ABSTRACTS

INTERNATIONAL CONFERENCE

GOVERNING FUTURES

IMAGINING, NEGOTIATING & TAMING EMERGING TECHNOSCIENCES

22-24 September 2011

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KEYNOTE PRESENTATIONS

Welcome Address
Geographies of Technoscientific Futures: Anticipatory Work, Emerging Technologies and Technopolitical Cultures

Ulrike Felt (U Vienna, AT)
Thursday, 22 September 2011, 13:00 – 14:00, Main Hall. Albert Schweitzer Haus

Societal investment into developing methods and techniques of anticipating futures is nothing new. Yet, what is characteristic for the past decades is a growing entanglement of emerging technosciences with both visions of specific societal futures and the ways these are, and can be, imagined in a legitimate way. Simultaneously, we can observe a change in practices how science, society and policy makers try to imagine, anticipate, colonize and tame futures, which becomes visible in a proliferation of contexts and modes of anticipatory work.

While these observations open a huge area of reflection, this presentation will specifically focus on the exploration of the very understanding of the notion "future" and delves into anticipatory work in its relation to technopolitical cultures. Thus, I will move away from seeing futures mainly related to "placeless" and "universal" technoscientific developments – as we often find it in policy discourses. Rather, I will investigate the importance of specific locally/culturally framed future making practices. The focus of my attention thus shifts from the future as "temporally stable object" to be constituted, followed and continually (re)performed, to the processes of doing and undoing futures – thus to the activities of *futuring* and the sites where these happen.

Hence, using the notion of "geographies of technoscientific futures", I want to attract attention to central elements, processes and sites in making, distributing, but also excluding certain kinds of futures. Specifically, "geographies" points at ...

(1) the proliferation of sites and moments where futures are being produced and consumed and how these are (dis)connected;
(2) the different understandings of the very notion of "future" – that is, what is to be mapped?
(3) the power involved in mapping out futures as well as making these maps travel and become dominant;
(4) the importance of the information and values which get acknowledged in such mapping exercises;
(5) the role of "newness" in these (re)mapping exercises when emerging technologies enter the scene; and
(6) the role of places and spaces as well as issues of centre and periphery.

Using material such as interviews with researchers and policy makers, discussion groups with citizens and media articles,* I will offer an analysis of the Austrian context as an exemplary case to look into more local anticipatory practices, structural regularities and specific habitual ways of addressing future(s) and thus hint at how deeply technopolitical cultures matter. I will close by speculating about the power relations involved in such geographies of technoscientific futures.

* The data were gathered in a larger research project "Making Futures Present: On the Co-production of Nano and Society in the Austrian context" funded by the Austrian Research Fund (FWF).

Domain of Faith: The Future as Fate, Fortune, Fiction and Fact

Barbara Adam (Cardiff U, UK)

Thursday, 22 September 2011, 16:30 – 17:30, Main Hall. Albert Schweitzer Haus

The future used to belong to god(s). Today we assume the future to be ours to make, shape and take. This brings with it consequences. The social sciences are best placed to identify these. But are they? As a science they are charged to deal with facts. What kind of knowledge, evidence and methodology could they draw on to access the future, a domain of faith that becomes factual reality only once it materialises in the present? A historical perspective on approaches to the future provides clues that help to answer this question and show the enormity of the task. Fate, fortune, fiction and fact are the key concepts chosen to tell this story and to map contradictions, paradoxes and conflicts that arise with each new phase of knowledge and practice. The presentation seeks to identify the social science conundrum together with some openings for change that are necessary for social theory and research methodology to become appropriate to the contemporary production of socio-technical futures that outlast their creators by millennia.

Barbara Adam is professor of sociology at Cardiff University and is best known for her path-breaking work on time and social theory. She has applied her temporal perspective to the breadth of social life and its institutions. As scholar and editor she has set the global agenda on social time and has written extensively on the subject of time and futures. Two of her five research monographs have been awarded book prizes. She is founder editor of the journal *Time & Society*.

www.cardiff.ac.uk/people/adamb
www.cardiff.ac.uk/socsi/futures

Deliberate Futures: Broadening Out & Opening Up the Politics of the Possible

ANDY STIRLING (Sussex U, UK)

Friday, 23 September 2011, 9:00 – 10:00, Main Hall. Albert Schweitzer Haus

The dynamics of knowledge and innovation are a focus of attention in many different academic traditions and perspectives concerned with understanding societies, histories, economies, polities and philosophies. Arguably, there exists no greater general depth and sophistication on this topic than in STS. But –despite inspirational insights – this community holds no monopoly of appreciation of the general picture. And in some ways, it may display certain blinkers. These might helpfully be overcome, where it is recognised, that – despite crucial but often over-emphasised contrasts – there actually exists significant common ground in contemporary understandings of the natures of scientific and technological change. This is all the more remarkable for spanning ostensibly deep divides between diverse epistemic, disciplinary and political cultures.

A key feature in this contemporary common ground of understanding, is that the orientation of any particular pathway in the evolution of a specific field of knowledge or innovation is under-determined by material or cognitive necessities. It is a matter of various shades of agreement, then, that key influences are also exerted by diverse processes of contingency, path-dependency, co-production and channelling by power. So, not all that is technically achievable, economically feasible or socially viable is actually historically realisable. Though conditioning aims and intentions are typically tacit and distributed, the drivers of unfolding human futures are – in a very real sense – socially deliberate.

Give this key characteristic of our knowledges on such a topical matter, it is remarkable that the globally prevailing 'Enlightenment' notions of progress embodied in 'knowledge society' discourse, continue seriously to neglect normative and ontological issues around the property of 'direction' in processes of change in knowledge and innovation. Mainstream discourses and high level policy making focus instead almost exclusively on properties of scale, pace, productivity, efficiency and leadership in what typically (and tacitly) remain as presumed-singular orientations for change in any specific area. This presents a remarkable disjuncture between current substantive understandings of the actual dynamics of knowledge and innovation, and the ways in which these are appreciated in wider politics and society.

This paper will examine the general implications of this disjuncture for contemporary policy making bearing on the exercise of more explicitly deliberate social agency over the orientations of possible futures. Drawing heavily on insights in STS, it will explore in some detail, the institutional and discursive dynamics of closure in regulatory understandings of scientific and technological 'risk'. It will argue that these serve to compound neglect of attention to contrasting orientations for progress in knowledge and innovation. In response, it will show how there exist a variety of methods, practices, discourses and institutional designs that can assist the 'broadening out' and 'opening up' of social appreciations of alternative futures. Where STS maintains an (ironically, reductive and unreflexive) narrative antipathy to quantitative or specialist appraisal, there is a danger that opportunities may be missed for potentially transformative provocation and catalysis.

