to the contemporary efforts of diverse state and non-state actors to link up collaborate service provision across the fractured urban space of Dakar's "archipelago" of AIDS services - regulation in Dakar has come loose from its state moorings and is now practiced through diverse apparatuses of urban planning, municipal politics, development infrastructures, national health systems and postcolonial technoscience.

This paper focuses on the state polyclinic where registered sex workers have been consulted for around eighty years. In 1985 HIV2 was detected in a blood sample taken from a sex worker registered at the clinic. This lead to a "scramble" (Lachenal, 2006) to uncover more about the new virus, to substantial infrastructure investment in the clinic and to a collaborative research project run by researchers Harvard University and sub-titled "The Prostitute Project". Drawing on 12 months of fieldwork and blending archival, oral history and ethnographic research, I examine how care, police work, bureaucracy and experimentation are shuffled together at this distinctively blended site.

First, I will discuss how the experiment and its logics of care are woven into the world of the clinic. Second, I will examine the impact of the experiment – in particular, the ambiguous ethicizing work of the research protocols and the effect of the research project's time horizons on how the care at the site is experienced. Finally, I will discuss some of the issues that this case raises for debates around how STS can articulate with postcolonial theory.

**DOTS implementation for tuberculosis control in Rio de Janeiro, Brazil: how a global strategy is turned into local practices**

*Rainho-Bras Oriana (Center for Social Studies, Economics Faculty, Coimbra University, Portugal)*

In 1994 the World Health Organization (WHO) jointly working with the International Union Against Tuberculosis and Lung Disease, started a strong campaign for directly observed treatment short-course therapy (DOTS), the strategy presented as the solution for the control of tuberculosis worldwide. Several countries adopted DOTS, but we are lacking empirical studies on the ways its implementation occurred in different contexts. This paper will analyze the process of DOTS implementation in Rio de Janeiro, Brazil, based in ethnographic fieldwork in tuberculosis services and interviews to several people involved, from July to December 2009. Brazil adopted DOTS in the nineties but its actual implementation in the services occurred in very few places. In 2004, Brazil reinforced DOTS as a priority for the national program for tuberculosis control and since then Brazil is integrating it into its national public health system, going through a decentralization process. Rio municipal program for tuberculosis control started DOTS in 2003, strongly focusing on poor communities living in slums where public services are scarce, and violence is constant. The expansion of DOTS in Rio is built upon the network of primary care services, and consists of training the existing primary health care staff for managing tuberculosis, assuring the supervision of dose-taking and patient support, planning services' hierarchy and laboratory networks in the municipality, and assuring free transportation for patients. WHO always presents DOTS as a simple package of conventional, low-tech, already tested actions for tuberculosis control. Rio case shows that the main challenges for implementing DOTS have to do with services structuring, human resources, multi-professional teams, work processes and intersectoriality, that is articulation of the health sector with other public services such as social services or the prison system. Moreover, local community associations and non formal collectives have been important in providing health education, intermediation of health services with very poor populations, and pointing out deficiencies and possible strategies. DOTS implementation in Brazil, and more specifically in Rio, reveals the challenges a global strategy met in the field and how it became something else when implemented. It also reveals the complexities of the relations between international, national and subnational levels of political decision and implementation in health as well as between governmental sectors. Disentangling these processes will enable us to bring contributions so that global health politics may positively relate to national and subnational health dynamics and therefore bring more benefits to the people suffering.

**The 'South' is not a place: Rethinking the 'North'-'South' divide through an ethnography of clinical trials in Sri Lanka**

*Sariola Salla (University of Durham, UK)*

*Simpson Bob (University of Durham, UK)*

The global travel of human experimentation has now reached Sri Lankan hospitals bringing with it novel interconnections between science collaborations, global health inequalities, and development. What happens when human experimentation travels globally has received some, albeit limited, attention in social sciences (Petryna 2009). Salla Sariola spent a year (2008-2009) interviewing doctors and researchers about the conduct of clinical trials. Drawing on an in-depth ethnographic account of the relationships and networks around two specific clinical trials and an analysis of the researchers' experiences of working together we question the commonly used 'North'/ 'South' binary and show the complexities of collaboration.

The two trials that were investigated were phase two drug trials: one funded by an international pharmaceutical company, one by academic trusts for health research based the UK and Australia. In these trials the knowledge that was created travelled in and out of Sri Lanka, across national boundaries and via networks that are not limited by nation states. In one of the trials the research subjects were patients of a serious local health problem and the beneficiaries of these trials generally found in the developing world. The other trial was outsourced to Sri Lanka by a 'Western' pharmaceutical company - it aimed at selling the drug under trial in 'Western' markets and it was not likely to be available in Sri Lanka. In both trials the researchers were made up of Sri Lankan and 'Western' doctors.

Using discourse analysis we provide a critical description of these findings specifically focusing on the concept of collaboration, which shows that a clear divide between the 'North' as the beneficiary and 'South' as recipient/ vulnerable/ developing is redundant and limited where trials are concerned. We draw attention to the international networks and relationships, and what is being exchanged in the trials: knowledge, social capital, capacity, data and samples, economic gains, practices and ideas. Through an analysis of these exchanges we discuss what counts as benefit, who the benefits accrue to and the way different benefits are distributed between interested parties. The nature of these networks and benefits bring into question the notion of a North-South division as an initial analytical premise.



## **History and Philosophy of UN Debates on Science and Technology for Development in Global South**

*Shah Esha (Technology and Society Studies, Universiteit Maastricht, The Netherlands)*

In this paper, I revisit a series of key moments in the last 50 years of UN debates on science and technology for sustainable development. The paper is a historical reflection on the way in which notions of development in the UN debates since the WW II have been associated with science and technology. The paper especially looks into the UN debates in the 1960s and 1970s which were declared as development decades. Two major conferences on science, technology and development were organised during this period: The first UN Conference for the Application of Science and Technology for the Benefit of Less Developed Areas (UNCSAT) was held in Geneva in 1963 whereas the second conference on Science and Technology for Development took place in Vienna in 1979. The paper discusses some of the fundamental philosophical assumptions on science and technology for development employed in organisation and outcome of these conferences and reviews the direction in which these assumptions and corresponding practices in the UN changed over the course of the development decades.

