

Call for Candidates for the EASST Elections

The Council of EASST invites members of the association to nominate candidates for the upcoming elections for three seats on the EASST Council and for the presidency of EASST. The term of office is three years. Elections by secret ballot to the Council and to the Presidency of EASST will be held between October 12, 1996 and January 1, 1997.

The EASST Council functions on a collegial basis and meets once or twice every year. Members of the Council, who coordinate their activities with the President, carry out a variety of organizational tasks in the Association, and prepare and develop new initiatives to be carried out by the Association. The term of office for the three new members of the EASST Council will begin on January 1, 1997. Aant Elzinga will step down as EASST's president on July 1, 1997. Between January 1, 1997 and July 1, 1997 the newly elected president will be a member of the Council as President Elect.

In accordance with EASST's Constitution, the list of candidates for the Council and for the Presidency is to be decided at the membership meeting. To prepare for the elections the Council has appointed a Nominations Committee (Olga Amsterdamska, Uli Felt, Rob Hagendijk).

The procedure is as follows:

- Members are invited to nominate suitable

candidates (self-nominations are acceptable), before September 10, 1996. The nominations committee will invite each candidate to confirm his or her candidacy and to send in a short biographical sketch and a statement on what s/he would seek to achieve as a Member of the Council or as the President of EASST.

- The Nomination Committee will report to the Council and to the Membership Meeting and prepare a list of candidates for the elections.

- The final list of candidates will be decided upon at the Council Meeting to be held on October 12, 1996 in Bielefeld.

- Elections by secret ballot will be held among all registered individual EASST members between October 12, 1996 and January 1, 1997.

- The newly elected Members of Council and the President Elect will join the Council on January 1, 1997. Aant Elzinga will step down as President on July 1, 1997 to be replaced by the President Elect.

The procedure outlined above requires some minor changes to the EASST Constitution. These will have to be discussed and decided at the Membership Meeting in Bielefeld.

Please send in nominations (including the full address of the nominee) before September 10, 1996 to the EASST secretary, Anne Beaulieu. For more information contact one of the members of the Nominations Committee.

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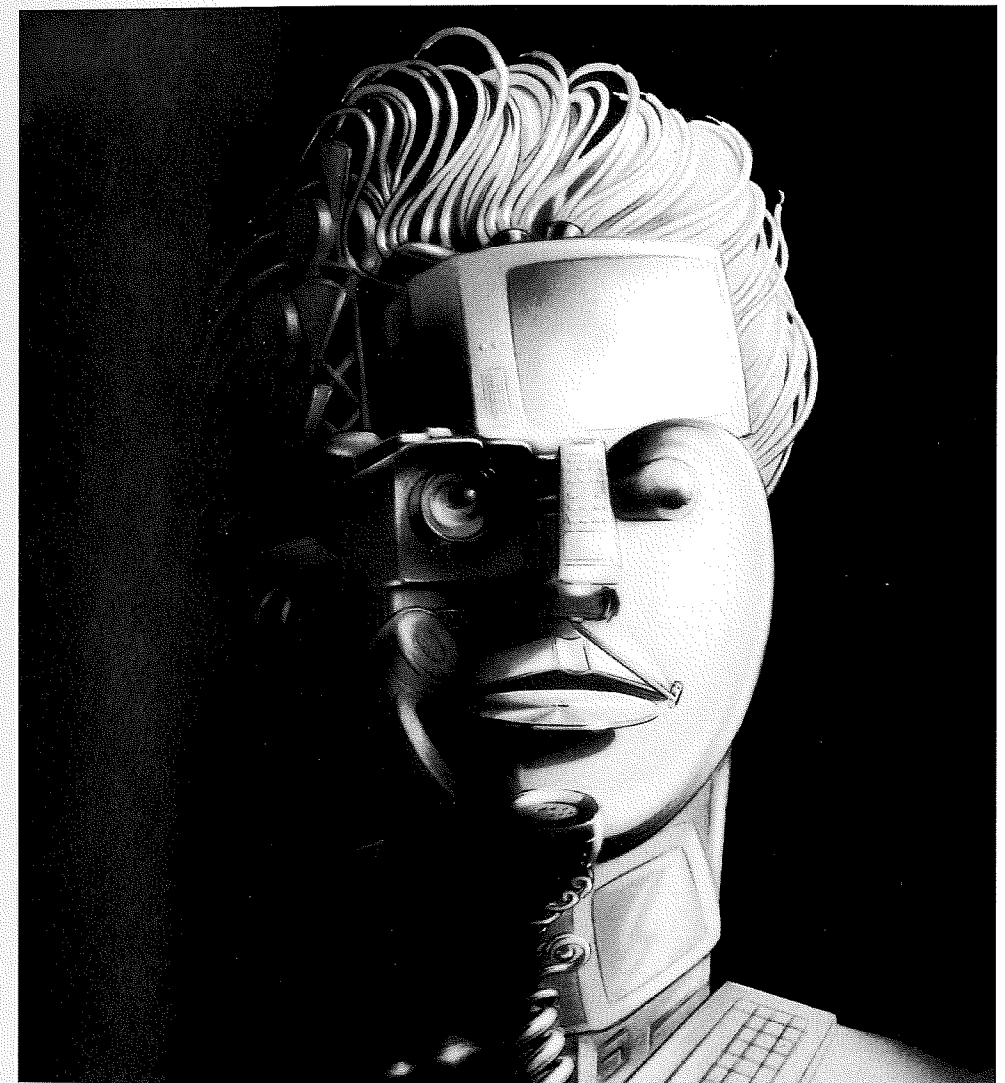
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No Surfing on Science Beach!

by Gerald Wagner

Department of Science and Technology Dynamics, University of Amsterdam

Review of Allucquère Rosanne Stone, *The War of Desire and Technology at the Close of the Mechanical Age*, 212 p, Cambridge: MIT Press, 1995.

Having returned from a trip to America in the mid-eighties Jean Beaudrillard wrote a small book with the simple title *America*. The book's epigraph cites an inscription that you can find on the outside mirror of an American car: Caution - Objects in the mirror are closer than they appear. We've read Dr. Lacan's warning, so where are the desired objects of our technological mirrors now?

Finally we are back on the road again. The sorts of dangers we are facing in the days of the 'information superhighway' obviously have changed. We no longer have to be aware of the car trying to pass us. Crashes do not happen on the cross-roads in cyberspace. It is still the old American dream of open spaces, fast routes, the myth of freedom and the absence of a regulating governmental body which is haunting the postmechanical age. People who enter the internet are on a search without any destination in particular. They prefer to travel alone, but they also want to meet nice people, want to make friends 'out there', who speak the same language and share similar values. And don't forget, people out there don't like questions like 'who are you and where do you come from?' Remember to be careful. Things and people out there may not be what they seem.

Our vehicles in this world are no longer a good horse or a T-Bird, but little packages of bytes attached to your e-mail address. The worst thing that could happen to the lonesome *Datenreisender* in the internet is that the university computing facilities crash. Seems to be quite a safe world.

But even here something is threatening us,

and again it has to do with objects and space and Dr. Lacan's prescription. Don't let the objects come to close to you; keep your distance! Don't fall in love with the mirror images, don't touch them and be as untouchable as anybody else in this world. Control your desires, otherwise you could seriously be hurt by the objects in the screen.

There are tales of the nets that provide us with those examples of proximity and danger. Like the story of a New York psychiatrist named Sanford Lewin and his on-line counter-ego Julie Graham. Julie's story, reported by Stone in considerable length and detail, begins in 1982 on the CompuServe on-line CB chat. A CompuServe user can log on those chat lines and write interactively to other users. Julie Graham first signed on in 1982. Soon she became a widely accepted member of this world of strong and long-lasting on-line friendships. After years of daily presence on the on-line services, these people had the impression that they shared their lives with each other, even though most of them never met face-to-face outside in the 'real world'. But one day it turned out that everything was a big fake. Julie Graham never existed. She was nothing but the invention of Sanford Lewin. It began as a psychiatric experiment, but after a while Lewin realised that his masquerade had gotten out of control. Julie "no longer simply carried out his wishes at the keyboard, she had her own emergent personality, her own ideas, her own directions. Not that he was losing his own identity, developing a parallel one, one of considerable puissance. Jeekyll and Julie." (p76) For Dr. Sanford 'Frankenstein' Lewin there was only one solution - Julie had to die outside the net. Lewin in his role as John, Julie's husband, told her on-line friends that Julie had become seriously ill and

was hovering between life and death. "The result was horrific. Lewin, as John, was deluged with expressions of shock, sorrow and caring. People offered medical advice. Some people went into out-and-out panic. The chat lines became jammed. So many people got seriously upset, in fact, that Lewin backed down. He couldn't stand to engineer her death. Julie recovered and came home." (p76) Not only was Lewin terrified by this result of his little experiment, but he also couldn't stand the fact that his Sanford persona "was being defeated by his Julie persona." (p77) In the net, everybody was overwhelmed by Julie's personality, while Sanford was a kind of net-nerd, nice but rather boring. So what do you do when the life of your images is much more fun than your own life outside the chat universe?

Lewin decided to reveal himself and thereby let Julie die. The result was almost more bizarre than in his first attempt to get rid of his stubborn and selfish electronic twin: "Perhaps to everyone's surprise, the emotion that many of those in the chat system felt was mourning. Because of the circumstances in which it occurred, Julie's unmasking as a construct, a cross-dressing man, had been worse than a death. There was no focused instant of pain and loss. There was no funeral, no socially supported way to lay the Julie persona to rest, to release one's emotions and to move on... Whatever Julie was or wasn't, she had been a good friend and a staunch supporter to many people in need." (p78)

Another boundary story. It is about a woman called Sarah who has been diagnosed as having Multiple Personality Disorder (MPD). It isn't one of those funny stories about gender-switching in IRC or such, but a sad report of rape. Sarah charged an acquaintance of hers that he "raped her after deliberately drawing out one of her personalities, a naive woman who he thought would be willing to have sex with him." (p45) Usually MPD is diagnosed as a mental disorder of traumatic origin, and it seems to be an inappropriate subject for a study of communication technologies. But Stone raises the question whether there is "any room for non traumatic multiplicity" (p58) in the common clinical accounts of this disease.

Actually she wants to depathologize MPD, promoting communication technologies as means of "healing trauma, but preserving multiplicity; or perhaps more pertinent, creating discursive space for a possible transformative legitimization of some forms of multiplicity." (p59) Enter cyberspace, and tell us about the others that share your body with you, because "the technosocial space of virtual systems ... is a domain of non traumatic multiplicity." (p60) But is cyberspace really an opportunity to *decriminalise* MPD? (p62) Stone thinks that the life of those 'multiples', "sharing a single body with several quasi-independent personalities, is emblematic of a fair percentage of everyday life in the world of virtual systems." (63) The lonely crowd of the fifties nowadays seems to have mutated into the crowd in the lonesome.

What do those 'borderland stories' teach us? Could they be of any interest to us as students of science and technology? Reading trendy papers that blow up their usually not so breathtaking findings with *überhyped* titles like 'Sex, Death and Machinery' or (even more pretentious) 'Cyberdämmerung at the Atari Lab', I usually follow my sociological 'Don't believe the hype' reflex and simply trash 'em. But let's see what we can get out of it. Due to the lack of appropriate beaches in the old world, unfortunately we Europeans are usually not very skilled surfers, whatever sort of waves there are - ocean breakers or just discourse splashing. For a Californian "discourse surfer" (p165) like Sandy Stone this might be not a very promising perspective. We prefer to sit on the beach in the shadow, frightened by those ugly remains from the mechanical age like the ozone hole, and watch the surfers out there, gliding in the sun from wave to wave, always in motion 'til the sun comes down on the Santa Monica boulevard'. Could we use this beautiful picture for the enrichment of our own academic entertainment back there in cold and usually rainy Europe? Okay, we can't surf, but at least we are not afraid of the deep blue of 'high theory' as Sandy Stone obviously is. "Occasionally it's wonderful, or necessary, to dive down. The depths are heady and beautiful, and if I linger too long, rapture of the deep sets in, and I begin to

think I can stay down forever. Which is the signal that it's time for air." (p165) Let's get a last deep breath of air, and dive down in the discourse on Science and Technology. Maybe thinking prevents us from sinking?