Operating in many different modes and levels, it will be proposed that a focus on such 'broadening out' and 'opening up' can help foster more effective 'learning ecologies' in the wider governance of knowledge and innovation. Social reflexivity in this regard becomes clear as a distributed, relational process, not a quality on the part of individual social actors (or communities). Only by stepping over the barricades in this way, might we hope to transcend overblown, set-piece – and highly politicised – dichotomies between rigour and legitimacy, analysis and deliberation, calculation and narrative, opportunism and precaution, experts and publics, trust and dissent. The result might be a more vibrant, mature, reflexive – and genuinely democratic – politics around alternative directions for progress.

Dealing with the Future: From Modernist TA to Reflexively Modern TA

Arie Rip (U Twente, NL)

Friday, 23 September 2011, 13:00 – 14:00, Main Hall. Albert Schweitzer Haus

In the 1970s, the professionalization of TA in the public domain was shaped by its orientation towards support of policy making and parliamentary debate. What has been called second-generation TA, visible since the (early) 1990s, responded (sometimes reluctantly) to the overall move in Western societies to experiment with participation and deliberation. TA remained professionalized, but with a broader mix of disciplines – including ethics. As Delvenne (2010) has shown for Parliamentary TA Offices, recently there is a further move towards intellectual reflection about new technologies, and to infotainment. The boundaries of TA become blurred. This might be positioned as an instance of what Ulrich Beck calls 'reflexive modernization'. This is an umbrella term, however, and one has to look more closely at what is happening. Interestingly, TA is also moving away from its policy focus by attempting to insert itself in innovation dynamics – at an early stage, and fuelled by notions of responsible development of new science and technology. In a sense, TA exemplifies how we deal with the present by a detour through the future. The future of TA itself will include both professionalized TA (a third generation?), and a broader range of activities playing with anticipation, whether labelled as TA or not.

Futures Embedded in Technoscientific Objects

Bernadette Bensaude-Vincent (U Paris I, FR)
Friday, 23 September 2011, 16:30 – 17:30, Main Hall. Albert Schweitzer Haus

Forward thinking seems to be a major feature of the technoscientific style developed in Nanotechnology and Biotechnology. Proposals and reports inevitably start with promising solutions to issues of all kinds and conclude with recommendations of foresight, and prospective exercises. This concern with the future is usually viewed as an engagement in responsible innovation.

While in the order of discourse, forward thinking prompts a massive use of linguistic prefixes such as «fore «pre» or «pro», how does it translate in the order of things, in the artefacts themselves?

This paper will focus on how the future can be embedded in the design of nano-objects. Two different strategies will be distinguished that can be roughly labelled as 'embedded closed future' and 'embedded open futures'.

First I will instantiate these two strategies by presenting the design of two nano-artefacts: targeted drugs, and induced totipotent stem-cells.

In a second step each strategy will be reflected upon from a philosophical perspective by looking more closely at their treatment of the future and at their underlying assumptions about nature and artefact.

Finally I will conclude with more general, critical comments on the respective approaches to technology.

Anticipatory Governance of Science and Technology: Some Critical Reflections on the State-of-the-Art

Daniel Barben (RWTH Aachen, DE)

Saturday, 24 September 2011, 9:00 – 10:00, Main Hall. Albert Schweitzer Haus

Anticipatory governance" has increasingly gained recognition as a concept that provides some compelling orientations regarding the assessment and shaping of science and technology in society. While building on ideas from different research traditions, the proponents of anticipatory governance claim to have achieved significant progress over previous or competing approaches to dealing with some challenging uncertainties related to future science and technology. In this presentation, I will review the more recent notion of anticipatory governance with regard to not only its strengths but also its limitations, thus hoping to push forward the debate.

First, I will put into context the notion of anticipatory governance and review its defining elements, paying particular attention to issues concerning technology assessment foresight, and governance.

Second, I will elaborate on the conceptual reach of anticipatory governance, asking what falls into its scope and what does not, especially in light of the fact that anticipatory governance has been articulated with regard to new settings of developing emerging technologies.

Third, aiming to overcome some of the limitations discussed and to better account for the configuration and dynamics of science and technology in society, I will suggest extending the notion of anticipatory governance in some significant fashion. My overall argument will be that while the conceptualization of anticipatory governance to date has succeeded in avoiding some of the common pitfalls of future-related claims to knowledge and action, the institutional scope is still rather limited and the continuing occupation with new science and technology, though important, is indicative of an insufficient account of societal challenges.

PARALLEL SESSIONS

Parallel Sessions
Thursday, September 22, 2011
14:30–16:00

Session: **Moral Governance of the Future** Main Hall

Ethicisation and Visions in Discourse on Emerging Technosciences

A. Ferrari (Karlsruhe Institute of Technology, DE), F. Mali, B. Groboljsek, T. Pustovrh (University of Ljubljana, SI), C. Coenen (Karlsruhe Institute of Technology, DE)

The development of emerging technologies in Europe appears to be strongly influenced by expert and 'stakeholder' discourse on their ethical, social, legal and political aspects (more commonly known as ethical, legal and societal aspects, or ELSA). In recent years, this discourse itself has become a subject of systematic scholarly analysis and political discussions. In a self-reflexive turn, the practices and intellectual characteristics of ELSA activities are often scrutinised by scholars and criticised by 'stakeholders' engaged in these activities. Arguably, one of the characteristic features of ELSA discourse on emerging technologies is the trend towards 'ethicising' issues of new and emerging technologies. Critics claim that this 'ethicisation' is a means of neutralising political issues (i.e. a depoliticisation), an introduction of norms outside the traditional process of law and policy making, and a way of closing down democratic discourse by institutionalising ethical expertise (Bogner 2010; Felt et al., 2007; Kaiser et al. 2010). Another typical feature of ELSA discourse on emerging technologies appears to be the renaissance of futuristic visions which are used to popularise and negotiate technoscientific projects in society (Grunwald 2011).