The paper subsequently engages with way in which the notion of sustainability transformed the idea of development and its relationship with science and technology in the debates leading to the Rio conference in 1992. At the turn of millennium, the UN Task Force on Science, Technology and Innovation, the 2001 UNDP Report on Making Science and Technology Work for Poor, and the International Assessment of Agricultural Science and Technology for Development (IAASTD) are engaged with to understand the significant points of departures on the notions of science and technology for development.

Eventually I intend to argue that these changes over the course of half a century do not simply denote chronological eras but represent the shifts in political positions on the struggle between north and south, and rich and poor on the question of distribution and justice. This paper therefore is not a study of the UN impact on development. It is an attempt to engage with the ways in which the “thinking” of one of the important global institutions has influenced the current ideas, practices, and imaginations on science, technology, and innovation for development.

## **The emergence of stem cell science in India: A twist from 'periphery' to 'centre'?**

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India is now seen as one of emerging centres for stem cell based research and therapies, having a significant number of research laboratories, public hospitals, private clinics and companies active in this area. India is becoming a destination for what has been described as 'stem cell tourism' with Western patients being offered therapies for certain conditions such as spinal injury, muscular dystrophy, Parkinson's disease, multiple sclerosis, diabetes, retinal pigmentosa etc (Blakely 2009; Patra and Sleeboom-Faulkner 2009). The development of stem cell science in India challenges the long-established dichotomy between the 'centre'/'periphery', North/South and developed/developing economies (Bharadwaj and Glasner 2009). However, there is a widespread perception that clinical research and therapeutic applications of stem cells in India do not meet international rules and regulations and violate standard ethical norms (Pandya 2008; Sipp 2009). The proliferation of stem cell science in India problematizes the concept of the unidirectional flow of western science and western cultures, and offers insight to re-visit the Basalla's 'diffusionist model' for the spread of modern Western Science (Basalla 1967; Krishna 1992). Drawing on empirical work of stem cell science in India and interviews with scientists and clinicians this paper aims to examine a) the stage of stem cell based research and therapies in India; b) the 'scientific culture' in non-western settings and c) the implications of the above for understanding the post-colonial development of science.

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## TRACK 41

### Open Track

## **The role of power/knowledge in health care improvement practices**

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Quality improvement collaboratives are increasingly used as means to improve health care on a number of issues like client safety and client autonomy. Within collaboratives, improvement teams from different organizations join forces to improve care within a set time-frame. Some evaluation studies investigate effectiveness of the collaborative. Other studies describe the improvement processes, often to learn how to improve developing and implementing a collaborative the next time. Usually, both types of evaluation have a policy or improvement based aim. Just because they are evaluation studies, they often commit themselves to the same goals as the actors involved in the quality improvement program.

However, another way to look at collaboratives would be to study them as power techniques, or a range of power techniques, aimed at influencing the actions of actors in the health care sector. In this study, we do not conceive of power as a negative mechanism, intended to repress people. On the contrary, we use the concept of power as it was developed by Foucault, in which power is enabling at the same time as it is restricting. Furthermore, following Foucault, power is not perceived as a one-way affair, in which policy makers directly influence health providers and clients' lives. On the contrary, contemporary governing mechanisms often work through the concept of autonomy. At the same time as autonomy is deemed to be desired by people, it is also a way to govern their behaviour at a distance, as both Foucault and Rose maintained.

By using data gathered in interviews and observations in the context of an evaluation study of a quality improvement collaborative, we analyze the different power mechanisms exerted by the involved actors (be they human or non-human actors) in the collaborative. While improvement teams within the collaborative had much leeway to come up with their own improvement plans and actions and in fact were governed through their freedom, they were directed to certain aims as well. For example, the measurement instruments were an effective way of governing both improvement teams' behaviour and that of clients. They formed a way of gaining knowledge both on institutional and on client level, and thereby enabled intervening on these levels. Through such mechanisms, the way clients think about and act upon themselves – i.e. their technologies of the self – will have (partly) changed.

By studying a collaborative in this way, we hope to open up a different set of questions than is usual in literature on collaboratives. For example, how is the relation between governmentality and human subjects established within a collaborative? What mechanisms are used to establish this relation and what are the (performative) effects of these mechanisms? What role does autonomy play within the collaborative? And as client participation is often seen as important within collaboratives, how is it used at the different levels of the collaborative in order to exert power, and to reach certain effects? Studying these questions enables both (a different kind of) reflection upon collaboratives and upon the health care sector in large.

## **Performing weight: Reading the doing of body-making as weighting-up and weighting-down processes**

*Caseley Allyson*

As body emerges from its historical construction as an entity that is separate from mind, we are challenged to understand weight and bodies in ways that accommodate their individual genealogies. Weight need not be understood as an entity that resides within bodies or on bodies, but emerges as an identifiable feature of the unique body-making processes that create weighting-up bodies or weighting-down bodies.

For professionals who work with clients in managing weight, this shift in our understanding of bodies signals a need for different ways of reading bodies, reading the processes of weighting-up and weighting-down, rather than reading the entity that has been created as body or weight. In order to read body-making, we require a model that accommodates discursive meaning and physicality as being in a shared relationship.

This study identified Barad's (2007) model of performativity as offering such a model. By presenting a conceptual framework that elaborates materiality as a relationship between discourse and access to possibilities for action, Barad's model offers transparency to the process of materiality-making.

Using this model, transcripts of interviews with several women who indicated they were trying to lose weight have been examined. From texts of interviews, the relationship between the discourses that are making meaning and their physical bodies can be read. Bodies are understood as the iteration of selected actions and meanings. From transcribed texts, individual body-making can be read as weighting-up processes or weighting-down processes.

Three specific features of body-making were read: the boundaries that provide access for food; the meanings that delineate what matters as body; and the ongoing performance of weight change as a relationship between subject and object. These features elaborate the relationships between discursive meaning and possibilities for action that delineate individual weight change performances.

Reading the discursive boundaries that enable or constrain access for food establishes what is able to enter the zone of unique meaning and doing that stabilises as a body. Porous boundaries, where multiple discursive meanings provide access to multiple entrances for food, made it more difficult for participants to establish a stable weighting-down performance. The iteration of what matters, discursively and physically, emerged to stabilize into what is recognized as a delineated body. Some bodies could be read as being delineated by clear discursive meaning that signalled what mattered as body. When the physicality of bodies was offered less discursive meaning, then materiality was less constrained, enabling bodies to be larger.

The consistency of ongoing weighting-up or weighting-down performances was read as a relationship between subject and object. By reading positions in discourses as subjects that are enacting varying levels of stable access to meaning-making actions, then the consistency or fluctuations which are creating weight change performances can be read.