The War of Desire and Technology consists of eight chapters, all of which focus somehow on phenomena around the emergence of communication technologies. Besides the already mentioned two stories on identity and the concept of the self, Stone devotes three chapters to some early virtual communities among the first generation of computer freaks in California. These chapters are well written and quite informative, but rather like an appetiser that leaves you yearning for more coherent, detailed and conceptually ambitious readings. Especially the chapter on the Atari Lab¹ is probably the most astonishing conglomeration of insider stories, cramped anecdotes and tiny fragments of the Atari Lab member's theoretical work on interaction and presence that ever passed the publisher's desk of MIT Press. Could it be that a diverse number of quite unique selves (scholars, surfers, anthropologists) "grounded in a body unit" have worked on these chapters? That of course would explain some of its variance. Squashed in between these chapters we find a coy part on "Reinvention and Encounter. Pause for Theory." Laying down the surfboard for a moment, Stone joins the theorists on the beach. What is the book all about?

Living in a metaphor: Cyber this and that This book "is about science fiction, in the sense that it is about emergent technologies, shifting boundaries between the living and the non living, optional embodiments ... in other words, about the everyday world as a cyborg habitat." (p38) It comes to mind that this book is not about science fiction but an example of the new genre *fiction science*, that is the scientific study of cultures *living in a fiction*. Enter the inevitable *Oberguru* William Gibson.² "As Gibson maintained from the beginning, to a certain extent cyberspace does exist now, as a metaphor for late-twentieth-century communications technologies, for instance, as data banks, financial systems, computer networks, military simulations and ATMs... Many of us

live at least part-time in cyberspace already. We call it computer-conferencing, or phone sex, or virtual this and that ..." (35).

Let's suppose there are people living in this metaphor (and obviously Stone considers herself as one of them). Suppose, too, that it's promising to think about computer mediated communication in terms of entering a sort of 'space' where one can 'meet' other 'entities'. What then does this world tell us about the current state of the 'postmechanical age'? The book is "only partly about cyberspace. It is also about social systems that arise in spaces enabled by and constituted through communication technologies ... new social forms that arise in a circumstance in which body, meet, place, and even space mean something quite different from our accustomed understanding." (p38) If we agree with Stone so far, we can also agree that "the kinds of interactions we can observe within the spaces of prosthetic communication are ... emblematic of the current state of complex interactions between humans and machines." (p36) Questions: In what sense are these 'social forms' *new*? In which way do those things like body or place there 'in cyberspace' *differ* from 'our accustomed understanding'? (Just as a reminder: Sociologists like Goffman or Garfinkel challenged these accustomed understandings ages before the first personal computer saw the light of day, and they didn't need any Gibsons to come up with a vocabulary of their own for their findings.)

Third question: What precisely does it mean to speak of social forms that are '*constituted through* communication technologies'? It seems to me that this is a core question. Referring to positions from authors like Brenda Laurel and Sherry Turkle, Stone describes computers "not only as tools but also as *arenas for social experience*." (p15) Confusingly enough she also talks about computers as 'prostheses' (with which she fell in love with). "In this frame of understanding, computers were prosthetic in the specific sense of the Greek term *prosthēnos* - extension." (p12) So a 'prosthetic community' is such an extension of other forms of communities, more used to us, but not better or higher or superior - just

different. Thus the concept of the computer is not numbers but other people. "Computers are arenas for social experience and dramatic interaction, a type of media more like public theatre, and their output is used for qualitative interaction, dialogue, and conversation. Inside the little box are *other people*." (p16) Unfortunately Stone does not even attempt to explain how they get in there, how these people overcome channel limitations and what it really means for these new social forms to be 'constituted through' a technology. Does it really hold that social systems like the few Stone describes are based on technologies? Why do some folks dig phone sex? Because they have a telephone? Or because they have sexual desires? Or maybe because they are socially isolated?

How far do we get with the assumption that social communities or cultural groups in general are *not* constituted through a technology, but through common interests, shared values, a common language or shared symbolic belief systems of whatever sort? Technical artefacts usually are part of these cultures; we interact with them and live in our cultures under the assumption that there are working techniques among us. Just as Anselm Strauss puts it, cited by Stone as an epigraph of her work: "A group constituted around a common symbolic structure is a 'culture area' of its own, the limits of which are set neither by territory nor formal membership, but by the limits of effective communication." (p. xi) If we carefully read Stone's Sanford Lewin example, first we see no technologically constituted culture, but rather normal white male and female adults in their thirties, most of them college graduates with good salaries and their usual kind of happy-go-lucky lifestyle. Communication among these people works not because they all have a computer and a modem, but due to the fact that they already live in a common 'culture area' that is based in the social structure I just labelled as 'educated middle-class', etc. That life provides them with things to talk about, with interesting events and all those human experiences that you can't make 'on-line'. Julie's on-line friends began to become suspicious because obviously Julie had no life

outside the net: "(Julie) was always off at conferences, where presumably she met face to face with colleagues. And she and (her husband) spent a lot of time on exotic vacations, where she must also be seeing people face to face. It seemed that the only people who never got to see her were her on-line friends." (74) Those examples make me think that the relation between net-life and life outside could be just the other way round. Stone, however, just read the quotation of Strauss to mean 'no territory' and assumed that means an open space, thus misconceiving communication-in-space for culture area. Consequently, she establishes a new territory - the inside of the machine - taking the technological prosthesis for the cultural arena itself. If you want to join them, enter the space behind the screen. I doubt that this kind of technological reification of culture is a very promising way of researching these now technologies.

And fourth: How can we observe "the identities that emerge from these interactions - fragmented, complex, diffracted through the lenses of technology, culture, and new technocultural formations"? (p36) If we follow Stone's advice, all we need to do is use the capture file facility of your internet software, and catch those stories like the one of Sanford 'Julie' Lewin. And there are quite a few Julies already around in cyberspace. "I want to see how groups of friends evolve when their meeting room exists in a purely symbolic state. I want to see how narrowing the bandwidth - that is, doing without customary modes of symbolic exchange such as gesture and voice tone - affects sharing and trust, and how inhabitants of virtual systems construct and maintain categories such as gender and race. I want to see how people without bodies make love." (p38)

Overcoming the bandwidth problem, however, has been an intensively researched aspect of computer mediated communication over the last decade. That research has made a significant contribution to a better understanding of the construction of the self and his or her body in everyday life in the same way as for example considering the construction of transsexuality helps to uncover the 'normal' construction of gendered bodies. Stone's work follows this

route of research for a while. Unfortunately when it comes to the interpretation of her empirical findings Stone reveals a very different point of view. Cyberspace is borderland, tells us borderland stories, but according to Stone this borderland is also the promised land of liberation *and* collectivity. Insofar as cybersociety "involves communicating with other people through narrow-bandwidth media, it is about negotiating the tensions between individual subjects, virtual collectivities, and the physical bodies in which they may or may not be grounded." (p35) Surfing the net and meeting more and more people "who engage in social interactions without ever meeting in the customary sense of the term ... has given me increasing opportunities to watch others try on their own alternative personae." (p2ff.) In places like CompuServe chat lines, these people "out at the margins who have always lived comfortably with the idea of floating identities" (p2) meet others "inward from the margins ... who are beginning, just a bit, to question. What it is they are questioning is a good part of what this essay is about." (p2)

They are questioning the concept of presence. Stone raises a variety of related questions that "include repeated transgressions of the traditional concept of the body's physical envelope and of the locus of human agency." (p16) Stone wants to make us see the variety of possible connections "between bodies and personae/selves/subjects". (p86) Therefore she tells us about the woman who has been diagnosed as having MPD as well as Sanford Lewin's story. Her subjects, however, are not MPD patients but people living in "technological communities" - a different ballpark entirely. She defines multiplicity as "sharing a single body with several quasi-independent personalities", and, to Stone, a "fair percentage" of the inhabitants of virtual systems exhibit this new technological MPD. (p63) The empirical findings Stone offers to underline this statement are by no means very convincing. Can anyone in any of these stories be considered as 'multiples', in Stone's sense? Sanford Lewin comes closest, but pretending to be someone else on-line is clearly different from being mentally confused about your personality.

Are there other possible cases? Does 'a fair percentage' of Stone's examples match the profile? Watch the reactions of the betrayed victims of Levine's masquerade. They are embarrassed, shocked and very, very disappointed - a rather strange way of reacting to something that, if we follow Stone, is supposed to be an everyday event in virtual systems. Again Stone is a victim of her own techno-narcissism. She is obsessed with Levin and Julie, because she identifies with both of them, but she doesn't look at the larger community of which Lewin was just a very small part. "I tend to make myself as an entity that has chosen to make its life career out of playing with identity." (1ff.) That may be a pleasure for her, but obviously nobody else in the community under study tends to agree.

How about the opposite reading of this borderland story? How about this interpretation: 'Attempting to be oneself and defending this achievement against its tendencies to dissolve over time is emblematic of a fair percentage of everyday life in the world of virtual systems.' This interpretation might be more helpful to explain why Julie's friends were so desperately fighting *for her*. Being a friend of Julie, sharing common experiences with her - all that meant a lot to them. They simply fought for themselves when they rejected to accept that Julie was a complete fake. If they would have had a variety of net-selves right at hand, why then did they have so much trouble with their 'being-friend-of-Julie'? I think that most people still have only one self, and that one self means a lot to them, because it's the only one that has shared quite a long time with that body in front of the computer. Adding a net-self to that body may be playful and fun, but could it reach the intensity of the old relationship? It's like in Coppola's *One From The Heart* when Frederic Forrest says to departing Terri Garr: "You can be on that beach in Paradise, but you'll still be carrying all your shit with you." And why should people want to get rid of their cultural identities? That's what makes them really interesting and very special and very unique people.

I propose to take these short cuts presented by Stone as first insights into the souls of

Haraway's cyborgs, a kind of psychopathology of the desire for identity in cybersociety. Apparently Stone considers herself a cyborg feeling quite at home in cybercommunities. But it takes a lot of distance to one's own culture in order to get something out of it that might be considered 'anthropological fieldwork'. It is precisely this complete lack of distance that makes this book a failure according to its own standards. For an novelist who introduces her work with a statement on 'How I Fell in Love with My Prosthesis' this might be forgivable; for an anthropologist it's not. "The floppy disk has become the cyberanthropologist's field notebook; in virtual social environments nothing escapes its panoptic gaze." (p190) Capture filing the nets may be a cosy way to a promising field site (you don't need to apply for visa, you don't need any vaccinations and you can always escape just by turning off your computer), but ethnography just doesn't work without any distinction between 'us' and 'them', even if this distinction is (like in most studies of science and technology) just a construction for the sake of encouraging one's awareness of the strangeness of our own culture. Even a 'discourse surfer' cannot surf on her own board, be the wave *and* ride it.

Apparently Rosanne Stone is a *culture narcissus* in the sense of someone in love with her or his own self-constructed culture. It seems to me that Stone's attitude toward cyberspace is the same as that of Julie's friends. Every contrary finding that Julie might not really be what she seemed was rejected by those who were strongly engaged with her. Stone in the same way rejects everything that might not fit into her idea about reality in cyberspace. Consequently everything in her book turns out to be identical. The subjects are Cyborg (Haraway), Cyborgs are technology, technology is a prosthesis community, cyberspace is a prosthesis, prosthesis are (parts of) bodies, and bodies are cyborgs, etc. Devoting one's work to the maxim "no causes, no effects, mutual emergence" (p21) sounds nice but should not invite sloppy theory.

Finally I want to cite the best paragraph of the book. "Electronic communication technologies, discourse networks, and social

formations continue the trend toward increasing awareness of a sense of self; toward increasing physical isolation of individuals in Western and Western-influenced societies; and toward displacement of shared physical space, both public and private, by textuality and prosthetic communication - in brief, the constellation of events that define the close of the mechanical age and the unfolding or revealing of what, for lack of a better term, we might call the virtual age." (p20) Unfortunately Stone is too much obsessed with the world 'inside the net' to be able to think about these new social forms with regard to "what we can learn from them about social problems outside the worlds of the nets." (p38)

Notes

1. "The Atari Lab was a unique, controversial, and explosively short-lived organization for basic research in virtual reality and interactive multimedia in the early 1980s. It was a child of the Atari Corporation, one of the first manufacturers of personal computers and interactive game software." (124)

2. I suggest from now on to stay abstinent from quoting William Gibson. Defining technological territories along the line of being »inside« and »outside« of some technological space simply was from the very beginning misleading and confusing sociological research on communication technologies.

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How I Learned to Start Worrying. (But) Where Is the Art?

by Ginette Verstraete

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Review of Roslynn D. Haynes, *From Faust to Strangelove. Representations of the Scientist in Western Literature*. Baltimore and London: Johns Hopkins UP, 1994. 417 pp.