In our paper, we discuss the role of ethical expertise in discourse on emerging technologies in Europe, focusing on the abovementioned issues (viz. the trend of ethicisation and the role of visions) with a view to disentangling the various modes of knowledge production that are relevant in this context. Our first step is to examine the material, institutional foundation upon which the tendency towards ethicisation is based, that is to say the institutions in Europe which give advice – to policy makers, above all – on ethically contentious technoscientific developments. We then focus particularly on the role that is played by such institutions in the creation and dissemination of expectations and hype concerning 'technoscience futures'. Focusing on the topic of 'cognitive enhancement', we also discuss which ethical questions (besides questions of acceptability and good life) are perceived in discourse as the most relevant and how future visions are construed and 'normalised', and explore some epistemic problems connected with the discussed scientific evidence for the selected techno-scientific developments. By taking into account some political and social context of the relevant visions and expectations, we aim to analyse the process of ethicisation from a comprehensive perspective. Against the background of our empirical analysis of pertinent activities conducted by political advisory institutions, we also analyse whether the creation of visions, or even hype, in the opinions and reports of these institutions is linked to specific aspects of emerging technologies. Finally, we discuss more generally the pitfalls and merits of the trend towards ethicisation and of the work of these institutions in visionary discourse on emerging technologies, also with a special focus on aspects of public acceptance of the relevant technoscientific developments.

Materials & Methods:

Our paper is based on research conducted in the European FP7 project EPOCH (http://epochproject.com/). Our empirical research includes, inter alia, a content analysis of publicly available documents of policy advice institutions, the use of a questionnaire to collect data about the work of these institutions, and a number of semi-structured interviews with representatives of the institutions. The analysis will also be based on extensive literature studies conducted in EPOCH on ethical and governance aspects of emerging technologies.

Implicit Futures: Research Ethics Review and Capacity Building as Practices of Progress and Protection

R. Douglas-Jones (Durham U, UK)

This paper examines the overlapping of two future-based activities: capacity building and ethical review of biomedical research. Capacity building is a concept full of promise, marking a horizon of possibilities. Ethical review promises to protect, and the objects of its protection vary from individual human subjects to 'society' at large. In this paper, I examine the form that capacity building in ethical review takes in the Asia and Pacific region, offering a critical analysis of the futures implicit in capacity building's promises. This I complement with the varied futures which render the act of ethical review a fraught and yet inevitable part of biomedical research.

The last decade has seen the 'offshoring' of clinical trials, and growth in biomedical research conducted in developing countries and emerging markets. Disparities between sponsor and host countries have led to declarations that ethical review of research should be conducted at 'both ends', declarations which have in turn led to calls for capacity building. My doctoral research has examined what it means to build the capacity for ethical review in the Asia and Pacific region, through following an NGO's activities for 15 months. Drawing on this material, I open this paper with a workshop conducted in Sri Lanka in 2009, an ethnographic moment in which we find the ethics review committees, viewed as a way of governing research, particularly in the absence of legislation and sanctions, taking a key role. We see how ethical review becomes not only a way through which implications of research are imagined, but an engine of anticipation in the present.

The paper moves to consider how events similar to this workshop elsewhere in the NGO's region reconfigure the handling of and governance over future possibilities.

Combining and comparing analyses from Thailand, Taiwan, the Philippines and China I show how biomedical research in each of these countries takes different forms, and outline how the organisation that seeks to build capacity handles the differences between them. I argue that difference handling is both a deliberate and incidental process. It is deliberate in that the NGO plays on volunteering and strengths of wealthier countries to form the cooperative ethos of its network. What happens alongside - the incidental - is, I argue, inherent in process of taking the standardised form of the committee across borders. While attempts to standardise the conduct of ethical review by the NGO have led to increased crossing of concepts across disciplinary borders, with borrowed terms from law (eg. due diligence, conflict of interest) and the 'templating' of management and measurement practices, we also see creative elaborations around these forms.
Often possessed of the ability to foreclose futures alternative to those it offers, capacity building relies on an image, enrolling expectations of progress and advance. Expectations of standardisation and reliability in science are being transferred to not only ethical conduct but the process of the review - an act which takes as its object possible futures. This paper asks what happens to differences in approach, expectation and hopes under such circumstances.

Materials & Methods:
The research was conducted following anthropologically informed participant observation and semi-structured interviews. It involved immersive fieldwork in a network of capacity builders in research ethics for periods of . This required me to attend workshops, planning sessions, informal meetings, trainings, surveys, audits and related events. Grey literature was widely consulted, and in analysis, fieldnotes and interviews transcribed.

Session: **Multiple Food Futures** Chapel

'Making a Banana out of an Apple': How Citizens Project Nanotechnology into the Future of Food

S. Schumann (U Vienna, AT)

The British food standards agency magazine BITE recently titled that "Nanotechnology is poised to transform the future of food. Should we be welcoming or worried?" These expectations of nano having the potential to radically change food in the future can be found in various other media articles, policy documents and industry comments. However, "nanofood" names a food technology that itself rather represents a "future abstraction" (Brown et al. 2005) than a material and discursive reality. At the moment, altough few products have been on the market for years, the rhetoric circulates around more or less possible future applications, such as interactive food that is able to change flavour or nutritional properties according to consumer needs or tastes (e.g. the nano milkshake that contains innumerable nanocapsules with the flavour of banana, strawberry etc. only released when triggered by the consumer in a certain way). These future visions of nanofood applications are certainly not decoupled from present and past. They always comprise a projection of present societal discourses and practices such as normative debates about "proper" nutrition, the entanglement of food with health, beauty and lifestyle, the global supply of food as well as eating and cooking habits. But nanofood visions have also inscribed experiences with former technological developments in the field of food and nutrition and their societal acceptance or refusal.
In the Austrian context, neither the notion of nanofood is widely known in the public, nor is there any controversial debate about its possible applications. Thus, it represents an interesting case to understand how Austrian citizens' integrate this highly technoscientific, unfamiliar and future-oriented emerging technology into the field of food, representing a deeply culturally and historically established everyday product and practice.
The focus of this paper is in particular on how citizens' project nano into their future imaginations of food, society and technological development as well as on the resources they draw upon to do this. Based primarily on a detailed analysis of a group discussion with Austrian citizens on nanofood, I seek to understand how they envision, create and discuss different kinds of "futures" (personal, societal, open, predetermined, utopian, dystopian etc.) and how the future related rhetoric used to establish this technological development as well as futuristic food-applications possible through the use of nanotechnology are negotiated in the group setting. I conclude with discussing the kinds of agency they see for themselves but also for other actors (policy, law etc.) to govern sociotechnical futures.