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This paper describes a study that examines how a performative model for reading individual weight change processes can be utilized by professionals in a therapeutic change relationship. Changes in the way practitioners read body, agency, and the change process itself all indicate how multiple sites for intervention might be targeted for effective weight change strategies.

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## **STS Contribution for Music Sociology: Theoretical Reflections based on a Case Study**

*dos Santos Boia Pedro (University of Exeter, UK; Instituto de Sociologia of the University of Porto, Portugal)*

This paper will present theoretical reflections on ways through which science and technology studies may contribute for the development of some relatively new approaches within music sociology. The author has been focusing on the problem of bringing the materiality and the physical-acoustical properties of music and instruments (intersected with the socio-aesthetical dimension) into sociological analysis (Boia, 2008 and 2010).

Although based on a case study [the author's ongoing doctoral research] – the viola and violist throughout history and nowadays, in terms of the uses of the instrument, its technique, its material properties, as well as the relation of all this with the identities of instrumentalists – these reflections have a wider theoretical and operational concern.

Under discussion will be various theoretical contributions from STS, as well as from music sociology and music psychology, and the possible articulations between them. The development of a performative idiom which strives to address material agency in ways that may transcend a (mere) constructionist perspective (developed by sociology of scientific knowledge), as proposed by Andrew Pickering, is a relevant contribution for any attempt to focus sociologically on materiality. However, in the sociological quest for material agency in music, we should not neglect mediation (Antoine Hennion has been stressing the importance of this concept). This aspect, along with some specificities of music, seems to necessarily imply social (and psycho-cultural) construction as well. The author argues for the need to intersect the two approaches and dimensions, highlighting the pivotal potential that the concept of affordance may have for this task (based on its original formulation by Gibson within the ecological theory, the concept has been applied to music psychology by Eric Clarke and to music sociology by Tia DeNora, for instance).

All these concepts will be discussed recurring to empirical data from the case study mentioned above (currently being prepared for publication) as will the notions of assemblage and co-production (from Bruno Latour and ANT), and mangle and dance of agency (from Andrew Pickering). Analysing specific periods of the history of the viola and the viola-player, I will focus on the dialectics between the social construction of instrument (socio-aesthetic context), incorporation processes (socialization of the players in terms of technical training and their identities), and materiality (material properties of the instrument). I will refer to particular process of re-shaping and moulding of the instrument as a result of dialectic processes unfolding throughout time between material and human agency, as they occur in (and through) specific configurations between humans (the players) and objects (the instruments), and framed by particular contexts localized in space and time.

## Hope infrastructure: enacting expectations in bloggers' material practices

*Estalella Adolfo (Scientific Research Center, Centro Superior de Investigaciones Científicas, Spain)*

This paper discusses the material dynamic of expectations among a collective of intensive bloggers in Spain and how they are enacted in the everyday blogging practice with the participation of the blog material infrastructure. I will argue that expectations on the power of blogs for transform society are based in the massive material inscription of blog/blogger interactions. Empirical data has been produced during 18 months of fieldwork focused on the study of intensive bloggers, a collective defined by recognizing themselves as bloggers, blogging everyday, and being deeply involved in the construction of the Blogosphere in Spain. Empirical data has been obtained in three different contexts: the Internet, face to face events and bloggers meetings and interviews (online and face to face).

Common among intensive bloggers is a reflexive practice focused on the discussion of their own blogging activity; key element of this reflexive discourse are the expectations posed on what is conceived as the power of blogs for transforming different domains of societies (mass media, science, companies and education, among other). Analyzing this reflexivity I will first present a set of expectations that circulate on the public discourse of intensive bloggers and drawing on the concept of inscription (Latour, 1999) I will then discuss how these expectations are enacted in the everyday material practices of bloggers with the participation on the blog infrastructure.

Any interaction among blog and bloggers produce material inscriptions like log files, hyperlinks and registries of visitors. A whole set of artefacts have been elaborated in the last years that manipulate these traces for elaborating different types of representations like statistics of visitors or lists of incoming links. Blog infrastructure has progressively integrated all these devices along the years and they have been incorporated by many bloggers into their everyday practice.

I will focus my discussion specifically on the extensive use of statistics of visitors. Drawing on the distinction between regimes of truth and hope (Moreira and Palladino, 20005) I first discuss the dynamic of facts and expectations that takes place when these inscription devices are mobilized in the everyday blogging practice and I problematize the common definition of expectations as predicate of the future; I will argue that expectations are formulated as uncertain predicates of present state of affairs. I will first show how these inscription devices perform materially present facts: number of visitors that are usually represent as a temporal line; but at the same time power of blogs and new expectations are the materially enacted as a deviation of the expected number of visitors when exceptional facts as a sudden deviation from the expected number of visitors are represented. The same inscription device is at the same time an artefact for performing present and routine facts and new expectations of the future. I will then argue that the massive inscription of the present by the blog infrastructure is the condition of possibility for enacting future expectations among intensive bloggers. The material infrastructure that takes place in the inscription process is a infrastructure for hope.



## Notions of gender in epigenetics

*Kalender Ute (IAS-STG)*

Epigenetic approaches more and more enter various fields of biomedicine and biomedical research. Epigeneticists deal with cell processes beyond the genes and assume that a metacode – the epigenome – exists which determines the regulation of genes. This epigenome shall not just be influenced by a specific diet or medical treatment, the epigenetic metacodes shall also be hereditary. So on first sight epigenetics does not just consider environmental influences, it also seems to be the opposite to gene determinism and to offer a more complex version of the organism.

For some time feminist theorists therefore have been interested in epigenetics: Because epigenetics focuses on the cytoplasm, which was associated with the egg, the 'female' organism and hence with the 'female' contribution to reproduction, feminists have interpreted epigenetics as an alternative approach to genetics and its implicit androcentrism. And indeed, current epigenetic approaches seem to revalue the 'female' organism, as key concepts in epigenetics are 'maternal' cell effects and 'female' reproductive behaviour.

However, on second sight this epigenetic interest in sex specific cellular processes turns out to be problematic: Because epigenetics assumes that the 'environment' – namely behaviour and lifestyle – coins genes, gender specific imperatives of genetic responsibility are intensified. The central claim of my paper thus is that in current epigenetic research this 'gender awareness' has been diverted into an even more sophisticated version of epigenomic susceptibility: Epigenetics creates a holistic version of epigenetic risks and responsibilities.