The first thing you notice about Roslynn Haynes's book is the huge amount of notes and bibliographical references on which her survey of five hundred years of western literature is based. Let there be no doubt: the author is well-read on the theme of the scientist in literature. And what is more: she manages to integrate her discussion of the representation of the scientist in literature with a reconstruction of the major developments in science itself. On top of that, she pays a lot of attention to the larger societal setting in which both the history of science and its representation in literature are to be situated. The aim of the book is nothing less than to examine "the representation of scientists from the Middle Ages to the present, showing how the recurrent mutual suspicion between scientists and other members of society was developed and reinforced in Western literature and pointing to some of the fictional suggestions for overcoming what is arguably the most pervasive problem of our time, namely, communication failure." (p6) The stakes are high. Perhaps too high. Inevitably, a price must be paid for such an enormous, historiographical enterprise. In her book, Haynes sacrifices the subtleties of literary analysis for the sake of a chronological, but above all classified, order: we begin with the sixteenth century version of the Faust-myth and end with Stanley Kubrick's *Dr. Strangelove. Or How I Learned to Stop Worrying and Love the Bomb* (1964). In

between lies a rigid categorization of five centuries of western literature that I shall deal with shortly.

As for the relation between science and its literary representation, I doubt whether the author has even begun to reflect on the old, inescapable epistemological implications of such a conjunction: whether the very idea of the artist's "representation" of the scientists of his day, does not falsely presuppose that there is a real preverbal (pre-artistic) realm of science to be portrayed. In view of Haynes's own interest in the way art has contributed to the ambiguous reception - and functioning - of science in western civilization, such a hierarchical distinction between art and science seems untenable. One may even ask whether the concept of "representation" is adequate in a study which claims that "viewed chronologically [the fictional scientists] achieve an additional historical significance... as ideological indicators of the changing perception of science over some seven centuries... These subversive fictional protagonists have inevitably contributed to Western society's ambiguous love-hate attitude towards science, which has resurfaced in recent decades in the debates over the use of public money for space research..." (p2). One need not be a radical anti-representationalist to find that such remarks point to a conception of science as culturally constructed. That literature has a role to play in the exposure of the hidden social implications of the scientific drive toward fact-finding - as well as toward objective representation - is one of the major contributions of postmodern (literary) criticism. Except for some occasional references to feminist criticism, however, Haynes never explicitly aligns herself with

this school of thinking, let alone theoretically raises the question as to how the status of science, and of (its) representation, changes when viewed from this constructivist perspective. Regrettably, her book remains superficial in this respect. Her analysis is based on a simplified definition of literature as the reflection both of the writer's opinions and of the predominant social - mainly critical - attitudes toward scientific development. Hence, to pursue my epistemological questions any further would amount to complicating the theme of the book in ways not directly relevant to it. Let me therefore turn to a brief discussion of what we do get from Haynes's historical survey.

As said, Haynes has done her homework: one can only praise her firm grasp on the history of science and its literary representation, from alchemy to nuclear physics, from Faust to Strangelove. Although the evolution of science portrayed is not new, the book's encyclopedic gathering of scientists, novelists and their work, makes it a valuable resource for anyone interested in the central theme: how have writers responded to particular scientific developments and how have their representations come to provide the west with powerful cultural myths about the controversial role of the scientist in society.

The immensity of information given, however, masks an extreme rigidity of design. Taken as a whole, Haynes's encyclopedia strikes me as too "scientific," in her own sense of the term: as obsessed with order, efficiency and control. Dozens of literary works are stripped of their formal complexities, and reduced to mere representatives of the six (varying) stereotypes that the author recognizes throughout the history of literature. There is first of all the popular image of the evil scientist who thinks that he can side-step the God-given limits of man's capacities (Faust, Frankenstein, Jekyll, Moreau and Strangelove). Other stereotypes include the stupid (absent-minded) professor, the emotionally deficient scientist, the heroic adventurer, the idealist and, finally, the helpless scientist who loses control over the (military) application of his knowledge. All

of these categories Haynes explores from a historical perspective: when and why were they introduced and at what points in history did they recur. Together they constitute the frame that allows her to cogently categorize innumerable canonical as well as lesser known authors: Wells, Huxley, Eliot, Hawthorne, Brecht, Musil, Hoffmann, Swift, Zola, Kubrick, Holsten, Aldridge, Colby, Kornbluth, Zuckmayer, and many others.

If curiosity is what keeps a reader going from beginning till end, *From Faust to Strangelove* might disappoint. There is a certain predictability about the narrative path chosen here that did not stimulate my desire to proceed. A chapter on the bad (unfeeling, immoral) scientist tends to be followed by a section on the good (idealist, heroic) one. Although historical movements have traditionally been believed to generate their own counterparts, such a predetermined Hegelian script seems to me by now outdated. Furthermore, while Haynes's investigation into the successive periods of literary history tries to do justice to the contextual differences, it is precisely her insistence on the shaping forces of the social-scientific setting, that makes her account somewhat bloodless, if not mechanical. Thus she starts, for instance, her chapter on early twentieth century American literature with an invocation of the cult of discovery instigated by such prominent inventors as Franklin, Bell and Edison, only to conclude that "[g]iven this adulation of the inventor, it is not surprising that American writers at the turn of the century incorporated actual inventors as characters in their fiction" (p164). There follows an admittedly perceptive discussion of the Scientist as Inventor, followed by a portrait of the Scientist as World Savior, the Scientist as Detective, the Scientist as Utopian Ruler. Not unexpectedly, the next chapter counters this idealism with the following opening-lines: "The scientists' reign as heroes of twentieth-century literature was always open to question, and even the promise of a limitless power source was not sufficient to prolong the idea beyond the 1940s" (p187). The myth of the evil scientist reappears - and comes true! - once science gets voluntarily involved in the machinery of the first and second world war: as the title of

chapter twelve triumphantly proclaims, "reality overtakes fiction." That this fulfillment of the Faustian myth raises the complicated question as to where to draw the line between reality and myth, science and fiction, Haynes comfortably neglects.

In Haynes's view, the function of art is to lay bare, and bridge, the gap between the scientist and his community. What Shelley's *Frankenstein* teaches us, for instance, is that a scientific experiment conducted in total isolation, cannot but be expressive of the scholar's lack of sympathy for the people closest to him. Hence the monster kills Dr. Frankenstein's future wife. The much-debated feminist implications of this destructive gesture are eloquently re-articulated by Haynes: *Frankenstein* is a novel about a scientist who wants to usurp his future wife's natural power of procreation. What is equally interesting in her discussion is the parallels she suggests between science and art: everything that is true for Dr. Frankenstein also pertains to the artist. Both are guilty of wanting to re-enact the omnipotent role of the Creator. Both thereby commit the crime of displacing reality (the original). Unfortunately, but perhaps predictably, Haynes does not explore her insights any further. What she leaves unsaid is that the artist works at the same distance from reality as the scientist that (s)he criticizes. Mary Shelley's novel is as much an indictment of her father's unemotional intellectual stance toward her, as it is a disconcerting inquiry into her own desire to replace the loss of her son with new, albeit artificial, life. If it is the fate of the isolated scientist not to foresee the destruction that his invention might unleash, it is no less the burden of the artist to produce a work of fiction that is necessarily different from--even intolerant of--reality. Given the fact that, not unlike the scientist, the artist is at odds with the world that (s)he recreates, how can one insist on the representative function of literature? How can Haynes on the one hand recognize that art subverts the scientific developments of its day, and on the other hand construe a history of literature that is totally determined by - and reflective of - those developments? Surely, if art questions the certainties produced by science, its meaning lies in its

discontinuity toward it. How, then, save by the ambiguities of its form, can art bridge or reveal the gap between the totalizing order of the scientist and the irreducible contradictions of its long-term social effects. Unfortunately, Haynes has devoted little attention to this characteristic open-ended form of art. In the end, her interest lies in generalities rather than particularities; in stereotypes rather than subversions; in content rather than form. I could not agree more that science is a problematic model for the arts.

STS on Other Planets

by Richard E. Sclove

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Science and technology, we all know, are constructed in laboratories, and so it is right and fitting that we in the STS community preoccupy ourselves with those haunts. Yet periodically, when suffering snow-blindness from staring at men in dazzling white coats, I close my eyes and fantasize about another planet: Planet XI. Like Earth, Planet XI is a place in which knowledge and technical artifacts are socially constructed, but in other respects it is utterly bizarre and exotic.

For example, on Planet XI a startling amount of knowledge about how the world works is produced by social groups comprising non-experts -- that is, ordinary women and men. Sometimes they are organized according to their occupations (a little bit like our trade unions), sometimes according to their social concerns (like our environmental or women's groups), and sometimes according to where they live (like our community and grassroots organizations).

Some of these groups produce knowledge entirely by themselves. For instance, if they fear that they have been poisoned by polluted water, they conduct their own surveys and empirical examinations to find out whether, how, and why. Farfetched as this sounds, they are able to do this without the benefit of university educations, research grants, or laboratory facilities.

But in other cases they produce knowledge in close collaboration with professionally trained researchers. Yes, it is hard to believe that there could be a place where men and women with professional credentials would even talk, much less cooperate actively, with others less educated. But on Planet XI, I insist, it is so. For instance, in one nation on Planet XI every university has established a set of research centers whose sole purpose is to facilitate studies conducted with or for

popular organizations. Thus on Planet XI, understanding how knowledge is socially constructed sometimes entails studying laboratories, but it also means spending time with all kinds of women and men in all kinds of social settings. On Planet XI, knowledge creation knows no sharp geographic, class or other social boundaries.

Even on Earth, science and technology are not, of course, autonomous enterprises; they are strongly influenced, for example, by government policies. But since the only kinds of people who significantly influence those policies are the same people who otherwise wear white coats and busy themselves with laboratory inscription devices, studying science policymaking on Earth hardly requires shifting one's gaze from the laboratory's customary denizens. Thus it is both a relief from tedium -- and yet also a bit shocking -- that on Planet XI many other kinds of people influence science and technology policymaking.

For instance, there is another nation on Planet XI that, realizing that knowledge and know-how are not only socially constructed but also have profound social repercussions, convenes panels of laypeople -- that's right, everyday folks from all walks of life, including school teachers, homemakers and street sweepers -- to publicly interrogate men and women in white coats and then reach their own policy conclusions. These lay panelists' judgements have influenced popular political deliberations, business decisions, and government policies.

You might well imagine that this process is not only costly but leads to ludicrously ill-informed judgements. But a broad cross-section of the nation's members -- including its political and business leaders -- claim that these irrational participatory

methods actually result in greater social justice and even in real economies. This occurs, according to them, because there is relatively little costly opposition to innovation, insofar as a wide range of social concerns are reasonably well reflected in prior R&D and policy decisions.

In several nations on Planet XI, programs have begun to be established through which workers and consumers can even participate directly in designing alternative technologies better adapted to their life circumstances and aspirations. Workers, for instance, have consistently demonstrated both an interest and impressive capabilities in helping to devise production technologies that are not only efficient but also maintain safe, high wage, high skill jobs, protect the environment, and result in high quality products or services.

Many university students on Planet XI pursue educations and careers no different from the conventional student trajectories familiar on Planet Earth. But others choose to become actively engaged in the preceding participatory activities as an integral aspect of their studies. For instance, one Planet XI university has a community research center located *within* its academic Technology & Society Program. The center is staffed by STS professors, who also teach courses on participatory research and on participatory approaches to technological design.

Students who take these courses receive credit for conducting participatory community research projects. Their projects, in turn, influence the university to adopt new courses that reflect community concerns (such as sustainable economic development) and to establish new, socially oriented, interdisciplinary research programs that include faculty from many different departments and programs throughout the university. This university's STS professors themselves hold graduate degrees in either natural science, engineering or social science -- but disciplinary credentials turn out to be of secondary importance, because over time all the professors have become generally familiar with one another's disciplines.

To read the mainstream STS literature currently being produced back home on Earth, one would have to conclude that

Planet XI exists only in my fevered imagination. But actually, Planet XI is a real place. (In fact, it is the third planet out from the sun at the center of our own solar system.) I just returned from a brief trip to two of the nations on Planet XI; they are named "Denmark" and "the Netherlands."

For instance, this past May 9th I was privileged to deliver a plenary address to the national meeting of the Dutch "science shops". The meeting was attended by staff from the Netherlands' 50 university-based community research centers, which together produce more than 1,000 studies each year in response to requests from community groups, trade unions, public-interest organizations, and local governments.¹ Other science shops, or related endeavors (not always based in universities), now exist in many other nations, including Denmark, Austria, Germany, Ireland, Norway, the Czech Republic, Canada, and the U.S. -- although the Dutch system is the oldest and mostly highly evolved. In the developing world there is a somewhat analogous international network of indigenous knowledge resource centers; its newsletter is published in The Hague.²

I also met with staff from Teknologirådet (the Danish Board of Technology), who since 1987 have conducted a dozen "consensus conferences" in which lay panelists become intensively informed on selected topics in science and technology policy and then, after participating in a public forum, announce their judgments at national press conferences that are attended by members of Parliament.³

I spent a day with several professors at Århus University, who are among the world's leading practitioners of participatory technological design.⁴ I was hosted for another day at the Danish Technological University in Lyngby, where indeed there is an 11-year old science shop located within an STS program and staffed by Professors Michael Sjøgaard Jørgensen and Børge Lorentzen.