Materials & Methods:
Qualitative analysis of a 4 hour group discussion on nanofood and follow up interviews with selected participants.

Contending Imaginaries of the Agro-Food System in Europe's Knowledge-Based Bio-Economy

L. Levidow (Open U, UK)

The agro-food system has become a contentious arena for global issues of sustainable development and food security. The scenario of 9 billion people to be fed by the year 2050, alongside resource constraints and competing demands for land use, has been widely cited as an imperative for eco-efficiency improvements in agricultural production. In the EU those issues have been taken up as 'grand societal challenges' for a Knowledge-Based Bio-Economy (KBBE), as a new framework for Europe to achieve sustainable development and contribute to global food security. The KBBE plays the role of a master narrative; it poses societal problems in ways that require technoscientific solutions and various supportive policies, while pre-empting the definition of those problems (Felt et al., 2007).
However, the KBBE narrative has generated divergent problem-definitions, solutions and policy agendas to realize them. These can be interpreted as contending imaginaries – visions of a desirable, feasible future society. Each elaborates an economic imaginary, i.e. visions of a future economic community which has common interests (Jessop, 2005), linked with a socio-technical imaginary (Jasanoff and Kim, 2009).
Each imaginary favours a different diagnosis of unsustainable agriculture and eco-efficient remedies; each gives different

meanings to the same key terms – knowledge, biological resources and economy, eco-efficiency, etc. In the dominant imaginary, Life Sciences will provide more efficient inputs and processes to convert renewable resources for various uses (food, feed and energy), thus avoiding conflicts over land use, while also enhancing European economic competitiveness for advantage in global value chains. In the margins, a rival imaginary links agroecology and quality products with shorter food supply chains; farmers can substitute their skills and knowledge for external inputs, while also gaining more from the value that they add.

With those imaginaries, rival stakeholder networks attempt to convince key actors who can provide or mobilise the resources necessary to realise a specific future (cf. Fairclough, 2010). These networks seek to influence R&D agendas, especially the EU's Framework Programme 7 on Food, Agriculture, Fisheries and Biotechnology (FAFB). This programme has generally favoured Life Sciences for more 'efficient' inputs – but has increasingly promoted agroecological research. These divergent agendas coexist within an overall R&D programme, while overtly conflicting in other policy arenas, e.g. the post-2013 CAP, 'green' procurement, land use and IPRs.

Technoscientific Future of Food: Performative Prototypes and Design Scenario from Fork to Farm to Phenotype

D. Kera (National U Singapore, SG), M. Tuters (U Amsterdam, NL)

From supply chains to metabolic exchanges eating involves political, technological and social acts defined by power relations between various systems. American fast food soliloquies, communal and family organised hawker style eating in Singapore, European restaurant enclaves for small elites mirror the various political, technological and economic systems which we are rethinking through our design work. By creating future niche communities organized around novel food practices, hacked and DIY tools we can understand today's food politics. We are already witnessing various "diet-tribes" and even "food-cults" forming around various applications and tools ranging from the DIY sous-vide appliances used by Paleo Dieters to geo-locative foraging services like Fallen Fruit for "freegans" to the crowd-sourced bio-data visualizations of nutri-genomics enthusiasts. In our research we speculate on the future neo-tribal societies related to emergent technologies which offer extreme relationships with nature. Novel mobile, locative and Internet interfaces are working with "food interaction" across scales trying to either enhance taste through knowledge of traditional geographical and historical provenance, or to deconstruct taste, the dish and the eating body to its molecular and chemical components. While seemingly philosophically opposed, both slow food and functional food approaches face similar design challenges of connecting data (provenance, molecules) with sensations (taste) and redefining the social and individual experience of searching for food, eating and dining. The concepts of flows, traces and scales are design elements which we want to explore in our research. In order to understand the various aspects of food interaction involving human and non-human actors across these scales we conducted two design probes (FoodMatch, 23andme dinner) leading to "gastronomical interfaces". To eat today simply involves tracing and understanding where food comes from and how it interacts with the larger economic and ecological systems as well as with our body. We call them gastronomical interfaces because they rethink in a more radical way what Brillant-Savarin envisioned in his famous work "Physiology of Taste". There he explicitly defines the difference between eating and feeding, beasts and men, in terms of "knowing" where the food comes from, how it is cooked and how to enjoy it in the company of other men. The connection between food, scientific data, provenance and styles of dining made possible by these novel interfaces is an explication of his famous II. aphorism that states that while beasts feed and men eat only the "man of intellect knows how to eat" .

Materials & Methods:

We conducted two design (cultural) probes in which we explore certain extreme versions of cosmopolitics of food, human and non-human interaction and metabolism formed around food. In this sense our approach is close to what Dunn & Ruby define as "design noir" probing extreme scenarios of future food cultures. We believe that critical design and design noir works in a similar way to James Joyce's "Finnegans Wake" mixing myth and science, pop culture and machines. The prototypes we created connect discourses, rituals and objects related to food, taste and pleasure. These performative and evocative prototypes explore the chemical, discursive and social affinities and associations between words, things and social customs. Prototypes become tools for provoking collective and individual associations, fears and hopes, balancing between apocalyptic and prophetic visions. The low fidelity of these material, discursive but also social experiments brings high connectivity in terms of the potential assemblages they create. Design fiction thus become a tool for experimental collectives (cosmopolitics) between humans and non-humans in what Bruno Latour envisions as a Parliament of Things. Eating here represent the ultimate form of "cosmopolitics".

Websites of the projects:
http://www.secretcooks.org
http://www.foodmatch.org

Session: Scientists' Imaginations of the Future — Edu4you SR2

When is Nanotechnology? Constructing the Temporal Dimensions of a New Discipline

E. York (U California, San Diego, US)

This paper will discuss the production of technoscientific futures in the nanoengineering classroom in relation to the following questions:

1) How do nanoengineers imagine the future?

2) How do these futures manifest in the classroom (how are they taught to a new generation of nanoengineers)?

3) What is the relationship between the temporal signature of nanoengineering and the formation of nanoengineering as a new, institutionalized discipline?

Discussions about nanotechnology usually begin with definitions, with attempts to explain *what* nanotechnology is. This talk

will not begin with the what, but will attempt to arrive there by looking at the *when* of nanotechnology. Following an STS tradition of treating 'nanotechnology' as a discursive construction that can't be defined simply in terms of the size of nanoparticles, I'm interested in exploring how pasts, presents, and futures, have been deployed in the development of nanoengineering as a new disciplinary formation.