My paper would critically analyze implicit notions of gender in epigenetic re-articulations of the term 'environment'. I would present insights from my empirical post-doc-project on epigenetics from a gender perspective. Qualitative interviews with epigeneticists in Great Britain and Germany form the basis of this inquiry. Further extant data are scientific journal articles, book chapters in edited volumes, websites of expert networks, position statements popular, and press reportings.

## **Cyborg Identities and the Fascimile: Body and Machine in Tomorrow's Eve\***

*Kokoula Xenia (ETH, Zurich, Switzerland)*

The description of the artificial female body in the 19th century Villiers de l' Isle Adam novel "Tomorrow's Eve" raises the issue of the redefinition of the body's relation to space through technology. While literary research has generally concentrated on the platonic idea of the simulacrum, this essay focuses on the social, discursive and technological process of production of the body, which points out possibilities of crossing at the same time gender and spatial boundaries.

The narrative is structured along an analytical delineation of the gendered (female) body following the order of the male's inspective look upon it, dividing it in parts, inner and outer organs and building analogies between them and their technological substitutes. Three distinct instances in the narrative support the view that what at the beginning is a cohesive female identity, ends up in being subdivided and fragmented, enabling the artificial body to surpass the alleged aim of the narrator to produce an ideal woman. These instances are the process of production through embossing, and the discursive juxtaposition of the android with two different types of human women, the evil mistress and the heroic mother archetypes.

The android's external surface is produced as an exact copy of prototype's body at a certain point of time. Through a process of embossing a living being's form, materiality, odor, voice and haptic qualities upon the assembled matter, the android is given an identity. The simulacrum is generally conceived as unaffected by time and highly mobile; however, in order to enable its traveling, a special coffin is needed, a box carved with the form of the original model on the inside. In there the matter of the simulacrum retains and reconstructs its shape, or it reproduces and affirms its identity. This technological artifact is the only element that spatializes the android body, ensuring at the same time its mobility-transportability.

Compared to the type referred to as the evil mistress, the android can be seen as an inversion of it. The natural body of the mistress is covered with certain artifacts and artificial beauty tricks, while the android, internally a complex mechanical construction, is covered by a natural flesh, or at least an indistinguishable from the natural one. Compared to the heroic mother, whose main role is that of reproduction, the android reveals another inversion: the mother's body contains the organ of reproduction (womb), while the android is being contained by, thus externalizing a womb-like coffin, a form-giving receptacle.

Through these patterns of inversion, displacement and mobility in space the android suggests ways of transcending both gender norms and spatial boundaries. As the limits between animal and human, between artificial and natural are constantly blurred, the concept of encasement of the body, the displacement of inner organs, and the inversion of the inside and outside, can be seen as possible trajectories to approach D. Haraway's question: "Why should our bodies end at the skin, or include at best other beings encapsulated by skin."

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\* This essay is based on a student work presented at the seminar „Mobility: For a Kinesthetics of the 20th Century“ at the ETH Zurich in 2009. It has been successfully carried out thanks to the support of the teaching team, Prof. Dr. Georges Teyssot, Prof. Dr. Laurent Stalder and Anne Kockelkorn.

## **National science evaluation systems and the productivity criteria in social sciences**

*Mali Franc (University of Ljubljana, Slovenia)*

In recent times, the national science evaluation systems have gained an increasingly important role in creating conditions for the higher productivity and international visibility of social scientists' research output. These systems are perceived as one of the crucial instruments used in R&D policy in attempt to achieve the national strategic policy goals, including the internationalisation of (social) science. However, social scientists' career paths and financial support for their research activity still seem to be shaped prevalently within their national context, especially in Central and East European (CEE) region.

In many CEE countries, the (social) position, the resources as well as the performance of the social sciences are still relatively low in comparison with natural sciences. The social science productivity and (inter)national visibility in this part of Europe are sometimes hindered by various structural social constrains, some of which derive from the past. Namely, in the former communist regimes the social scientists were much more isolated (locally oriented) with more parochial research output than their counterparts in hard sciences. Actually, the basic transformations of science evaluation systems of CEE countries were going on in the last fifteen years. Have these changed systems contributed to a greater international visibility of social science output of the CEE region?

Moving from this basic conceptual background, I will present the situation in Slovenia to point out the impact of science evaluation system on the social science productivity and its visibility in CEE region. As it has been noticed by many sociologists of science, we can expect a lot of burning questions and problems around the practical functioning of the evaluation systems, especially in such type of transitional countries as Slovenia with a small community of social scientists. For example: how to combine bibliometric indicators with peer-review in a small scientific community, how to evaluate journal versus non-journal publications, national versus international publication behavior, etc?

In the first part of the paper, the theoretical and methodological arguments for the need to create efficient evaluation system in social sciences will be presented. The second part of the paper will provide a critical overview of the situation in Slovenia where the gradual modernisation and improvement of the evaluation system has hypothetically influenced the orientations of the social scientists to be more open to the international scientific arena. My attention will be primarily focused on the investigation of the differences and similarities of Slovenia with other small CEE countries. One of the main reasons for this approach is that some type of a more qualitative comparative study of science evaluation systems in several small countries can also provide a more reliable picture about the situation in Slovenia too. All of these issues are highly compatible with the thematic framework of the proposed EASST-SSTNET session Research productivity in social sciences and this abstract is a part of the session proposal.

## **Visualising Genetics: Modes of diagnosis and interpretation in the troubling body within paediatric genetics**

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*Clavering Emma (PEALS, Newcastle University, Newcastle upon Tyne, UK)*