And so one comes naturally to the question of why these, as well as other real-life examples that seemingly represent an important thrust toward democratizing science and technology, are so little considered within the conventional STS

literature. The first Danish consensus conference was held in 1987, but the main STS journals, such as *Science, Technology & Human Values* and *Social Studies of Science*, have not discussed these procedures. How do the reports produced by Danish lay panels compare substantively with those produced by conventional technocratic approaches to technology assessment? Is their social and political impact typically greater or less? The bulk of the STS community has apparently not found such questions of interest.

During the mid-1980s Loet Leydesdorff and colleagues published several illuminating studies of the main science shop at the University of Amsterdam.⁵ But at the time there were already about a dozen other science shops scattered throughout the Netherlands. What of them? Indeed, since that time the number of Dutch science shops has *quadrupled*, but apparently no one in the STS community has found this vibrant effort to democratize university research capabilities worthy of serious attention. In fact, when the very shop that Leydesdorff et al. studied was recently shut down, ostensibly owing to university budget constraints, did a single person from the STS community know, care, or do anything to try to help?

How do the four dozen remaining Dutch science shops vary from one another? How are participating students' career decisions affected? Do the shops appreciably influence faculty research programs? What is the social impact of the shops' research? How does their social utility and cost efficacy compare with that of conventional research systems? How do science shops in various countries reflect the different circumstances of their origin? Could science shops and the popular constituencies they serve evolve into a grassroots foundation for challenging other, non-democratic science and technology institutions? Is the Internet permitting transnational collaborations among science shops to emerge?

No one knows the answer to these and a hundred other such questions, for the simple reason that no one has asked them. The answers would not merely be of academic interest; they could help provide a basis for maintaining and greatly extending the practice of community-based research. (In the

U.S. I have argued that a "National Community Research Network" ought, in principle, to supplant our vast national laboratory system, which includes over 700 labs spending more than U.S. \$20 billion in tax dollars annually, largely as an anachronistic holdover from World War II and the Cold War.)

The pioneering anthologies on participatory action research have all been published by Third World activists or by social change-oriented sociologists, not by members of the STS community.⁶ Likewise, the pioneering anthologies on participatory design in the workplace were compiled by Computer Professionals for Social Responsibility, an activist group, not an STS organization.⁷ The latter anthologies are extremely useful, but other questions remain to be asked. For instance, if workers and users should participate in technological design, what about affected *non-users*? What are the cultural, institutional, and legal barriers to participatory design, and what types of political strategies might be used to soften them?⁸

Several years ago I noted that (at least in the U.S., with which I am most familiar) a majority of new STS graduate students arrive each year motivated primarily by awareness of some particular deep social problem involving science or technology.⁹ They want to study that problem, and to contribute constructively and actively toward addressing one or another real social ill. Do our current STS programs nurture that eminently worthy desire? For the most part, no. These admirably motivated students are coopted into courses and research programs whose inadvertent (?) thrust is to remake their social commitment into a commitment to largely idle scholarship instead. This is good for academic careers, perhaps, but not for society. STS -- as a codified profession, field or discipline -- is now near-perfectly accomplishing just what Foucault claimed disciplines normally do: producing docile utile bodies.

Similarly, the STS community's recent, intense preoccupation with establishing that technologies are contingent social *products* (a theoretical point that was actually pretty well established in the 1970s by social historians

of technology and by appropriate technology practitioners) has meant that almost no one in the STS community is studying the other half of the coin: particular technologies and technological complexes specific social *consequences*. The relative inattention to consequences has been noted, for instance, by sociologist of telephony Claude Fischer, diffusion theorist Everett Rogers, and urban infrastructural historian Christine Rosen.¹⁰ The embarrassing truth is that when I want to learn about the social consequences of emerging technologies, I do better canvassing human interest stories by *New York Times* reporters than reading anything in the leading STS journals. Recently in the U.S., the most influential scholarly claims about the social and political implications of technology have been made by Harvard political scientist Robert Putnam, who never cites any STS literature and has never published in our journals.¹¹

A few others in the STS community have called attention to various expressions of depoliticization within our field -- famously symbolized by the recent the shift in meaning of "STS" from "science, technology & society" to "science & technology studies" -- but little has yet changed as a result of these critiques.¹²

So, why is STS relegating overt attention to democratizing science and technology to a back burner? One obvious hypothesis is that such attention would directly challenge current social power relations and so risk currying disfavor within the corridors of power, including those that provide funding. Servants of power are rewarded in our societies; challengers are frequently punished.

This hypothesis is unfashionably straightforward and simple, but there is also some evidence to support it. For example, two of the most gifted and inspiring STS professors with whom I studied as a beginning graduate student in the 1970s were David Noble and Langdon Winner; both were politically engaged, and both were, not coincidentally, denied tenure by MIT. Did these spectacularly unjust and irrational decisions function as early warning shots across the bow, teaching other aspiring STS scholars the career risks they might run if they didn't depoliticize their research and

teaching programs?

Perhaps one way to start reversing this socially damaging climatic chilling within our field would be for socially concerned STS professors -- or, better yet, the leading STS professional societies -- to establish standby mechanisms for quickly mobilizing external support to colleagues whose political commitments are jeopardizing their careers. We could also establish prizes to recognize and reward socially engaged research and teaching.

One of the interesting features of the studies conducted by science shops is that normally projects are never initiated unless there is an organized social group committed to utilizing the research results within some sort of emancipatory social practice. It seems today as though most STS research is only conducted under exactly the opposite conditions; that is, only when there is clearly no risk at all that *any* progressive social group will make constructive use of the results.

NOTES

1. Richard E. Sclove, "Putting Science to Work in Communities," *The Chronicle of Higher Education*, 41, no. 29 (31 March 1995), pp. B1-B3.

2. *Indigenous Knowledge and Development Monitor* is published by the Center for International Research and Advisory Networks (CIRAN), P.O. Box 29777, 2502 LT The Hague, Netherlands, e-mail <editor-ikdm@nufficcs.nl>.

3. Richard E. Sclove, "Town Meetings on Technology," *Technology Review*, forthcoming July 1996; Simon Joss and John Durant, eds., *Public Participation in Science: The Role of Consensus Conferences in Europe* (London: Science Museum, 1995).

4. See, for example, *Computers in Context: Joining Forces in Design*, Third Decennial Conference Proceedings, Århus, Denmark, August 14-18, 1995 (Århus: Dept. of Computer Science, Århus University, 1995).

5. E.g., Loet Leydesdorff and Peter Van den Besselaar, "What We Have Learned From the Amsterdam Science Shop," in *The Social*

Direction of the Public Sciences: Causes and Consequences of Co-operation Between Scientists and Non-Scientific Groups, eds. S. Blume et al. (Dordrecht: D. Reidel, 1987), pp. 135-160; Rolf Zaal and Loet Leydesdorff, "Amsterdam Science Shop and Its Influence on University Research: The Effects of Ten Years of Dealing with Non-Academic Questions," *Science and Public Policy*, 14, no. 6 (Dec. 1987), pp. 310-316.

6. E.g., Orlando Fals-Borda and Muhammad Anisur Rahman, *Action and Knowledge: Breaking the Monopoly with Participatory Action-Research* (New York: Apex Press, 1991); Peter Park, et al., eds., *Voices of Change: Participatory Research in the United States and Canada* (Westport, CT: Bergin & Garvey, 1993).

7. E.g., Douglas Schuler and Aki Namioka, eds., *Participatory Design: Principles and Practices* (Hillsdale, NJ: Lawrence Erlbaum Associates, 1993); Randall Trigg, et al., eds., *PDC '94: Proceedings of the Participatory Design Conference* (Palo Alto: Computer Professionals for Social Responsibility, 1994).

8. Richard E. Sclove, *Democracy and Technology* (New York and London: Guilford Press, 1995), esp. chap. 11; and Åke Sandberg, et al., *Technological Change and Co-Determination in Sweden* (Philadelphia: Temple Univ. Press, 1992).

9. Richard E. Sclove, "Soul-Searching: What About STS Activism?," *Technoscience*, 6, No. 2 (Spring 1993), pp. 12-13.

10. Ibid.; and Christine Meisner Rosen, Book review of "The City and Technology," edited by Mark H. Rose and Joel A. Tarr, *Technology and Culture*, 30, no. 4 (Oct. 1989), pp. 1070-1072; Claude S. Fischer, "Understanding Technology: An Agenda," Book review of "The Social Construction of Technological Systems," edited by Wiebe Bijker, et al., *Science*, 238 (20 Nov. 1987), pp. 1152-1153; Everett M. Rogers, *Diffusion of Innovations* (3rd ed., New York: Free Press, 1983), pp. 371-379.

11. E.g., Robert D. Putnam, "The Strange Disappearance of Civic America," *The American Prospect*, no. 24 (Winter 1996), pp. 34-50.

12. See, for example, three 1993 articles in *Science, Technology & Human Values*: Brian Martin, "The Critique of Science Becomes Academic," vol. 18, no. 2 (Spring), pp. 247-259; Susan E. Cozzens, "Whose Movement? STS and

Social Justice," vol. 18, no. 3 (Summer), pp. 275-277; Langdon Winner, "Upon Opening the Black Box and Finding It Empty: Social Constructivism and the Philosophy of Technology," vol. 18, no. 3 (Summer), pp. 362-78; and also Carl Mitcham's review of "The Handbook of Science and Technology Studies" in the Lehigh University newsletter *Science, Technology & Society*, no. 106 (Winter 1995), pp. 2-4.

Richard E. Sclove is the author of *Democracy and Technology* (New York and London: Guilford Press, 1995). He directs the Loka Institute, a nonprofit organization committed to making science and technology responsive to democratically decided social and environmental concerns. The Loka Institute manages several action-oriented Internet discussion lists, including FASTnet (the Federation of Activists on Science & Technology Network). Another current Loka project is working to establish a National Community Research Network in the U.S., modeled partly on the Dutch science shop system; the Institute's "scishops" Internet listserv is dedicated to advancing this endeavor. The Loka Institute, P.O. Box 355, Amherst, MA 01004, USA; Tel. +(413) 253-2828; Fax +(413) 253-4942; E-mail Loka@amherst.edu; World Wide Web <http://www.amherst.edu/~loka>.

Letter from London

(9 May 1996)

by Janet Rachel

University of East London

Channel hopping my way through a difficult patch on Sunday evening I found what I was looking for. A scientific programme investigating the essence of music. There they were. Charicaturing themselves better than ever I could manage (or dare) if it were left to me to 'ethnograph' them. In their definitive scientific laboratory - it's hard to imagine anyone who would fail to recognise the semiotics of science that were represented here - in their white coats. They had a Real Musician (apparently) lying on his back, his head surrounded by some 'scanner', and a keyboard lowered from the ceiling to where his hands could comfortably reach. A lap top computer was wheeled in on an instrument trolley, the two scientists stood back at a discreet distance. The object of this experiment was to record the brain activity of the subject as he played ordinary scales, and compare this to the activity when he played a piece by Bach. The two white-coated men stared in silence at the computer screen, then one spoke in a hushed voice 'we could be looking at the essence of music', he said.

All at once, in a sudden unmistakable rush, I was filled with an energy, not entirely positive in its disposition, but which was curiously comforting. For a few moments longer than I would admit here, I stomped around my kitchen ranting against the crass stupidity of ANYONE who could think they were looking at the essence of music ANYWHERE let alone in that ridiculous charade. Hurrah for sociology of science I congratulated myself. If it weren't for that I might have no defence against this lunacy. Suddenly I had the reason for finishing that conference paper that was resisting all attempts at conclusion, I knew there was a purpose for doing the stuff we do. Hrmph.

etc...

And then I remembered. Well... what about all that talk about celebrating difference? about the diplomacy of interdisciplinarity? respecting the Other? Just a couple of weeks ago I had been moved in the other direction by 'Dead Man Walking' - a Tim Robbins film (as they say). This only came out in the UK recently - we don't like to rush into things over here - so perhaps you saw it a long time ago. A nun takes up the challenge of understanding a man on death row. He has been sentenced to death for his part in a rape and murder of a young couple out on a date. It is for the nun to ... what? well, try this: to find a way to make sense of this man from his own point of view. She finds herself trying two ways to bring him to terms with his sentence. She tries to rearticulate the sentence (through the appeal procedure) to bring it into terms with the man's version of events. And she tries to rearticulate him - to find a way of joining him to the description which propels him to his death. This latter provides the bulk of the business as the law proved more stubborn than the man, and something had to give as a result.