I'll draw from a case study in which I've observed a newly formed Department of Nanoengineering at a prominent research engineering school in a public university administer its brand new undergraduate nanoengineering major (established in 2010). Over the 2010-11 academic year, I observed nanoengineering courses; interviewed students, faculty, staff, and administrators; administered questionnaires to new nanoengineering students; analyzed material artifacts that intersected with the curriculum; and observed a nanoengineering lab.

I'll discuss the ways that temporal narratives are operating in the department and through the curriculum to help define nanoengineering as a unique and distinct discipline. I will argue that origin stories (pasts), narratives and practices of current research (presents), and imaginary and promissory discourse (futures) are critical to the construction of nanoengineering as a new discipline, and operate to create a temporal signature of nanoengineering that is paradoxical, pragmatic, and central to what nanotechnology is. In doing so, I will discuss the role of other-worldly authority, the ways that nanoengineering positions itself in relation to cosmic history, the ways that its origin stories contextualize its futures, the ways that its futures constitute a temporal orientation and worldview that is taught in the classroom to create a the 'nanoengineer' identity, and the ways that material artifacts becomes sites for performing the future.

Materials & Methods:

The University of California, San Diego, established its Department of Nanoengineering in 2007, and its undergraduate nanoengineering major in the 2010-11 academic year. My study consists of observing undergraduate nanoengineering classes, interviewing students and faculty, administering questionnaires to the students, observing department events (such as new student Admit day), and engaging in textual analysis of texts that have guided the creation of the curriculum as well as texts used in the curriculum. My study will also have a longitudinal component, as I will be tracking and following up with students as they proceed through the major, but as the 2010-11 academic year is the first year this program has been offered, I do not yet have this data.

My paper will draw from empirical data from the 2010-11 academic year, as well as literature in nanoethics, public engagement, and the philosophy of technology.

Sociological Consideration of 'Problematic Situations' Related to the 'Responsible Development' of Nanoscience and Nanotechnology

C. Shelley-Egan (U Twente, NL)

The development of a new and emerging science and technology (NEST) such as nanotechnology poses a number of challenges because it introduces novelty and uncertainty. Responses will initially take the form of "tried and tested" approaches to previous new technologies. At the institutional/collective level, "organized irresponsibility" is an effect of standard responses to novelty because the explicit and implicit responsibilities of the past may not be adequate in the new situation. In nanotechnology, there is recognition of the problem of 'organising' responsibilities, for example, in discourse on the 'responsible development' of nanotechnologies. Although 'responsible development' is not operationalised and there are no specific, dedicated activities associated with it, actors nonetheless feel the pressure to respond. Scientists and industrialists are particularly interesting in this respect because they are co-constructing the novelty and thus are part of the circumstance that leads to "organized irresponsibility".

The aim of my PhD dissertation is to map the responses, particularly the ethical stances, of scientists and industrialists in relation to the challenge of the novelty and uncertainty of nanotechnology and to evaluate their responses with regard to opportunities and possibilities for responses which go beyond just adding to "organized irresponsibility". While this can be taken up as a straightforward sociological undertaking of mapping responses and trying to understand them, there is a normative concern as well: how can a social scientist contribute to better responses to the problematic situation he or she perceives? This normative concern is addressed through a sociological extension of the pragmatist ethics of American philosopher John Dewey, which couples Dewey's notions of 'problematic situation' and 'reflective inquiry' with a multi-level co-evolutionary perspective of socio-technical change in society (Rip & Kemp, 1998; Geels, 2005).

The picture which emerges from the empirical analysis is that well-intentioned professionals are at a loss as to how best to respond to the 'problematic situation' of novelty and uncertainty of nanotechnology and particularly the pressure for responsible development. This way of summarising the situation draws on Dewey's notion of a 'problematic situation' that actors encounter and may recognise. Dewey also emphasises the importance of 'reflective inquiry' in addressing the 'problematic situation'. However, once one recognises that micro-level 'reflective inquiry' will always be embedded in meso-and macro-level settings and their dynamics, it is no longer easy to identify what is to count as 'reflective inquiry'.

This is where the social scientist can contribute. A social scientist can contribute insights about patterns and possibilities in processes at the collective level which are not easy for actors (scientists and industrialists) to obtain. One has to understand both the particular context in which actors are embedded, along with co-evolution at the collective level of institutions and sectors. This sociological understanding of problematic situations related to the 'responsible development' of nanoscience and nanotechnology, combined with the multi-level approach, facilitates the identification of building blocks for a more adequate and longer-term response to problematic situations, which takes into account overall dynamics and the possibilities of modulating them (at different levels).

Materials & Methods:

This research pursues a pragmatist ethics approach, combined with a multi-level co-evolutionary perspective of socio-technical change in society.

Semi-structured interviews - informed by theoretical and empirical expectations of the ethical perspectives of actors - were the primary form of data collection. In addition, document analysis, observation during meetings and a small focus group exercise were carried out. Informal discourse analysis was used to interpret the data.

Understanding the Talk of Scientific Experts on Genomics and Common Disease Research

L. Bitsch, H. te Molder (U Twente, NL)

Scientific experts are important actors in shaping emerging technoscientific practices. Even in the early stages of the innovation process, they will not only produce new knowledge, but will also envisage a future world, in which this knowledge may become part of novel societal practices (Kay 1998; Wynne 2005). In assessing and promoting the future potential of their innovation they work from a concentric perspective. In this perspective the developing innovation takes centre stage as the surrounding world turns into an obstacle to be overcome (Garud and Ahlstrom 1997). The eventual material shape and embedding of the emerging innovation is unknown, and much preparatory work is done through the construction of promises and expectations to the future (Van Lente 1993; Van Lente and Rip 1998; Brown et al. 2000; Borup et al. 2006). Scientific experts have been encouraged to engage with publics in order to improve sociotechnical innovation processes, and a number of different models for engagement exist. The rationale behind such processes of 'bottom-up' governance being that they will lead to a democratisation of innovation processes, and in the end improved outcomes. A number of repertoires have been found to guide the way scientific experts talk about scientific development and the public (Rip 2006; Davies 2008). Examples are the wow-yuck pattern; that a moment of disenchantment will necessarily follow with the introduction of new technological options, or deficit models of public understandings of science; that resistance to new technology is caused by people's inability to understand technoscientific developments.