Paediatric genetics involves highly interpretative visually based diagnostic processes, involving multiple forms of craft and expertise, technologies and actors. One aspect involves studying the physical features of a child over time to establish (or claim) what 'clues' those features provide as to what genetic syndrome a child may embody. This involves the taking of multiple, close up digital photographs of the child over time, which will be used by the geneticist, by themselves or in team meetings, to point towards what area of DNA sequence they may wish to focus their diagnostic investigations on. At this point the gaze turns from the external to the internal with the production of visual representations of tiny fragments of the child's DNA via techniques such as Fluorescence In Situ Hybridization (FISH) or Comparative Genome Hybridisation (CGH). These representations of the external and internal child's body, also sit alongside photographs the family has of the child and others in the family taken in varied contexts and via varied technologies. In these familial contexts, the visual representations produced of the child are not clues to aid a medical diagnosis; instead they are clues to the child's belonging to kin, both present and past, read through physical similarity. Each of these representations and the technologies which produce them become part of interpretative processes the geneticists and the family participate in, including the child in question, as they seek to identify what differences and similarities this child embodies and potentially its genetic source within inheritance. In so doing questions are raised about: who has authority to interpret visual representations of a child's body; how is authority given, exchanged and challenged; what is the significance of the external body being used to define the internal and the boundaries that makes and blurs; what notions of inheritance and belonging are made and unmade via the identification of clues; and what role do different technologies of representation play in the mediation of troubling embodiment. This paper will draw from ethnographic research, funded by the Economic and Social Research Council, of families referred to a paediatric genetic service in England<sup>1</sup>. The fieldwork is ongoing, but involves longitudinal interviews with multiple family members, including children, and observations of clinical consultations and other social contexts of family life. Our work proposes that while medical authority is significant to the meanings generated by the formal diagnostic process, the social significance of the existing narratives and values embedded in familial representations of the child are not simply subsumed by this authority. Instead forms of co-existence and mediation continue to exist and inform readings of the troubling body.

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<sup>1</sup> Kinship and genetic journeys: A study of the experiences of families who are referred to paediatric genetics' (RES-062-23-1475). The full team are Dr Janice McLaughlin<sup>1</sup> (PI), Dr Michael Wright<sup>2</sup> (CI), Professor Erica Haimes<sup>1</sup> (CI) and Dr Emma Clavering<sup>1</sup> (RA). <sup>1</sup> PEALS, Newcastle University, <sup>2</sup> Northern Genetics Service, Newcastle upon Tyne Hospitals NHS Foundation Trust.

## Biosecurity: The Significance of Intersubjectivity

*Murdock Keelie (Rathenau Institute)*

Dual-use materials and methods of experimentation in the life sciences have become an issue for a diverse set of actors around the globe including politicians, policy-makers, scientists, public health and emergency workers, members of law enforcement, biosafety officers, various governmental and non-governmental organizations and members of the security and defence sector and commercial biotech industry. Biological agents and toxins can be used peacefully to improve and/or protect human, plant or animal health or conversely can be used offensively to harm or destroy living organisms. Similarly, while experiments with biological agents and toxins often lead to innovations that contribute to the improvement of health and welfare, they also have the potential to facilitate the development of more efficient methods of biological warfare. This dual-use dynamic is particularly problematic at the moment because no universally accepted secondary criterion exists to differentiate between programmes and practices that pursue the former or those which pursue the latter. This project concerns itself with this dilemma, namely managing the boundary between peaceful and offensive purposes or good and bad ethical behaviour. This is a multidimensional problem, which deals with two of the most fundamental concepts of humanity, life and death. The different dimensions of the problem relate specifically to the different ways in which this boundary is threatened and thus requires different measures and mechanisms of control. These policies and practices have been appropriately assembled into a biosecurity network which extends far beyond international arms control. Biosecurity is thus a concept which has been adapted by a range of international actors from different sectors and specializations, implemented by governments and scientific institutions and applied by local scientific, educational and administrative actors. It is mutable and mobile and connects various disciplines and organizations internationally, regionally and nationally. This project follows the term and empirically analyzes how the meanings attached to it have become translated and embedded with specific preferences for the organization of society, shaping the way that the essential boundaries are constructed and incorporated into existing infrastructures. Based on the case of biosecurity implementation in the Netherlands, it analyzes how the concept has been brought into play, how it mediates and manages the interests of different communities of actors and their competition for authority and control over the phenomena in question and meanwhile illustrates how the challenge of cooperation across previously demarcated communities have been overcome internationally but remain somewhat divided locally. Biosecurity provides a mediator between different experiences with the world in general and disease in particular and through its appropriation it has generated new meanings with the symbolic force to shape and create new roles, responsibilities and identities to absorb the tensions. Thus, a biosecurity regime has emerged with regenerative properties and the power to redefine and revolutionize the relationship between biology and society. However, the boundary lines between the different ways of seeing and understanding the problem inevitably remain, creating value conflicts, complexities and confusion at the level of application. A framework for a flexible, multi-disciplinary dialogue is thus provided.

## The viral economy of HIV

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*Ellard Jeanne (National Centre in HIV Social Research, University of New South Wales, Australia)*

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This paper examines the circulation of HIV and the ways in which it is organised into an economy. Through this ordering, the potential value that accrues to HIV through different enactments is made explicit.

The paper draws on several forms of data: gay men's 'barebacking' websites; media reporting of criminal prosecutions for transmission of the virus; interviews with scientists and gay men about HIV genotyping; and promotional material from a biotechnology company that undertakes HIV genotyping.

Barebacking websites are spaces in which HIV—usually considered abject—is instead accorded an opposing, highly prized, value—that of a 'gift'. In many narratives of these sites, the recipient experiences this exchange as highly personal, as does the donor. However, like in many other gift economies, the exchange of virus in these spaces is strategic and calculated, and specific kin relations are being forged between donor and recipient.

The increasing criminalisation of HIV transmission works to oppose this valuing by rendering HIV infection a harmful event to which it is legally impossible to consent. The recipient, instead of agent, becomes victim.

Although media accounts of criminal HIV transmission often also reinforce this assumed distinction between (guilty) perpetrator and (innocent) victim, sometimes this explanation is disrupted by an alternative valuing of the virus. Like barebacking websites, this reversal of victimhood and criminalisation draws on the counter-narratives produced by participants in gay sexual subcultures. These personal accounts enact HIV as productive and valued. HIV, in these instances, becomes something that is deliberately sought out, and potential occasions of infection are celebrated and ritualised in 'parties'. In this ordering, HIV transmission can also become an event that increases the number of HIV-positive people in the population, thereby creating a larger pool of potential sex partners.

And finally, in another example—viral genotyping—we show how HIV attains the features of a commodity, where it (or rather its genetic sequences) can be exchanged for competitive advantage, increased market share, and profit. To make this possible, blood samples provided at the time of HIV diagnosis, as part of regular monitoring, or through participation in research, are sequenced and along with other information are incorporated into global databases. In this way, blood and virus flows to reference laboratories, to databases, and returns as information to the patient. And as a necessary part of this process the information is incorporated as intellectual property. Information flows from the public to the corporate sphere, where the latter incorporates information as a commodity, which increases the future or speculative value of its product, the database of genetic mutations.