As you sit in the dark and watch the film, perhaps you follow her surges of rage and revulsion as she faces a creature whose world is organised according to an alien set of principles. The question is, can she (you) stick with it long-enough to make him make sense as a person? If you can, then we have a Man that is brought to life at the point of death. If you can't then we have a sub-human about whom we need lose no sleep. You might think it in bad taste to draw a comparison between a film which follows the path of a rapist and murderer to his own death penalty, and two Scientists tracking the

essence of music in a man's brain. I would agree. Except that this isn't the level of comparison I'm attracted to. What stuck in my mind was a line in the film. One of the parents of the murdered couple (who were fully occupied with their grief and not at all ambiguous about the fate of the sentenced man) said to the nun 'I admire your faith' to which she replied: 'I wish it were that easy.'

So, if Susan Sarandon's serene character stumbles at the prospect of achieving a relationship with difference, I can at least identify my mundane struggle with a subject of significant proportions and take heart in the knowledge that what I do is difficult, and even worth the effort. The extra dimensions I

take from the film, though, which I struggle to find in our subject's texts is the hard bloody work of translating anger, contempt, revenge (strong words, but are you going to say you've never felt them?) into the possibility of a sustainable relationship. What the film forbids me to overlook are the implications of Right and Wrong (not absolute, but decided upon) that make sense of this work. And finally, the film is good to think with when it comes to the desire to understand and be understood through difference: it underlines the fact that transformation is required somewhere in the equation. We can't all stay in the same position as a result.

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Dissertation Abstracts

Manuel Duarte Laranja, *Small Firm Entrepreneurial Innovation in Portugal: The Case of Electronic and Information Technologies*, D.Phil, University of Sussex

This thesis concerns the innovative role of small independent entrepreneurial firms in Portugal. Focusing on Electronic and Information Technology (EIT) the objectives are to examine the firms' formative influences, their progress, problems and patterns of external interactions. Prior to this study there has been little research on the contribution of small firms to technological progress in Southern European industrialising countries such as Portugal. Also there is little understanding of the influence of Government policies on small firm innovation in Portugal.

The empirical research is based upon a detailed survey of 62 small entrepreneurial start-ups, followed by in-depth study of illustrative cases of entrepreneurial networks. Complementary interviews with managers of Business Innovation Centres, venture capitalists and a case study of a university-based research institute are also undertaken to explore policy, network innovation and the financing, of small companies. This research shows that EIT entrepreneurial firms are a most important component of overall technological innovation in Portugal. The study analyses how the firms emerged because of attractive local-demand niche opportunities which entrepreneurs-innovators could match by tailoring products, providing new services and contributing to the technological needs of large user firms. Because of labour, technological and social linkages the firms tend to concentrate on large cities such as Lisbon and Oporto. As well as their innovation-imitation activities, small entrepreneurial EIT firms are extensively networked with other local small or large firms, foreign multinationals and with universities, in what is termed as "entrepreneurial networks of innovation". The research shows that small firms positively

contribute to technology acquisition from abroad, adapting and transferring it to local users. Within the entrepreneurial networks, small EIT firms form a locus of collaborative innovation-imitation activities involving the acquisition, adaptation and transfer of technology to local users, who themselves actively participate in innovation network initiatives.

Although exploratory, the research derives important implications for policy in Portugal and other European lagging countries. Because of the innovation-imitation role of small firms, countries wishing to improve their technological development should develop specific policies of support for the formation of small EIT firms and entrepreneurial networks in order to overcome barriers to entry, financing difficulties, managerial problems and other limitations frequently confronted by such firms. Targetted policies could contribute to overall technological acquisition from abroad and facilitate diffusion amongst local users, enhancing overall prospects for high technology development.

Bert Sadowski, *Opportunities and Constraints for Public and Corporate Networks in Post-Reunification Germany*. D.Phil., University of Sussex.

The study examines the relationship between corporate and public telecommunication networks, and the role of interconnection. The telecommunication development in East Germany in the post-unification period is presented as a critical case study to examine the impact of restricted interconnection and monopolistic network supply on corporate network growth. A survey questionnaire in conjunction with in-depth interviews with large corporate users is applied to evaluate their propensity to establish private networks in eastern Germany. In order to generalise the results, statistical methods (logit and probit

models) have been applied to several empirical data sets. The empirical findings of the analysis are compared with assumptions that have guided public policy in Germany between 1990 and 1994.

The study demonstrates that interconnection accelerates network tipping, i.e., the adoption of private networks by a majority of large corporate users in conjunction with their exit from the public network. It evaluates different technical solutions to unbundle activities in digital networks that enable an interconnection of corporate and public telecommunication networks. In distinguishing between closed and open network access, interconnection is related to the concept of 'appropriability'. Open network access facilitates competitive network supply and undermines the traditional monopolies of the Post, Telegraph and Telephone Administrations (PTTs). Closed network access restricts competitive network supply and is a characteristic of a network design controlled by a dominant PTT. The study argues that closed network access can lead to a 'lock-in' configuration, i.e., an inefficient adoption of network technologies. It postulates that the 'lock-in' situation in the eastern German telecommunication sector in the 1990s due to the instantaneous application of the West German regulatory framework and monopolistic inefficiencies of German Telekom.

The main conclusion is that there is a need to reconsider the traditional 'naturel' monopoly as the most appropriate industrial structure to accelerate infrastructure development in countries poorly developed telecommunication networks especially in East and Central East Europe. Moreover, it is argued that the expansion of corporate networks can contribute to the modernisation of telecommunication infrastructure when open network access is permitted. However, the specific circumstances in which open interconnection policies can facilitate the modernisation of the public network depend on a large number of country specific features. These are examined in detail for the case of the former German Democratic Republic.

Enrico Santarelli, *Technological change and the finance process: Theory, evidence, and an*

application to the data processing industry, D. Phil., University of Sussex.

A serious weakness of standard economic theory emerged during the mid-to-late 1970s and the 1980s, when technology revealed itself as the driving force of a process of innovation which has interested most industries in developed countries. In this perspective, the present thesis is an attempt to broaden the economic explanation of technological change, moving from the assumption that development and diffusion of new technologies are closely related to the financial arrangements and institutions which prevail in any given historical period. To support this hypothesis theoretical prescriptions are combined with empirical evidence, to demonstrate that technological innovation is not only a process of scientific discovery and invention which finds (technological) explanation in its own nature, but it is also affected by the financial arrangements which characterize the interactions among firms. The aim of this research is therefore to bridge the gap between the analyses of financial and technological determinants of industrial development on the one side and the studies of firm organization and behaviour on the other, in order to single out some realistic micro-foundations of the functioning of real markets when they are faced by technological discontinuities.

The first five chapters of the present work are aimed at putting together theoretical prescriptions with empirical justifications and evidence, in order to identify the interdependences between technology and finance. From the macroeconomic perspective it appears that the long-term rates of change which take place in the financial and the technological structure follow a similar pattern. From the microeconomic perspective it emerges that firms with different organizational forms resort to different sources of capital to finance their investment outlays when these are devoted to the search for new patentable discoveries. In chapters VI and VII the theory and the evidence provided in the initial chapters are applied to the analysis of the way aggressive R&D strategies are funded by firms belonging to the data processing industry, whereas in chapter VIII policies devoted to promote various sources of innovation

financing are compared. Finally, in chapter IX some concluding remarks are drawn.

Suma Subramanyam Athreye, *The spread of technology and the level of development: a comparative study of steel mills using the Electric Arc furnace technology in India and Britain*. D.Phil., University of Sussex.

In this thesis the relationship between the spread of technology and the extent of economic development is analysed. The quantitative dimension of the spread of technology is usually analysed in studies on the speed and extent of diffusion across countries and industries. The qualitative dimension concerns the adoption and use of technology which is usually studied in the literature on technology adoption and adaptation by firms.

A process technology in two countries that differ considerably in their level of development, viz. UK and India, is considered. This controls for the technological and industrial specificity of the spread process allowing the influence of the development factor to be seen more clearly. The study is conducted at the industry/economy level, as well as the firm level. In this way the effects of the studying the different levels of aggregation together, and the relation between adoption and diffusion are clarified.

The study indicates a wide diversity of patterns in the spread of technology across countries. Differences in both the coefficients of the diffusion curve and in the underlying functional form are identified. A deeper analysis of the patterns of spread in India and Britain reveals the greater influence of supply and infrastructure constraints in India, while in Britain the entire process was largely consumption constrained. If it can be assumed that capacity and production side constraints are more likely in industrialising economies, these dynamics could be inferred as more typical in influencing the spread of technology in developing countries.

A study of the use and adoption of the technology by firms shows the importance of existing market structures, defined broadly to include the structure and organisation of production and consumption. In fact the composition of consumption in terms of users

and user sectors was vital in defining rules of competition and in what way technology was harnessed as a competitive force. In the purely technological sense of operational efficiency it is shown that Indian firms performed more poorly than British firms. Furthermore this poor performance could be traced back to diversification strategies of Indian firms which in turn were a response to poorer levels of market formation in the economy.

K. Thiruchelvam, *Utilisation of Industrial R&D Findings in Malaysia: A Case Study of Selected Public Research Institutions, Universities and Industry*, D. Phil., University of Sussex

The literature on the management of R&D particularly in developing countries is very sparse. This thesis attempts to fill this gap by exploring how management practices impact on the utilisation of industrial research findings in selected public research institutions (PRIs), universities and firms in a rapidly developing country like Malaysia. Case studies on research projects from three sectors namely, rubber products, food processing and electronics/engineering are examined to delineate the key research management practices that shape the success or otherwise of these projects undertaken in the three different organisational settings. More importantly, how the operating environment of the organisation ensures that these practices are enhanced or otherwise is investigated.

A predominant theme emerging from this study is that adoption of sound research management practices is fundamental to enhancing the success of the research effort. The research management practices governing the success of research utilisation are broadly similar irrespective of the environment of the research performing organisation or the type of industry sector in which the research project is undertaken. There are sharp differences in the research management practices adopted by firms and those that are found in PRIs and universities. Research projects undertaken by firms are largely underpinned by concerns of profitability. Such bottom line considerations are reflected in the adoption of stringent project selection criteria. Also, the research process in

firms is characterised by a holistic or integrative approach towards research utilisation. Such practices are seldom undertaken in PRIs and universities. The evidence from the case studies reveals that there are wide disparities in the adoption of sound research management practices among PRIs and universities reflecting varying degrees of top management commitment to the research effort as well as the consequences of deficiencies in the national public research funding mechanism (or IRPA). This unevenness in research management practices underscores the importance of leadership and commitment at all levels of the research effort. A constant strand throughout this study is that PRIs and universities are constrained by prevailing civil service regulations from adopting more effective research management practices to enhance their research efforts.

The adoption of sound research management practices in PRIs and universities would generate a number of managerial and policy implications in terms of disciplined research management, research funding that is both competitive and comprehensive and institutional autonomy. This study submits three recommendations aimed at strengthening the adoption of sound research management practices in PRIs and universities. Also, suggestions for further studies are made.

Conceição Vedovello, *Science Parks and University-Industry Links: A Case-Study of the Surrey Research Park*, D. Phil., University of Sussex

This thesis concerns the links between industry and university R&D, and the expectation that Science Parks will strengthen their links. It concentrates on the analysis of these links through a case study of a single British Science Park. The research explores the factors affecting the strength of links. It focuses on two issues that have been superficially approached by contemporary studies. The first refers to the key characteristics of Science Park firms that might influence the establishment and strength of their links with the host university. The second relates to the argument, extensively used by advocates of the Science Park mechanism, that geographical proximity

between universities and firms will facilitate and strengthen the links between these partners. The field-work is based on personal interviews conducted through questionnaires addressed to the (i) the Park management, (ii) a sample of firms located on the Park, and (iii) a sample of the host university researchers. The study examines a wide range of possible links in three broad categories concerned with (i) formal R&D and consultancy, (ii) human resources, and (iii) informal contacts. The research demonstrates that the links between university and industry in this Park are not profuse. However, the higher the involvement of firms with R&D activity, the higher the possibility of linkage with academe. In addition, through a comparative analysis provided by data related to links established with other universities (from the firms' side) and other firms (from the researchers' point of view), it is shown that geographical proximity between the partners is not an important influence on the existence or strength of links between university and industry.