We add to these findings by asking how to understand scientific experts talk of emerging technoscientific developments as social actions performed as part of their everyday life. In particular, we focus on genomics and research on common disease as an area characterised by uncertainty as well as controversy on its contribution to future technoscientific practices. The attention to social actions performed through talk, brings out the interactional goals achieved by scientific experts in portraying genomics and publics in certain ways. Especially, we show how scientists achieve specific roles and responsibilities in this emerging innovation trajectory by drawing on repertoires of 'genomics (science) as progress', and 'people as unable to understand complex information'. In the case of the former a need to justify research on common disease using genomics is avoided, while in the latter the position of healthcare professionals as gatekeepers of information is defended. Bringing out these interactive goals is important as they guide the kind of innovations which can be imagined, as well as the communicative processes between scientific experts and the public. Specifically for genomics and common disease research, expectations of a revolution in healthcare approaches have been repeatedly voiced. Our research indicates however, that instead of leading to new practices and division of roles, scientific experts discursively reconstruct traditional practices and roles. That is, science as an unquestionable good, and people as passive recipients in need of increased surveillance and guidance for their own good.

Materials & Methods:

The findings presented result from 10 one-hour open-ended interviews with scientists in the Netherlands and the US. Four main topics were used to structure the interviews; important developments in research in the last 10-15 years, current challenges for research, perspectives on future developments and thoughts on future contribution of research to clinical practice. The analysis is based on a discourse analytical approach. In getting at the interactional goals of the interviewees, analysis follows three main principles, 1) variability: moments when different versions of the same phenomena are constructed signals different interactional goal, 2) the rhetoric nature of the talk: in order to understand for what purpose a specific version is constructed, the analyst considers what alternative version of reality is resisted in the given description, 3) participants uptake of the interviewer's talk: how do the interviewees treat the talk of the interviewer. What parts are made relevant by the interviewee, and what interactional goals does it serve.

Parallel Sessions
Friday, September 23, 2011
10:30–12:00

Session: Connecting Pasts and Futures — Main Hall

Working on Memory for Anticipating the Future of Nuclear Waste

L. Raineau-Facchini, S. Poirot-Delpech (U Paris 1, FR)

Nuclear energy emerged out of the post Second World War credo in progress through technological innovation. Nowadays it is presented as an adequate response to limited fossil energy and to global warming. However, nuclear waste tempers this optimistic view and generates anxieties about the future. Ultimate nuclear waste products can neither be recycled in energy production nor be released in nature because of their dangerous radioactivity rates. How to anticipate the distant future over the course of millennia?

Based on the French case our talk will point to a paradox of its strategy for nuclear waste storage. The French choice of deep geological disposal is based on two reasons. First, it is impossible to rely on institutions given the long radioactive period of nuclear waste products. Second, stable geological soils are considered provide safer and more durable confinement solutions than technological treatment or containers. Given the limited capacities of societies (institutions) and artifacts (technology) to operate on the long term, nature (geological time) appears as the most reliable actor to deal with nuclear waste in the next millennia.

This strategy raises a vexing issue: How will future generations know about the danger lying underground in the absence of permanent institutions? They might handle or even use them out of ignorance or malevolence. The solution of deep geological disposal thus raises new problems: How to transmit the memory of the disposal? Can we build tomorrow's memory? And how can we imagine and predict the way people will remember our choices in the future, knowing that we live in a changing world? It seems that, whatever "solution" is adopted for nuclear waste, it will have to connect the anticipation of the future with memory.

Using their Analogical Imagination: How Citizens Envision and Debate Nanotechnology Governance in Austria

C. Schwarz (U Vienna, AT)

In recent years the governance of emerging technosciences has entered a new era, in which publics are understood as relevant stakeholders in deliberating about the governance of new technoscientific developments such as nanotechnology. Future-oriented tools and narratives such as scenarios, anticipated applications or science fiction are increasingly employed to stimulate public engagement and debates on nanotechnology's potential ethical, social and legal implications at such an early stage. Yet at the same time, it is also fundamental not to lose sight of how the past influences citizens' perspectives and how they build their position towards nanotechnology in the present by connecting retrospective and prospective thinking.

In my presentation, I argue that analogical imagination, which describes the ability to compare and connect past experiences and knowledge with new phenomena, is central for opinion formation and anticipation processes in public engagement settings on new and emerging technosciences. By using their analogical imagination, citizens order nanotechnology into pre-existing categories, connect it with familiar cases and thus try to envision its potential trajectories and consequences. We hence need to conceptualize analogies as constructions that integrate retro- und prospection and hence are important resources for anticipatory processes. Exploring how analogical imagination is expressed in analogical discourse helps us comprehend not only which references are drawn upon but also how they influence the assessment of nanotechnology.

Building on a detailed analysis of analogical discourse in four discussion groups with Austrian citizens on different nanotechnological fields, the presented paper discusses which analogies are constructed and negotiated to imagine nanotechnology governance in Austria. It explores how arguments and (dis)analogies are developed, (con)tested or resisted in the course of debate and how particular socio-cultural resources and argumentative strategies influence the way citizens anticipate possible modes of governance in the Austrian context. A specific focus will be on the role of the GMO analogy in citizens' discourse as well as how the analogies which citizens create vary among different application contexts such as medicine, food, information and communication technologies and consumer products. In the presentation, I will also critically reflect the general role of analogies in debates on emerging technosciences—their potential and limitations—and propose some practical recommendations for how to stimulate and guide citizens' analogical imagination in public engagement settings.

Materials & Methods:

The presentation draws on material from four discussion workshops with Austrian citizens that were carried out in the research project "Making Futures Present: The Co-Production of Nano and Society in the Austrian Context", which is currently running at the Department of Social Studies of Science, University of Vienna. It applies a discourse-analytic approach to explore citizens' analogical discourse in these participatory settings.

Neuroscience in the Media: Relationships between Society, Neuroscientific Research and Technoscientific Futures

J. Allgaier (Research Center Juelich, DE)

Public discourses on neuroscience mediate the relationship between the neuroscientific research community and its societal environment. In 'media societies' the mass media constitute the most important public arena: They not only inform the public about neuroscience but also the neuroscientific community about its public image, thereby contributing to the governance of neuroscience. Media constructions of emerging technologies and applications stemming, for instance, from neuroscientific research are also a space where possible futures of technologies are imagined and negotiated.