As these accounts show, HIV is far from a stable object, neither does it have an inherent or intrinsic worth. Rather, as it circulates, it is conferred with different values, and is variably both a gift and a commodity, and more often, a hybrid of these two systems.

## Patterns of science development and social sciences productivity

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Global Scientific space is highly heterogeneous and stratified both within Europe (Oliveira & Carvalho, 2009) and between Europe and other regions in the world. This is truth considering scientific development in general and becomes even more heterogeneous if we consider specific scientific areas, as for instance natural and social sciences (Prpic, 2009). Different factors explain this situation and the most relevant is the economic and social development of countries, as defined by UNDP<sup>39</sup>. Moreover the highly skewed distribution of productivity among countries and disciplines can be explained, at least in part, by a process of accumulative advantage and, in this sense, history of science and disciplines has given relevant contributions to open the black box of scientific productivity. During decades, in the context of the State Nation frontiers, the scientific development, strongly influenced by political regimes, besides its intrinsic value, could be seen as part of the national culture and countries identity.

More recently, with the globalisation process and the new information technologies – giving rise to a new specialization in bibliometric studies, called Webometric (Vanti, 2005) –, this model does not exist anymore and scientific policies, at least in EU, are designed to improve internationalisation of science through the scientists' mobility, the constitution of international research networks and the pressure to publish abroad.

Gradually, physical frontiers are disappearing, but disciplinary cultures, native languages, perceptions of quality, recognition of various kinds of excellence (Lamont, 2009), as well as the national "stages" of scientific development, are becoming more visible, as a kind of "new frontiers" between developed and less developed countries.

Taking as a starting point this idea of a Science Stratificated World, our main hypothesis is that scientific productivity is straight related with science development of each country. If this starting hypothesis is correct, most developed regions should differentiate from others by having higher scientific productivity. We focus our analysis mainly in the social sciences and we consider a sample of countries chosen in different continents, but we analyse deeply the European Union regions.

Using data from OECD and ESI Data Bases, reported to 2009, methods of multidimensional analysis were used in order to explore the relationships between several indicators – proportion of R&D expenditure in purchasing power standards (PPS) per capita by country; number of researchers and domestic expenditure on R&D – as well as to identify the structure of that stratification, and to find different patterns that distinguish groups of countries from each other.

Concerning science productivity, some indicators were selected, such as the number of papers and citation rankings, and the relations between these indicators and the different patterns of scientific development (found in the first analyse) were explored.

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<sup>39</sup> See UNDP report 2009, United Nations.

## Critique as sociomaterial performance

*Postma Dirk (University of Johannesburg, South Africa)*

This paper aims to develop a notion of critique as a sociomaterial practice. This conceptualisation of critique follows from the “practice” and “material” turn in the social studies of science and technology. It accepts that critique cannot be rendered from a human-centred meta-position when it takes seriously the human entanglement with material entities. Since practices are performed heterogeneously through the problematical generation of boundaries and identities a different conception of critique is needed. In order to address the sociomaterial performative nature of practices, critique itself has to be of the same kind. Critique not only has to question the ways in which boundaries and identities are created, but also has to perform a different sociomateriality. In the process it performs the boundaries between the social and the material differently because the definition and demarcation of the “social” and the “material” are political effects of a network (Bloomfield & Vurdubakis, 1994) where agency and responsibility are distributed. This very separation is at stake when Berg (1998, p. 477) states that “(p)olitical ‘danger’ does not lie in the ‘symmetrical’ treatment of humans and nonhumans but in limitations of the approaches that insist on the dualism of human and machine”.

Reality is being generated through sociomaterial practices such as science (Latour, 1999), IS design or organising (Law, 1994). It is a realisation of the ontic commitments about the nature of and relations between entities (Verran, 2007) embedded in practices. While different practices generate different ontics (Mol, 2002) hegemony is achieved through the dominance of a single configuration. Hegemony would have been complete when alternatives could not be contemplated in a universe. The notion of a “fractiverse” (Law, 2007) indicates that the different ontics do not portray a perspective of one underlying reality, but they perform different realities that are often in tension. They should also not be seen as isolated fragments since they impact on and relate to each other.

Examples of how critique could be practised sociomaterially are further explored in this paper. In one case the production of a critical text which reflects an awareness of its own political implications, Law (2007) illustrates how writing which follows the metaphoric juxtaposition of the pin-board is very different from the kind of writing that generates hierarchy and problematical distributions. In the second case the contribution of Verran (2007, 1999) is investigated. She reports on the way in which a particular design of a digital learning environment enables the Australian Aborigines to “practice space”. She points towards a cognitive advantage that is brought about by the ability to live in an ontic tension that is brought about by the differences between the digital environment and traditional spaces. This cognitive advantage is developed here as the ability to live critically in a “fractiverse” generated by different (sociomaterial) practices. It is argued that critique not only uncovers the oppressive implications of a particular regime, but also creates the opportunity to live with it in an ontic tension. It is the possibility to perform a different world that breaks the hegemony of a particular regime.



**Track 41**  
**Open Track**

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## **The types, dynamics and predictors of social scientists' publication productivity: Croatian empirical studies**

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Though studies of scientists' publication productivity are very numerous and their number has been still increasing, social scientist' productivity has not attracted as systematic and comprehensive research as the topic deserves, considering the specificities of the social science knowledge production and its policy implications in comparison with "hard" sciences (Whitley, 1984; Fuchs, 1992; Becher & Trowler 2001). For that reason, ESA research network (RN24) on the sociology of science and technology (SSTNET) proposes a thematically coherent session entitled Research productivity in social sciences within the Open track of the EASST conference. Four abstracts on the topic, accordant with the concept of the session, have been submitted for the Open track. They include: 1) a broad international comparison of social science productivity indicators (Luísa Oliveira & Helena Carvalho); 2) deeper analyses of the questionnaire and bibliometric studies of that issue in two very different European countries - Norway (Gunnar Sivertsen) and Croatia (Katarina Prpić & Nikola Petrović); 3) an international comparative (policy) study on the productivity criteria in the evaluative processes in social sciences (Franc Mali).

This paper is based on the findings of the Croatian studies of publication productivity in all scientific areas, including social sciences. These questionnaire and bibliometric studies enable a more complex analysis of the patterns, visibility, trends and predictors of publication productivity in social science(s). The former studies, which cover the pre-transitional as well as post-socialist period, will be used for a synthesis of their findings about the types of productivity and productivity dynamics during the course of time, but also the findings on the significant productivity predictors which show important specificities when compared to the productivity predictors in other fields. The data collecting included surveys of the whole research population (sub)samples, of the eminent scientists, of the young researchers and of the social scientists, using the same set of the respondents' socio-professional features and performance indicators.