News from the Association

From the President's Desk

by Aant Elzinga

I take this opportunity to hail Chunglin Kwa, the Editor, for his successful revamping of the Newsletter first to a Review and now to a new format, realizing something of his vision of running a lively digest of debate, reviews and current affairs, etc. Richard Rogers is also congratulated for neatly putting us into the Web, so that you now can visit our homepage through the internet and explore some of the informative, stimulating and entertaining linkages he has set up from Amsterdam. This includes the one to the Bielefeld Conference Home Office, our hosts in October. You will also be aware that we have transferred the Membership Secretariat from London to Amsterdam, where it is now being run by Anne Beaulieu. I wish here to heartily welcome Anne; we all look forward to working together with her. She tells me that she has been at the Dept of Science Dynamics for about a year and a half, working on a PhD on technology in the neurosciences (in particular, PET scanning). Otherwise, her life goals involve cultivating a magnolia tree. At the same time on behalf of Council I reiterate our thanks to Peter Healey for SPSG's willingness to house the Secretariat until now, and Irene Duker for attending to the job of maintaining the membership register, getting the Review printed and distributed, etc., which are all things that Anne Beaulieu is now taking over.

For my own part I was hoping that this would be my last entry under this rubric in the *EASST Review*. Alas it is not. At our Council meeting graciously hosted by the Science and Technology Dynamics unit in Amsterdam 23-24 March last, I took up my intention to end my term as President, and we discussed nominations for new persons to replace both myself and other veterans of the EASST revitalization drive now almost five years behind us.

Since 1991 we have been as an organization in both Göteborg and Budapest (have a look at

the fine volume of *Social Studies of Science* vol. 25, No. 4, Nov. 1995, special issue covering one of the themes in Budapest, David Edge has put the volume together - thanks David!). Now we are approaching the next joint conference with 4S, in Bielefeld, where by good fortune that organization's current President, Karin Knorr-Cetina also has her academic home.

Anyway, it turns out I can't just leave in Bielefeld. Our Council, and the General Meeting of EASST at Budapest 28-31 August 1994 put in place a new Constitution (cf. *EASST Newsletter*, vol. 13, no. 3, Sept. 1994, p. 36) which is more comprehensive than the one we had before. In the new Constitution we have a rule that a slate of nominations is to be taken up at the General Meeting for discussion before it is finalized. Thus elections will be held directly after the Bielefeld conference and not before (see page 32 of this issue).

Also the expansion of our organization has meant that the task of President is more time consuming and public relations oriented than before. Therefore it has now been decided to run two parallel election slates, one for new Council members (to start their 3 year term 1 January 1997), and one for a new President (to come one board the same date as President Elect, and taking charge as President 1 July 1997). All members are now encouraged to come in with nominations of suitable candidates, names with addresses and information about their affiliation and suitability to be sent to our Membership Secretariat, c/o Anne Beaulieu who will pass everything on to Rob Hagendijk, Olga Amsterdamska and Ulrike Felt. These three make up a Committee responsible for implementing the nominations and elections process.

When I agreed to assume the task of EASST President after Stuart Blume, who arranged

elections five years ago, I didn't realize what I was getting into. Stuart had just spawned a genial plan that provided for institutional members in order to beef up our economy. This helped us get going and made it possible to set up workshops together with NECSTS, introduce travel stipends, reorganize the Newsletter and much more. Last year we reduced fees for institutional membership, and hence expanded this category of members considerably, while at the same time following the rule that each member of Council sits there only in her or his capacity as STS scholar. This year in Bielefeld we are inviting Directors and other leading representatives of STS Centres in Europe to a luncheon to discuss how EASST might further enhance its role on behalf of institutional members, e.g., in relationship to the European Science Foundation (where I have been promoting STS perspectives) and the EC, in connection with current discussions of a larger place for humanities and social sciences within EC funding programmes for R&D under the fifth framework programme. This is only one topic, others are joint ventures in the form of workshops, outreach, educational training, etc. To spark it off a Task Force including Terttu Luukkonen and myself will be convening a special session with a panel of both representatives from DG XII (among other TSER - the Targeted Social and Economic Research Programme) and leading scholars in STS from Britain, France and Sweden. Our own input will be around the results of a poll we conducted on the rate of participation of STS Centres across Europe in TSER and other Brussels programmes. The idea is to raise the

Paul Bunge Prize 1997

The German Chemical Society welcomes applications for next year's DM 10,000 prize. Applicants should submit a paper (in English, German or French) on the history of scientific instruments in any field. Send the

visibility of STS scholarship and facilitate dialogue on future prospects for our multifaceted field.

You will already have noticed EASST's expanded travel stipend fund scheme that I hope graduate students are taking advantage of in connection with the Bielefeld meeting, as well as coming workshops. The inspirateur behind this scheme is as usual Rob Hagendijk, our Treasurer.

Another issue taken by Council, and on which we would like an open discussion in these pages, is the intellectual profile of our organization. We think we are too lopsided and should make some efforts to bring in more people from the STI fold (STI = Science, Technology and Innovation studies), as well as more traditional disciplines like political science where some policy studies are cultivated. The Bielefeld conference is also in various ways encouraging such interchange with other disciplines. Günter Kuppers at our meeting in March gave us an update on preparations for the October meeting, which are now well in hand. It will be a big one, and we wish the organizers, all of them, all the best.

EASST also has a Publications Committee. It has been somewhat dormant, but now it is perking up with Steve Fuller and Andrew Jamison putting forth several ideas for book and journal projects. Anyone interested, or with ideas of what EASST should be doing on this front, please get in touch with them. You will be hearing more from them in the Review, probably in the next issue.

With this, let me sign off with - "SEE YOU IN BIELEFELD".

paper, a publication list (if available) and a CV to the German Chemical Society, Public Relations Department, P.O. Box 900440, D-60444 Frankfurt/Main. The deadline is 30 September, 1996.

The Future of STS on the Web, or: what I learned (naively) making the EASST website

by Richard Rogers

This piece contains no handy tips for website development as we know it. Here I provide no information on how, effectively, to panhandle for internet wisdom amongst your colleagues, schmooze with the network guy, beg the department for more computing power, negotiate content, locate model websites, download the right guide to the web, work with an HTML editor, hack code, create links, make forms, use ftp, beta test, write an ü, or keep the access and referral log files in order to angle for advertising down the line. I will not talk about work reduction strategies after a site is 'finished' for the first time, as 'if you'd like your announcement to be on the site right this minute, no problem; just give it to me in HTML'. There is nothing in here about my internet behavior (or yours), and the word netiquette will not appear again.

This piece, contrary to the endless how-we-do-it guides, is about what websites are not - up till now. As far as I've seen, there is plenty of social science and STS on the web, to which the modest EASST site and the contents of the links attest. There's also some social scientific analysis of the web, as in the field of internet studies advertised in the Sage mailings. There is, however, very little social scientific thinking embedded in website design.

It's as if every webmaster-social scientist stows his methodological baggage and takes on the mantles of an eclectic librarian and specimen collector, this 'creator' included. Despite tremendous growth, the world wide web remains an elaborate show-and-tell session, with connections to other one room schoolhouses doing the same, but with different acorns. Webmasters are currently locked into the 'promotional flyer', 'merchandise catalogue', 'resource guide' or 'spatial metaphor' design paradigms, all of which (technology studies anyhow predict) have nothing to do with the

inherent limitations of HTML. As Buckminster Fuller used to say, 'it's a design problem'.

The web is meant to afford the opportunity for the server advantaged to be his/her own publisher and communicator, so why do we upload only publications, commentaries, publication lists and CVs, and list our favorite links? And why do the sites, on the whole, look and feel like cabinets of contemporary curiosities, however fascinating? There are perhaps other ways of proceeding with website development and experimentation, in and for STS. I will discuss four preliminary ideas, which I've yet to see.

Evolving Discourse Sites

Most every website is created and maintained by single organisations peddling themselves. Whether it's Pepsi's, Greenpeace's, CERN's, your university department's or EASST's, it contains information about the organisation's services and products, and often provides links to like-minded parties and their productions. A website, contrariwise, could just as easily be created to depict positions on an issue and to chart an evolving discourse *across* organisations.

Here's one way. Take your favorite schematisation of a debate, and render it into a graphic or image map. You can upload your own materials on the positions taken by the relevant actors or organisations in the debate, linking your internal pages (the material) to the respective actors depicted on your graphic. An elementary example would be to select an issue, draw a 'political spectrum' image map and link the position statements made by political parties and interest groups to the proper areas on your spectrum.

Your site becomes 'dynamic' once you find and link points on your spectrum to the actual political party or interest group websites. With

some insight into URLs, you can link the spectrum points to the pages on the issue *within* the parties' or interest groups' sites. You can 'capture' (or save) the parties' positions at various points in time, and eventually have your site portray the evolution of the debate, as it appears on the web. I could imagine, say, a SCOT or an ANT perspective similarly rendered with a combination of external and internal links. For now, thick descriptions probably belong in books or on CD-ROMs.¹

The parties involved in the site may be asked to check it for fairness and accuracy. Contributions could be solicited, and email links set up. The site eventually may become a resource for one or more actors or social groups, whereby you could think through the implications of your representations as well as your role as 'debate webmaster'. To wit, you also hold the access codes to 'close' the debate - literally. Then you can watch whether you set the boundaries to the web debate (and whether the site became indispensable), if and when a new site is made without you.

Activist Loop Sites

Web activism is rampant. Celebrated calls for spamming and flaming people and organisations are reported in the popular press. Another form of web activism lies in the blue ribbons pinned mainly to American sites, expressing support for free web expression. [For those interested, one of the American origins of this practice of pinning ribbons to indicate solidarity lies not in the Red Cross or the Gay Pride movement, but in a '70s American pop song, 'Tie a yellow ribbon 'round the old oak tree'.] There are still more examples, as net canvassing and electronic petitions emerging from spatially dispersed virtual communities and/or mailing lists. For instance, if you're on the list, you may receive a request to email Wal-Mart to protest drug store development on American Indian burial grounds in upstate New York.

Mapping, following and depicting desktop activism (in close to real time) takes a bit of work, but unlike street marches or meetings you don't have to be physically present to be in the loop. You could start small, sending 'subscribe' messages to the leading web activist lists, and eventually build up a healthy base.² The webmaster then has to filter the incoming

messages (maybe once a day), and upload the calls to action on the site, arranging them by date and by topic, perhaps with an overlay on a geographical map indicating physical origins and destinations of the activities. Email links could be set up to the originator and the intended recipient, allowing for two-way protest and/or information exchange.

The site is stationary and controlled but the contents are ever-changing, which would make it suitable for science and technology museums and (STS) classroom internet labs. If the senders and/or recipients of the protests cooperate and provide some data, one can begin to have students explore aspects of NIMBY theses in the context of computer-mediated communication, among other didactic opportunities.

Reflexive Webometric Sites

Academic societies (not to mention other publishers) could upload the full contents of their journals, but many don't because they feel the hard copy may become redundant and their sources of income vanish. The same holds for the *EASST Review*, with its one issue electronic lag time. There is some reason to put all academic journals on the web, in full, right now. Here's why.

There are subdisciplines of STS and elsewhere beginning to work with log files, i.e., records of which servers have hit which website and web pages, and how much time a user has spent there (if he/she keeps clicking on your site). Log files only contain server names (and/or IP numbers), not the names of the user of that server, at that time. For our purposes, the server name is enough. We usually know what it means.

In the case of the *EASST Review*, I could design the site so that every article is its own separate page, and chart how many hits each page (i.e., each article) receives. You're not measuring something like citation patterns, but awareness. The next step is to put 'download' and 'print' buttons on each article (and ask the visitor to use those buttons, and not netscape's, for saving or printing). You similarly measure saves and print-outs, i.e., readership. So just as the number of times your articles have been cited is counted and weighted, so are the number of times your electronic articles are hit, downloaded and/or printed. To wit, the one

with the most hits and readers from the most prestigious servers (e.g., mit.edu) gets tenure.

After a short time, you tell the visitor to your site what you're doing, and how the data could be used, with a flashing warning message. [Please be advised that article hits, downloads and print-outs are being counted, and that the data are fed into reputational and funding structures of academia.] Next to the title of each article would be visible 'counters', with the number of times it's been hit, downloaded and printed. Self-hitting will register (but the self-hitter may wish to rotate servers as randomly as a human can muster, or write a bot). The rest I'll leave up to the reader.

Virtual Presence Only Sites

The question is whether an organisation or person must exist outside the web for the actor to be relevant in debates on the web. We'd ask whether and how someone or an organisation can establish a reputation on the web, without having a reputation (or anything else) in real life. Just how 'flat' are social hierarchies on the web?

Make, for example, an evolving discourse site, and restrain yourself from uploading information about your organisation or from presenting your findings at a conference or wherever else. If you can, find yourself a generic domain name which doesn't readily identify your server. Because the discourse site (or whatever kind of site you design) will be packed with key words and names of people and organisations, web foragers searching the net for themselves, their organisations and/or their subject matters probably will find it.