In our research we are interested in whether and how media coverage of research can 'informally' govern research processes. Our research is designed as a cross-cultural study about public communication of neuroscience and its repercussions on the research community. We want to provide a systematic overview of how neuroscientific research is covered in the German and US media. In order to find out what types of research appear in the media and what types of sources are selected to evaluate the research represented therein we are conducting content analyses of German and US media coverage of neuroscientific research. Thereby, we can find out more about who it is that participates in the shaping and negotiation of the future of neuroscientific research and its technoscientific applications (in fields ranging from public health care to criminal justice and modern warfare). Furthermore, we are analyzing how neuroscientific evidence is presented in the media and whether and how controversies and uncertainties are dealt with by journalists. Understanding and evaluating the evidence basis of emerging technologies, and how it is represented in the media, are an important starting point for the analysis and evaluation of promissory discourses. The public representation of these discourses are part and parcel of the creation, negotiation and management of technoscientific futures.

We are also conducting an analysis of funding, legislation and other regulatory contexts of neuroscientific research in the United States and Germany. In addition, we are interviewing neuroscientific researchers and practitioners in the US and in Germany, in order to find out how they assess the construction of neuroscientific futures in the media. Moreover, we want to know more about their own role in publicly shaping and negotiating possible futures of neuroscientific research and its applications. In our conference presentation we are going to demonstrate some trends and present some illustrative examples from our ongoing research.

Materials & Methods:

1. Content analysis: 2 x 400 articles of US and German print and online media
2. Document analysis: Central documents concerning the regulation of research, e.g. legal documents, calls for funding, ethical guidelines etc.
3. Semi-structured qualitative interviews with neuroscience researchers and practitioners.

Session: **Governing Local and Global Futures** Chapel

The Future Archaeologist: A Method for Reconstructing the Landscapes of Future-Making

L. Watts (IT U Copenhagen, DK)

Here I stand, beneath a sky filled with clouds of luminous water, before a roaring sea halffilled with prototype wave energy generators. On this stone-wrecked beach the future of the world's marine energy industry is being materialized: in environmental impact assessments, in local farmers, in local poetry, in the prior five thousand years of monumental technology from stone circles to war-time gun emplacements. The landscape and seascape, the people and the place, are integral to the way the future is imagined and made.

This is Orkney, an archipelago off the north-east coast of mainland Scotland, where the Atlantic and North Sea meet. Here, the future of these fragile islands is an everyday concern, talked about over farmhouse coffee and cake. Here the future is being made, must be made, hard and fast. The local future for the islands is being co-constructed along with the international future for marine renewable energy. Orkney is perhaps regarded by some as peripheral, as too distant from traditional centres of innovation. But here the fierce weather and stormy seas, the extraordinary world heritage and wildlife, make the effect of natural-cultural landscape on how the local and global future gets done visible.

But I am here to do more than just document the agency of landscape in future-making. My role is to make creative interventions into future-making, to ask the important question: how might it be done otherwise? Marilyn Strathern has argued that ethnographic fieldsites are made from fragments of evidence, fragments that are not part of any *a priori* whole. Fieldsites are, in part, creative projects. As Donna Haraway has long made clear, knowledge-making is both empirical and generative, both fiction and fact; there are always gaps, possibilities, things that could be imagined otherwise. It is an archaeological sensibility: a concern with the generative potential of breakage and *bricolage*. It is also my sensibility, and my method. As an archaeologist reconstructs the past from fragments of evidence, so I reconstruct the future from fragments of evidence.

I am the Future Archaeologist. And this paper is how and what I do.

Materials & Methods:

My work is based on ethnographic fieldwork which considers how the future is imagined and made in everyday practice. The method I have developed to study future-making draws on approaches in Science & Technology Studies and feminist technoscience (e.g. Lucy Suchman, Bruno Latour, John Law, Donna Haraway). However, as suggested by my abstract, it also draws on theoretical approaches in archaeology and social anthropology.

My ongoing fieldsites include the mobile telecoms industry near London and the renewable energy industry in the Orkney Islands, Scotland. As part of my fieldwork I collect audiovisual material, artefacts, as well as fieldnotes, and documents. My conference papers usually include something of this heterogenous set of evidence.

Differential Cosmopolitanisms and the Governance of Technoscientific Futures: The Case of Indian Technomigration

A. Khandekar (Rensselaer Polytechnic Institute, US)

This paper draws on two years of ethnographic fieldwork conducted among Indian technomigrants – engineering students and early-career professionals who have migrated to the United States from India for the purposes of higher education and employment. I argue that Indian technomigration is shaped through the complex articulation of many factors – middle class imaginations of successful careers and lifestyles, immigration law, familial considerations, and discourses of cosmopolitanism, being some of the most salient ones. In articulating these disparate conditions, I argue that Indian technomigrants are forging new conceptions of self and community in an emerging world order.

I conceptualize these new ways of being as a form of differential cosmopolitanism – an articulation of global belonging that is based in conceptions of the difference of Indian culture from dominant Western culture. The cosmopolitanism of Indian technomigrants figures through a discourse of global Indianness, which is constructed as the space in between the binary opposition of "India" and the "United States." Both India and the West (United States) appear as essentialized categories in technomigrant discourse and are actualized through everyday practices of education, professional employment, hospitality, consumption, community, and kinship. Hence, I argue that Indian technomigrants are highly reflexive actors who circulate in the contemporary global system with relative ease by assuming cosmopolitan global Indian subjectivities. However, the nature of their reflexive practices is such that they reproduce rather than disrupt existing social inequities. Their articulations of difference are, on the one hand, powerful critiques of a dominant materialist West. These critiques, however, fail to engage the multiple fractures within themselves – in technomigrant discourse, there is little reflection on the politics of class, caste, religion, and gender that is constitutive of Indian technomigration.

Based on the above empirical analysis, I conclude the paper with three theoretical interventions in debates concerning the governance of technoscientific futures. First, I argue for renewed attention to technoscientific practitioners as cultural actors. As the case of Indian technomigration demonstrates, it becomes necessary to engage ways in which technoscientific actors reinforce and challenge existing politico-ethical, and sociocultural norms and practices – especially given their positions of relative privilege within these systems. Second, I argue for critical attention to how objects of governance are constituted and the modes through which they are governed. An ethnographic analysis of technomigration, for example, suggests the need for cultivating critical reflexivities among Indian engineers, rather than state-based governmental interventions. How might alternative conceptions of self and community – ones geared towards greater civic engagement, for example – be mobilized among Indian technomigrants? What spaces and media – community centers, temples, online forums etc. – can be utilized towards generating and debating these competing sociocultural imaginaries? Lastly, then, the analysis underscores the need for linking discussions involving governance of technoscientific futures and those involving notions of reflexive cosmopolitanisms. How are the worlds that we inhabit constituted through technoscientific logics and practices? How are our own analyses complicit in those constructions? What competing ethical imaginations of the world and of worldly belonging can we, as critical social scientists, facilitate?