On the other hand, bibliometric investigations show the elite productivity and visibility of social science output in the corresponding scientific subfields/communities. The findings of a comprehensive study (1996-2005 period) of all WoS indexed publications (and the citations received) by all social scientists according to the individual scientific fields, and a study of the international productivity and visibility of the sociologists with highest academic ranks will be used for a synthesis of these very restrictive bibliometric data. Contrary to these results, our (new) bibliometric study of all Croatian sociologists will compare data from several different resources: WoS (both the more and less restrictive data searching versions), Google Scholar Citation Counter and the most comprehensive data source - Croatian Scientific Bibliography (CROSBİ). The aim of this study is to establish the differences in the outcome of various productivity analyses, and to examine the adequacy and comprehensiveness of the used bibliographic and citation databases for measuring, studying and monitoring social science publication production and its local and international visibility.

**On the Performative Effects and Political Habilitations of a Medical Category: Disorders of Sex Development (DSD) versus “Intersexuality” Controversy**

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The present paper analyse the socio-scientific controversy generated around the proposal for substituting the medical category “intersex states” for “Disorders of sex development”, - “DSD” in its acronym form. By considering the performative effects medical categories had, and their impact in the emergence of “social identities”, we interrogate the effects the proposed change may have in the social actors implied. To do so we start by re-constructing a “fluid” cartography –re-elaborating from Mol and Law’s phrase (1994)-, about the diverse actors, discourses and relations at display within this process. In particular, we highlight how they have been rearticulated and displaced in the course of the controversy. This cartographic devise makes visible how legitimated and authorised knowledge production positions get reconfigured and habilitated as such. A process that tend both to erode and to resettle boundaries between so called “experts” and “lay people”; between what is seen as “science” and what counts as “politics” (Epstein, 1996). In this direction, exercises for building consensus emerge as strategies for silencing and invisibilising multiplicity through the homogenisation of what holds underneath the new term –DSD-, on the one hand, and by expelling those voices thus identified as “too political”, on the other –activists groups opposing the nomenclature change. This whole process of debate and contestation get further complicated as it is embedded in what Nicolas Rose (2007) considers a new biopolitical order. An new order based, 1) on the enhance of life, specially through new developments in molecular genetics –whose language is appropriated by the physicians supporting the new terminology-; and 2) on the emergence of new forms of “bio-sociality” (Rabinow, 1996) and “bio-citizenship” (Rose, 2007) that articulate communities and identities with political agendas and increasing bio-medical expertise through the deployment of new communication technologies, in particular, the development of the Web 2.0.

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## **Need or Nerds; S&T images in the Dutch media from 1990-2008**

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In this paper, results from a large-scale Dutch qualitative and quantitative study on the changing images of science and technology and of scientists and technologists in the Dutch media during the last 20 years will be discussed. In this study, a wide range of media images such as in science sections in newspapers, magazines with S&T as theme, comic books, movies and children's books were analyzed for the images they showed on S&T. Moreover, three Dutch television programs on S&T for youth: het Klokhuis, Jules Unlimited and Willem Wever were quantitatively analyzed for their images on S&T over the last twenty years. Although we found that some images gradually changed: e.g. science was presented as less risky but more negative for society, and slightly more women scientists were presented, though they were mostly shown in lower professional positions, we also found that some images remained stable and dominant over the years. Scientists and technologists were predominantly shown in stereotypical ways: as people who do their work mostly alone, their work is displayed as very difficult and risky and the societal need for S&T is in the majority of cases not clearly defined or even questionable. In fictional, and to a lesser extent the non-fiction media, we furthermore found a predominance of specific prototypes (e.g. the 'genius', the 'wizard' or the 'nerd') and a lack of prototypes which might be more conform the kind of work scientists are often engaged in, such as the 'doubter' or the 'puzzler'. Moreover, scientists and technologists were presented as people who are completely absorbed by their work, who don't care about their looks and whose work almost magically delivers things and 'facts', without it being clear which processes and performances are involved in the construction of these facts and things. Most of these results offer an interesting explanation for the lack of popularity of the profession of scientist or technologist amongst youth and especially amongst some groups of girls.

## **“We used to give care with the gas pedal” – Time, Care and Telemedicine in the Ambulance Service**

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This paper focuses on the enactment of telemedicine technology in the ambulance service in Sweden. The implementation of new technological systems in the workplace is, as scholars have shown, not always an easy process. Focusing on medical settings, researchers have shown that the introduction of more and new technology in different parts of the medical profession raises challenges to the professionals. The technology challenges both the professionals established work procedures and their relations to the patients, challenges that have to be handled in various ways to keep the care process functional. There exist some studies with a focus on technology, evaluating the effects of telemedicine in pre-hospital emergency care in general and ambulance care in particular. This research point to the success or failures of technological or medical interventions, highlights how the introduction of various forms of technology can improve medical practice, increase survival rates, enhance planning and triaging in-between various units in the chain of care, and to focus on the usability of the technology, evaluating what works. However, these studies rarely address social and organizational aspects or the interplay between telemedicine technology and human actors. Thus they tend to overlook what makes the telemedicine technology work, the situated enactment practices, and the recursive interaction in which the telemedicine technology is put into practice. Empirical “in situ studies” with such a focus are as different scholars have argued still few. This paper offers such perspectives. With a focus on interaction and by using participant observations material, this paper highlights and analyses the enactment of telemedicine technology in the ambulance service in Sweden and the steps and measures undertaken by ambulance crews putting telemedicine technology to work.

Research show that telemedicine can improve pre-hospital care. Nevertheless, the introduction of telemedicine technology in the ambulance service creates time conflicts and poses challenges to the ambulance crews’ established and preferred work procedures. Despite improved technological equipment and a changed educational background, the ambulance crews still has a preference for short stays at the scene of emergency and quick deliveries to the receiving hospital. Using the telemedicine technology as planned would prolong the ambulance crew’s work, delay their departures from the scene of emergency and distracts the crews when giving care to the patient. Thus, rather than improving or making their job easier, the telemedicine technology slow the ambulance crews’ down and gets in their way. This paper outlines and discusses the negotiation work undertaken by ambulance crews handling the problem of diverging time rationalities and the telemedicine technology, trying to proceed with their idea of good ambulance.