Watch your access and referral logs to chart the impact and relevance of your site. You could make the site similar to a webometric site (and count the hits, downloads and prints), but, for the relevance index, you should also check the referral logs, i.e., the records of the sites which have linked yours to theirs. (For example, the EASST referral log of the first two weeks indicates that sites in Latvia [latnet] and Bielefeld [4S/EASST conference] have linked EASST. It also gives us a list of queries which led the internet searcher to the EASST site.) Do not interfere by announcing your site.

Now vary the originator. To ascertain the weight attached to server names, ask prestigious server administrators to mirror your

site (then upload a 'we've moved' message on your site, deleting everything else). Of course, you also can pull a Latourian 'Jim Johnson' or a similar useable precedent. You may wish to follow up some time later with a questionnaire, among others to the webmasters who've linked you.

With some additional social engineering, you may be able to start in motion a shift in website design, which you also can follow. The resulting 'book' is an umbrella website, with links to all your web experiments and results.

NOTES

1. Though every footnote or picture reference could be clickable. But remember, the more clickable words, the quicker the user will leave the main event.

2. See the Loka Institute's (www.amherst.edu/~loka) and Durham's Technothings (www.dur.ac.uk/~dss8zz2/tec.htm) sites to begin snowballing mailing lists related to science and technology issues.

Conference Announcements and Calls for Papers

The *International Federation of Automatic Control* is having its world congress in **San Francisco** from June 30 to July 5th this year. IFAC is probably the world's largest engineering professional organization. One of the official technical committees of IFAC is the Committee on the Social Impacts of Automation. On Sunday, June 30, from 11:00 until 4:00 the Committee will sponsor a special meeting devoted to discussions of participatory design. The meeting, which is open to the public and free, will be held at the San Francisco Marriot.

The *North American Society for Social Philosophy* will hold its thirteenth annual conference on 15-18 August, 1996 at the Bemis International Center, **St. Norbert College, De Pere, Wisconsin**. The theme of the conference is Technology, Development and the environment. Contact Cheryl Hughes, Philosophy Department, Wabash College, Crawfordsville, IN 479330352, tel. 1-317-361-6283, fax 1-317-361-6295, email hughesc@wabash.edu.

The *Society for Literature and Science* will hold its annual conference in **Atlanta** on 10-13 October, 1996. For information contact Anne Balsamo, Georgia Institute of Technology, School of Literature, Communication and Culture, Atlanta, GA 30032-0165.

The *21st annual Interface 96 on Humanities and Technology* will be held in **Marietta, Georgia**. Contact Julie R. Newell, Interface, Department of Social and International Studies, Southern College of Technology, 1100 South Marietta Parkway, Marietta, GA 30060-2896, tel 1-770-528-7481, fax 1-770-528-4949, email jnewell@sct.edu.

An International Conference on *'The future of DNA - presuppositions in science and*

expectations in society' will be held on 2-5 October, 1996 in **Dornach, Switzerland**. For information, contact the Ifgene conference office, Goetheanum, CH-4143 Dornach, Switzerland, tel 41 61 706 444, fax 41 61 706 4446, email 100716.1756@CompuServe.Com

'The Normal and the Pathological: Life, Disease, Cure - A conference in honour of the memory of Georges Canguilhem' will be held on Saturday 14 September 1996 (9.30 - 5.30) at **SOAS, University of London**, Russell Square, London WC1H 0XG. Speakers include: Paul Rabinow, Ian Hacking, Colin Gordon, Mike Gane, Richard Horton, Camille Limoges, Nikolas Rose, Graham Burchell and Francois Delaporte. The conference fee (including tea, coffee and lunch) is £35.00 (or £15.00 concessionary). Further details and registration forms can be requested from: Professor Nikolas Rose, Goldsmiths College, University of London, SE14 6NW, UK, tel 44 171 919 7770, fax 44 171 919 7773, email n.rose@gold.ac.uk. General inquiries should be made to Dr. Thomas Osborne, Department of Sociology, University of Bristol, BS8 1UQ, UK, tel 44 117 928 7507, fax 44 117 970 6022, email thomas.osborne@bris.ac.uk

The **Science Museum, London** is organising a special conference entitled *'Here & Now: Improving the presentation of contemporary science and technology in museums and science centres'* on 21-23 November, 1996. If you register by 30 June a reduced fee of £150 applies; otherwise it's £170. For information contact Rebecca Mileham, Science Museum, Exhibition Road, London SW7 2DD, London, tel 44 171 938 8047, fax 44 171 938 9773, email r.mileham@nmsi.ac.uk.

The **British Sociological Association (BSA)** is holding a day school on the *'Sociology of risk & the environment'*, on 5 July from 10.00 to 17.00 at the London School of Economics,

Sheffield Street, Room Z329. The developing world of regulatory science will be examined, including: regulation and globalisation, the implications of new European regulatory frameworks, the developing dynamics of public and private sector regulatory science, biotechnology regulation, BSE, pharmaceutical regulation, and the non-regulation of plastic food packaging. Contact Henry Rothstein by 26th June at Henry.Rothstein@brunel.ac.uk, or at

CRICT, Brunel University, Uxbridge, Middlesex, UB8 3PH, UK, tel 44 1895 203123, fax 44 1895 203155.

Fair

The *21st International Antique Scientific & Medical Instrument Fair* will be held on 27 October, 1996 at the Radisson/SAS Portman Hotel, Portman Square, London W1 (Marble Arch tube) from 10.00 to 16.30. Admission is £3.

Web news

Technothings (<http://www.dur.ac.uk/~dss8zz2/tec.htm>) the interactive sci-tech studies site from the University of Durham has been updated again. Within its 5 sections you can find the following:

NOTICE BOARD - Requests for information and assistance plus some conference announcements

LINKS - Links to some of the newest and most useful sci-tech pages on the web

SIGN ME UP - Direct subscription to 12 different news groups

WE WANT YOU - How to contribute to Technothings

263 - A collection of papers and essays on the following topics:

An overview of Technothings by Steve Fuller;

Paul Edwards talks about the demise of the Stanford STS program

Eileen Gebbie reviews Andrew Pickering's "The Mangle of Practice"

Tim Rogers discusses the growth of STS and its ability to influence policy

Jane Park on the development of scientific progress

Tim Rogers asks whether scientific knowledge is different from other forms of social knowledge

Andy Pickering talks about his current

research project

Steve Fuller brings the consequences of automation home by looking at its implications for how academics conduct business

Emily Watkinson discusses the current BSE scare in the UK and the failure to understand the historical and sociological dimensions of scientific enterprise

Simon Brown considers why the "Age of Enlightenment" was such a big deal

As well as the ability to contact the author directly for feedback or questions by clicking on the 'mail' icon at the head of each paper, there is now the facility to download these papers directly by clicking on the 'disk' icon.

Positions Available

A two-year, full-time Postdoctoral Research Fellow is sought at the **Department of Technology and Social Change, Linköping University, Sweden**. The successful applicant is expected to work within a research programme concerning the role of knowledge, identity and organisation in the development and use of technology, and the duties include undergraduate and graduate teaching. If you wish to apply, contact Professor Boel Berner *immediately* at email boebe@tema.liu.se or fax 46-13 13 36 30. If the position is still open, you can make arrangements to send your full application shortly thereafter.

At the **University of Bielefeld, Germany**, the Graduate School of 'Genese, Strukturen und Folgen von Wissenschaft und Technik', has on offer two, 18-month Ph.D. student stipends (beginning 1 October), which may be extended for additional year. The Institut für Wissenschafts- und Technikforschung encourages proposals which combine questions from the philosophy and sociology of science and technology. The German-speaking candidates should submit a short 'exposé' on their planned Ph.D. project as well as *die üblichen Unterlagen*. Applicants are requested to apply before 21 June to the Sprecher des Graduiertenkollegs, Prof. Dr. Peter Weingart, Institut für Wissenschafts- und Technikforschung, Universität Bielefeld, Postfach 10 01 31, D-33501 Bielefeld, fax 49-521-106-6033.

The **AIP Center for History of Physics (Maryland, USA)** seeks an Associate Historian for a term of three years. A Ph.D. is required, preferably in the history of science, plus experience in the history of physics or an allied field (astronomy, geophysics, etc.). About two-thirds of the working time is to be spent on (1) oral history interviewing of scientists, (2) conducting educational and informational projects addressing the general public or students (such as exhibits and internet

services), including fund-raising for those projects, and (3) providing general support as a professional historian to the work of the Center for History of Physics (visit archives, respond to inquiries, etc.). The remaining one-third should be spent on research and publication in related areas. Please send letters of application and vitae to: Spencer Weart, Director, Center for History of Physics, American Institute of Physics, One Physics Ellipse, College Park, MD 20740; you may send these by email to sweart@aip.org. Selected candidates will be asked to provide letters of reference.

The **Center for History of Physics of the American Institute of Physics** has a program of grants-in-aid for research in the history of modern physics and allied sciences. Grants can be up to \$2500 each. They can be used only to reimburse direct expenses connected with the work. Preference will be given to those who need part of the funds for travel and subsistence to use the resources of the Center's Niels Bohr Library in College Park, Maryland (easily accessible from Washington, DC), or to microfilm papers or to tape-record oral history interviews with a copy deposited in the Library. Applicants should either be working toward a graduate degree in the history of science (in which case they should include a letter of reference from their thesis adviser), or show a record of publication in the field. To apply, send a vitae plus a letter of no more than two pages describing your research project, including a brief budget showing expenses for which support is requested. Send to Spencer Weart, Director, Center for History of Physics, American Institute of Physics, One Physics Ellipse, College Park, MD 20740, tel 1-301-209-3174, fax 1-301-209-0882, email sweart@aip.org. Deadlines for receipt of applications are 30 June and 31 December of each year.

News about Education

The University of Bielefeld

by Peter Weingart and Heide Hackmann

Funded by the Deutsche Forschungsgemeinschaft (DFG), the Graduate School 'Foundations, Structures and Consequences of Science & Technology' was established in 1993 within the Institute of Science and Technology Studies at the University of Bielefeld. Drawing on the strengths of several faculties, the Institute provides an interdisciplinary research framework within which doctoral studies can be promoted. Apart from providing intensive supervision of individual projects, the School offers a structured curriculum aimed at addressing fundamental questions in the sociology, history and philosophy of science. In addition, it runs regular workshops, and hosts visiting scientists, in order to facilitate in-depth discussions of specialised areas of interest. A further objective is to expose students to research being undertaken in other settings, and to encourage networking and collaboration with students from related institutes. In line with this policy, Bielefeld's Graduate School has recently entered into an agreement of collaboration with the Netherlands Graduate School of Science, Technology and Modern Culture. A first meeting of these two groups was held in Amsterdam during April 1996.

Currently supervising 17 doctoral candidates, and a post-doc student, the themes being addressed within the Graduate School cover a broad range; yet all fall within one of the research foci of the Institute for Science and Technology. These include:

The development of science and technology in socio-political contexts (Lundgreen, Krohn, Küppers, Weingart)

The validity of scientific knowledge and the analysis of epistemic cultures (Knorr, Küppers)

Socio-technical innovations (Krohn, Küppers)

Quantitative methods in science studies, and the development and application of science indicators (Winterhager, Weingart)

Current doctoral candidates and their (abbreviated) dissertation titles: Stefan Baur: *Modelle vom Geist in der Kognitionswissenschaft*; Cornelius Borck (post-doc): *Zur Geschichte der Repräsentation von Gehirnakktivität in elektrischen Aufzeichnungssystemen*; Ludwig Fahrbach: *Modellen der rationalen Überzeugungsänderung*; Silviana Galassi: *Kriminologie im Deutschen Kaiserreich*; Carmen Garcia del Carrizo: *Das spanische Evaluationsmodell vom Forschungsleistung*; Markus Göbel: *Soziologie in Deutschland und Amerika (1890-1930)*; Petra Gödecke: *Die Strafrechtsreform in der Bundesrepublik Deutschland 1954 bis 1969*; Heide Hackmann: *The impact of political transformations on the South African social science research system*; Sabine Hanrath: *Die psychiatrische Wissenschaft in der Deutschen Demokratischen Republik und der Bundesrepublik Deutschland, 1945-1989*; Shiang-Ling Hu: *Kontroversen über die zivile Nutzung der Kernenergie in Schwellenländern, am Beispiel Taiwan*; Marco Iorio: *Mit bloßem Verstand. Eine Studie zum Begriff der Begründung*; Monica Kalt: *Wissenschaftliche, ideologische und ethische Implikationen eines Engagements für indigene Völker*; Gerold Krüggler: *Über den Sinn und Unsinn des "ökonomischen Imperialismus"*; Andreas Mayer: *Die Erfindung des Unbewußten. Eine Problemgeschichte der Psychoanalyse*; Wilfried Mende: *Systemische Rationalisierung: Zur Genese eines neuen Typs von Technik*; Staffan Müller-Wille: *Linnes Klassifikationstheorie und ihre Genese*; Jürgen Roth: *Der Umgang von Wissenschaftlern mit Technikkritik*; Markus Timmermeister: *Policy-Network-Analyse der Abfallpolitik*.

"Signatures of Knowledge Societies"

Bielefeld, Germany, October 10-13, 1996

Joint Meeting of
the European Association for the Study of Science and Technology and
the Society for the Social Studies of Science

Science and technology have long been regarded as both productive forces and engines of modernization, but these images have given way to more troubled perspectives in the late 20th century. Today we also associate science and technology with increasing risks and uncertainties, including the blurring of boundaries between human subjects, technical systems and natural conditions. Assumptions about science's universalism and objectivity are challenged by gender-based and culture-bound epistemologies. The increasing analytical power of science at once reveals and is threatened by the unpredictable complexity of social and natural dynamics. These and similar paradoxes characterize today's knowledge societies. They pose a challenge to science and technology studies and form the central themes of the 1996 meeting.

About Bielefeld:

Founded as a market town in 1214 by Count Hermann IV of Ravensberg, Bielefeld has worked its way through seven centuries of history, weaving every aspect of life into a complex cultural and economic fabric.

Today Bielefeld is the chief economic and cultural centre of East Westphalia, an area of approximately 2 million inhabitants. Bielefeld proper has a population of more than 320,000 and ranks amongst Germany's twenty largest cities. Bielefeld's wide range of industries is internationally renowned: names like Oetker (baking and food products), Seidensticker (clothing), Duerkopp (sewing machines, conveyer systems), Ostmann (spices), Gildemeister (machine-tool building) and Schueko (metal doors and windows) are representative of the amazing diversity of local industries and commerce.

The cultural scene compares well to that of any other big city. Bielefeld's two theatres are well-known far beyond the borders of East

Westphalia by lovers of high-quality theatrical and musical productions; and all connoisseurs of classical music praise the Rudolf-Oetker-Halle (concert hall) for its excellent acoustics. Chances are high that you will get to hear a well known orchestra, ensemble or soloist. There is also an art museum ("Kunsthalle") which has a famous selection of German expressionism.

The Institute for Science and Technology Studies (IWT):

The Institute for Science and Technology Studies is hosting this conference. With the establishment of this institute as a research initiative which draws on the strengths of several faculties, the University of Bielefeld was the first research institution in Germany to meet the organizational prerequisites for longterm, interdisciplinary work in the field of science and technology studies. Today, after 25 years of existence, it is recognised as an internationally successful centre of research in social, philosophical and historical studies of science and technology.

Apart from research conducted under these topics, the Institute for Science and Technology Studies houses a graduate school (see p. 31 of this issue).

The Interdisciplinary Centre for Women's Studies / Interdisziplinäres

Frauenforschungs-Zentrum (IFF)

Founded in 1980 as a working and research group on women's issues, the IFF is now institutionalized as an academic centre for women's studies at the University of Bielefeld and serves as a nationwide model for this type of institutionalization. Scholars engaged in research and other activities within the IFF come from various departments within the natural sciences, social sciences, humanities, economics, and law.

The University of Bielefeld

The University of Bielefeld combines the best of the German university tradition with innovative research and teaching structures. Established in 1969 as a reform university, its aim was to recover the lost unity of research and teaching in accordance with Humboldt's ideas and, at the same time, to bridge the dividing lines between disciplines.

Life and work at the University of Bielefeld benefit from the unique design of the university building. All departments and institutes are housed under one roof and are located within a short distance of each other. The "centre" of the university building is a large meeting hall which serves as a weather-proof campus and interconnects all meeting rooms. It also has restaurants, shops, a post office, a bank and access to one of Germany's highest rated libraries, as well as other information centres which are open to all attendants. The hall is also an excellent place for exhibitions, musical performances and other cultural events, which we plan to have at the meeting. The university is surrounded by the hills of the Teutoburger Forrest which offers scenic walks. The hotels are located in downtown Bielefeld. A regular bus service connects the university to all the facilities of the city with a ten minute ride.

Getting to Bielefeld

Bielefeld is situated in the north-western part of Germany. It is connected to international airports (Frankfurt, Duesseldorf, Hannover) by excellent express trains which run every hour. The airports of Amsterdam, Hamburg and Bremen are conveniently situated. The nearest airports are Hannover (1 hour) and Duesseldorf (2 hours).

Hotel Accomodation

All reservations have to be made using the reservation card of the Bielefeld tourist board. For students only: We have prebooked a small number of beds (dormitories) at the local youth-hostel at a price of DM 30 per night. To reserve low budget accomodation, contact the local organizing chair (Guenter Kueppers). Please note that all reduced prices can only be guaranteed if reservation is confirmed before June 30, 1996.

Weather

In mid-October the weather in Bielefeld is often sunny and dry, with warm days and cooler

evenings. Average daily temperatures for October are a high of 18 C and a low of 7 C. Lighter clothing, with a sweater or jacket for evenings, should suffice.

Child Care

As is customary for 4S/EASST meetings, we will endeavour to arrange daycare for children aged 5 or under from 8 AM to 5 PM. If you intend to use this service, please contact Petra Ahrweiler (e-mail: petra.ahrweiler@post.uni-bielefeld.de) in order to make an advance reservation.

Further information

For updated information about the conference program (sessions, session organizers, titles, speakers) please see [www](http://www.uni-bielefeld.de/iwt) site: <http://www.uni-bielefeld.de/iwt>. You may also call or email the local organizing committee or program chair.

Special events, tours etc:

The local organizing committee has arranged four special tours for conference participants.

1. Max Weber Tour: Saturday 14:00-19:00; (DM 15,-) Oerlinghausen, a small town near Bielefeld, is not only the birthplace of Marianne Weber - the wife of Max Weber - but, since 1851, has been the domicile and economic basis of the industrial family Weber, from which Max Weber stems and where he spent many holidays between 1893 and 1918.

The Marianne Weber archive is accommodated in an Art Nouveau villa. It contains documents relating to Marianne Weber as a feminist, sociologist, and her husband's biographer. The house, located on the site of the original Weber family's former property, provides an example of the lifestyle of the German upper middle class at the end of 19th century.

2. Lipperland: Friday, 9:00-17:00; (DM 45,-) A tour of the surrounding areas of Bielefeld, including beautiful landscape (Teutoburger forest), old towns of interests (Renaissance architecture typical of the area), and a visit to several places of interest, such as an old farmhouse museum in Detmold, the "Hermannsdenkmal", a monument in memory of the battle between Arminius or "Hermann der Cherusker" and the Roman general Varus, and the site of a unique geological formation (Externsteine).

3. Schlaun: Saturday, 9:00-17:30; (DM 45,-)

This tour follows a trail of the work of one of Germany's most famous Baroque architects, Johann Conrad Schlaun, who built Nordkirchen, the German Versailles. The tour also visits some watercastles, which are typical for the area surrounding Muenster, and ends in Muenster where the old cathedral is one of the most exciting monuments in town.

4. Bethel, Thursday and Friday, 14:00-19:00; (DM 10,--) Founded in 1867, the "von Bodelschwingschen Anstalten Bethel", has become world famous as one of the largest charities of the protestant church in Europe. Today, Bethel is a self-contained little town in Bielefeld, where more than 6,700 ill, physically and socially handicapped people live and work together in an environment designed to provide as normal a daily life as possible. It has its own shops, schools, and even its own money. Bethel has become particularly highly regarded because of its unique "epileptic centre". The tour of Bethel offers an insight into the history of the largest Protestant charity in Europe.

To enable further planning it is necessary to reserve your tour ticket as soon as possible. For this purpose please contact gkueppers@argo.hrz.uni-bielefeld.de

Reception, Banquets etc.

There will be a welcoming reception at the university on October 9, at 7 p.m. On this day the registration office will be open from 2 p.m. until 9 p.m., all the other days from 9 a.m. until 5 p.m.

To attend the conference banquet on Friday evening 11 October, please make your reservation registration form. The price of the banquet is DM 50 which should be paid together with the conference fee. All banquet guests are invited at 7 p.m. to attend a pre-dinner cocktail party which is being hosted by the journal "Social Epistemology". After the banquet, there will be a dance party at the banquet restaurant.

Registration

Member of EASST or 4S: DM 140 (after June 30. 1996 DM 200)

Non-member of EASST or 4S: DM 200 (after June 30. 1996 DM 260)

Student: DM 80 (after June 30. 1996 DM 100)

The registration fee covers the preparation and printing of the program, badges, and an address list of participants. It also covers modest coffee breaks, and the service of public transport within

Bielefeld during the conference. *Please ask for the registration form and send or fax it to Guenter Kueppers.*

Special equipment:

If you need any technical equipment other than standard overhead projectors (e.g. video, computer presentation, slide projector) please address your request to Guenter Kueppers.

Official carrier

The official carrier is Lufthansa. For further information please contact your local Lufthansa office.

Please address any questions concerning the program or the local organizing to:

Wolf Krohn (Program Chair) Institute for Science and Technology Studies University of Bielefeld PF 100 131, D-33501 Bielefeld
Fax: +49-(0)521 106 5844;
Phone: +49-(0)521 106 4665;
e-mail: WKROHN@argo.hrz.uni-bielefeld.de or:
Guenter Kueppers (Local Organizing Chair)
Institute for Science and Technology Studies
University of Bielefeld PF 100 131 33501
Bielefeld Fax: +49-(0)521 106 5844
Phone: +49-(0)521 106 4674 e-mail:
GKUEPPERS@argo.hrz.uni-bielefeld.de

The sessions program begins every day at 8:30 am with Thematic Sessions, which are devoted to investigating the meeting theme "Signatures of Knowledge Societies". Topics introduced in these sessions will also be developed throughout the program in other sessions, workshops and special focus units.

The programme

We apologize that we cannot print the entire programme, owing to a lack of space.

Ten Thematic Sessions are devoted to investigating the meeting theme "Signatures of Knowledge Societies". Topics introduced in these sessions will also be developed throughout the meeting program in other sessions, workshops and special focus units. There will also be 149 regular sessions.

Special Events

For more detailed information please consult the regular session program

Thursday:

- 13.30 Author Meets Critics: Wiebe Bijker: "Bicycles, Bakelites, and Bulbs. Towards a Theory of Sociotechnical Change" (Org: Jane Summerton)
20.15 Panel "Feminist Focus"

Friday:

- 12.30 Feminist Focus Keynote Speaker: Elizabeth Beck-Gernsheim: "The Social Construction of Risks: The Case of Prenatal Diagnosis"
13.30 Author Meets Critics: Niklas Luhmann: "Ecological Communication" (Org.: Loet Leydesdorff)
15.30 Presidential Plenary Session: Relating Nature, Objects and the Social. Challenges of a Knowledge Society (Org.: Karin Knorr-Cetina; Chair Aant Elzinga)

Saturday:

- 13.30 Author Meets Critics: Andrew Pickering: "The Practice of Mangle" (Org.: Ted Schatzki)
15.30 Exhibition: Reconstructing Historical Experiments (Org.: Falk Riess) 17.15
17.30-18.30 Keynote Speaker: Niklas Luhmann
17.30-19.15 Performance: The Sound of Plasma Physics (Andor Carius)
20.15 "Twenty Years On: 1976-2016: 4S and the SSK Strong Programme" (Organizer and Chair: David Edge)

Business Meetings, Interest Groups, etc.

Wednesday:

- 14.00-17.00 4S Council Meeting I
17.00-19.00 EASST Council Meeting

Thursday:

- 12.30-13.30 STS Centers meet Easst Council
12.30-13.30 Editorial Board Meeting: *Social Studies of Science*

Friday:

- 12.30-13.30 4S Business Meeting

- 12.30-13.30 GWTF Business Meeting

Saturday:

- 11.00-12.00 Easst Council Meeting II
12.30-13.30 Easst Business Meeting
12.30-13.30 Editorial Board Meeting: *Science, Technology, and Human Values*
12.30-13.30 Feminist Caucus

Banquets, Receptions

Wednesday:

- 19.00 Opening and Reception by the President of the University of Bielefeld and the Mayor of the City of Bielefeld

Friday:

- 19.00 Reception: 10th Anniversary of *Social Epistemology*, sponsored by Taylor and Francis
19.30 Banquet and dance party