## **Trends and patterns of social scientists' publication productivity: Norwegian empirical studies**

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The aim of this study is to observe and discuss trends and patterns in the scientific publication activity of the social sciences with regard to publication type (articles in journals, articles in books, and books), publication channels (journals, series, book publishers), and language. With regard to trends, we will look both at changes in the patterns and at possible growth in the total volume of publications. The social sciences will be compared to the other sciences. Variations in patterns and trends within the social sciences will be studied on the level of disciplines. The process of internationalization will be studied both in terms of the language and of the channels of the publications.

The study has three main data sources. One of them is three surveys with questionnaires among the academic staff in Norway in 1982, 1992 and 2001 (Kyvik 1988 Kyvik 2003). The other is complete bibliographic data from Norway's a National Research Documentation system (Sivertsen 2006, Schneider 2009) covering the total Higher Education System with around 45,000 (fractionalized) scientific publications from the five years 2005-2009. Around 10,000 of these publications are from the social sciences. The third data source is Web of Science data for Norway, which in the case of the social sciences represents 15 per cent of the second data source, but with large variations in coverage between the disciplines.

The results from the questionnaire surveys and the more recent data from bibliometric databases are combined in order to have a more complete and detailed picture of trends and patterns over time. The combined results will be discussed in relation to two related research policy issues that receive much attention on the European scene presently. One of them is the quest for better coverage in bibliometric databases of the social sciences and humanities. The second is the discussion of performance based funding of research institutions on the basis of evaluations or assessments of research output (Sivertsen 2008).

This abstract is a part of the proposal for a thematically coherent EASST-SSTNET session entitled Research productivity in social sciences within the Open track of the EASST conference.

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## **Intermediaries and the framing of use-practices in design-use relations**

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This paper explores how design-use relations – framed and facilitated through intermediary organizations and forms of organizing in the process of technology design as well as use – come to bear upon, yet, in turn, also are qualified through, users and other instances' engagement through practices of domestication. By addressing the issue of intermediary engagements in the exploration and discussion of the role of users, the idea is to shed light on the shifting status and roles of users and other network elements in the hybrid configuration of practice(s). Both as relates to the practices of design, and of use, various network elements are in flux, serving at times as 'intermediaries' (here used in the delimited Actor-Network sense) and other times, as 'actants' in networks of relations.

The paper grapples with the issue by drawing upon two delimited case studies, dealing with 'public access defibrillators' and 'design for patient safety', respectively. The first concerns automated external defibrillators which in recent times have cropped up as a recognizable fixture in the public domain (such as in train stations, exercise facilities, office complexes, airports, etc.). Often facilitated by authorities and/or organizations seeking to strengthen life-saving efforts for victims of cardiac arrest in public settings, particular focus on this case is the situation in Denmark, where legislation paved the way for making the devices available to the general public. Some other countries have instead relegated their use solely to trained individuals, who may be relied on to be present in the vicinity of where such defibrillators are located (e.g. specific personnel at a train station etc.). The second case takes up design for patient safety, where the overall focus in Denmark has been strongly anchored in a Human Factors approach – an orientation toward grappling with patient safety primarily through a focus upon the prevention of unintended consequences by the user. The seemingly fixed conception of the technology, and hereby the role of use-practices in care, is challenged through the case.

The paper draws upon the domestication of technology to unfold the temporally emergent character of use-practices, and the analytical broadening of the 'user' conception to encompass various units of analysis. Hereby hybrid dimensions of domestication and socio-material underpinnings in and across seemingly distinct units are addressed (Mie & Sørensen 1996, Sørensen 2005). The paper discusses how partial framings through intermediary engagements can hereby be discerned and engaged productively in the analysis, making otherwise plausible relations – by way of juxtapositions and reframing – visible through re-presentation (Law 2002, Cooper 2005). The relevance of intermediaries for design is addressed, where the cases in point show how aspects of use, and hereby the role of users and use-practices, are implicated and distributed through enactments in the heterogeneous orderings and networks of relations in design and use. These are articulated and become manifest through mediations – at once opening up and enabling, while also delimiting and constraining, how the design-space vis-a-vis realms of enactment in use-practices, may come to be engaged.

## **Biochemistry at the Crossroads: Science, Technology, and Policy at Arne Tiselius' Laboratory Around 1960**

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The Department of Biochemistry (Biokemiska institutionen, BKI) at Uppsala University seemed already in the 1950s to be fulfilling what is currently the main goal in European research policy: to produce research of highest international standards that also led to commercially successful innovations. The department was established in the 1930s when Arne Tiselius was given a personal professorship at The (Theodor) Svedberg's Department for Physical Chemistry. Tiselius worked, like his former supervisor and mentor Svedberg, on separation techniques and in 1948 he received a Nobel Prize for work on electrophoresis and chromatography. In the early 1950s he became Director of a new laboratory where this kind of research ("separation science") was further developed. By now Tiselius was more of an administrator and a policy maker than an active researcher. But some of his pupils managed to develop fresh approaches to the problem of separation, leading to the invention of gel filtration in the 1950s. This work was carried out by Jerker Porath in collaboration with researchers at the drug company Pharmacia that had moved to Uppsala in order to be able to collaborate with BKI. In 1959 Sephadex (Separation Pharmacia Dextran), a product used for gel filtration, was launched and quickly became both a technical and a commercial success, followed by other similar products.

The aim of the paper is to discuss the case of Sephadex from the point of view of studying the relationships between academic research, commercial innovation, and research policy. It is not clear exactly how Sephadex was invented. There are several versions of events that partly contradict one another. There is a version that emphasises harmonious collaboration between university and industry, another emphasising controversy over Intellectual Property, a third that describes the process of invention as an industrial project, with academic science as part of Pharmacia's marketing strategy. An analysis of Sephadex will be connected with an analysis of the changing research policy at the time, where Arne Tiselius was an important actor, pushing for a modernisation of biological research in Sweden. The case of Sephadex will also be discussed in the context of the evolving research programme at BKI, where more and more emphasis was placed on separation science, furthering research from the evolving discipline of molecular biology that was promoted by Tiselius on the policy level, making it more and more product oriented.

A preliminary conclusion is that BKI became more an auxiliary to Pharmacia than a breeding ground for the kind of modernisation in biology that Tiselius and others tried to implement, and that this was the result of a conscious strategy to focus on areas where one was internationally and commercially successful.





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