Materials & Methods:

Materials: Primary data gathered through in-depth interviews, participant observation at Indian diaspora conference, government reports, various materials available online.

Methods: Multi-sited ethnography over two years conducted in Mumbai, India; Troy, NY, USA; and various other parts of the United States (telephonic interviews).

Emerging Technoscientific Productions in Urban China: Transnational Imaginations of Free Culture, Open Innovation and Alternate Futures

S. Lindtner (U California, Irvine, US)

Labels of free culture and open innovation have come to dominate the discourse and imagination of the social and political change promised by digital technologies. Emerging innovation labs across the U.S., Europe and Asia, despite their local contingencies, share a commitment to and passion for Silicon Valley ideals of a free and open culture of investment and sharing of resources with the ultimate goal to stimulate new forms of innovation. As they participate in this transnational imaginary, they produce not only knowledge about modes of material making, but also cultural imaginaries of alternate futures for organizational structure, infrastructures for international collaboration and technoscientific exchange.

In my work, I explore how these transnational imaginations of free culture and open innovation are mobilized in a technology innovation lab in Shanghai, China. Through findings from ethnographic research I track how the appropriation of free culture ideals is often interpreted and expressed as a transnational phenomenon. I illustrate how the lab positions its technological innovation work as a most progressive, or "cool" force in modern society (Liu, 2004). In this process, I explore the following questions: what models of global citizenship are embedded in technoscientific productions centered around digital innovation in urban China? Who is involved in crafting the image of a new transnational class of knowledge workers? I elaborate how forms of governmentality are inscribed in the constructions of a technologically savvy, self-managing and transnational citizen.

Contemporary urban China has often been marked as a site of rapid technological, social and cultural change enabled by international investments and the global market. For example, in recent years, the planning and building of large-scale urban innovation centers alongside global events such as the Beijing Olympic Games and the Shanghai Expo have not only visibily transformed city-scapes, but have also changed China's image on a global scale and laid the groundwork for transnational collaborations and exchanges. These changes in urban and technological infrastructures to stimulate new forms of innovation are often rendered by national political discourse as an ideal path towards modernity, as a move to transform „made in China" into „made by China."

I suggest that the transnational identity that is ascribed to the members of the technology innovation lab in Shanghai is neither an example of the straightforward up-take of techno-ideologies of Silicon Valley culture in places elsewhere, nor a case study of a global city networks and global flow theory (e.g. Castells, 2006; Sassen, 1991). Rather, I explore the complex and entangled paths of material and semiotic production around technoscientific innovation that emerge at the frictions

of local/global interaction (Tsing, 2005). Through my ethnographic data, I point to ways in which technology innovation labs position their work both in opposition and alliance with large-scale projects of change and innovation in China, in order to distinguish themselves from national competition on the one hand and to remain attractive to governmental and industry funding on the other.

References

Castells, M. 2006. The Theory of the Network Society: A Global Perspective. Cambridge, Mass.: MIT Press.

Liu, A. 2004. The Laws of Cool: Knowledge Work and the Culture of Information. Chicago: University of Chicago Press.

Sassen, S. 1991. The Global City: New York, London, Tokyo. Princeton, NJ: Princeton University Press.

Tsing, A.L. 2005. Friction: An Ethnography of Global Connection. Princeton, NJ: Princeton University Press.

Materials & Methods:

In my research, I use ethnographic methods such as participant observations conducted both in the urban space of the innovation lab and online, formal and informal interviews and archival research. This includes analysis of policy documents, media discourse, digital and visual objects produced by the innovation lab, mass communication and promotional materials that are circulating within the wider open innovation community both in China and transnationally.

Session: **TA, Experts and the Future** Edu4you SR2

Visionary Futures in Science and Technology – A New Source of Expertocracy?

A. Grunwald (OTA German Bundestag, DE)

Mid-term and long-term visions are of increasing importance in the scientific, political and public debates on future technologies in new fields like stem cell research, brain science, nanotechnology, human enhancement technologies and synthetic biology. Visionary futures in these fields

- are referring to the more distant future of some decades;
- show revolutionary aspects not only in technological but also in cultural, human behavioural, individual and social aspects;
- are mostly created and communicated by scientists, science managers; and science writers
- are assumed to come into reality by their authors who frequently give milestones which shall bridge the gap between today's state and the visionary future state.

Visionary futures in these fields show a high degree of uncertainty and are difficult to assess with respect to their degree of feasibility and their possible impact on future society. However, they often enter public and political debates very successfully. They influence public attitudes, research funding and science and technology policies, and they frequently frame societal debates on risks and chances. This implies that visionary futures have a high impact on societal perception of new technologies, and therefore are an important part of their governance.

In my presentation I will address the question whether and to what extent the fact that those visionary futures frequently are created by scientists and science managers acting as stakeholders with own interests could lead to new (and more hidden) forms of expertocracy. A possible scenario is that visionary futures provided by science could dominate social debates by determining their frames of reference which would leave to the social debate only aspects of minor importance in a predetermined frame. In this case, those visionary scientific and technological futures could endanger public opinion-forming and democratic decision-making which might be a new form of a "hidden" expertocracy. Against this background the paper will address

- new roles of visions in public and political debate on future technologies;
- the question for a new expertocracy behind technofuturistic visions
- possibilities for "democratizing" those visions.

Materials & Methods:

These issues will be discussed using results from recent TA studies of the Office of Technology Assessment at the German Bundestag (TAB), and from ongoing research on the role of visions and their cognitive and evaluative content.

Expertise and Politics: Negotiating the Future of Xenotransplantation in (Participatory) Technology Assessment Procedures

E. Griessler (Institute for Advanced Studies, AT)

Xenotransplantation research, which is dealing with the transplantation of organs, cells or tissues across species had a hype in the late 1990s and early 2000s and was by then considered a therapeutic option with huge financial potential which was to become clinical standard practice in the near future. Driven by these economic hopes and by the expectation that xenotransplantation might alleviate the so-called organ shortage governmental actors in different countries but also international organizations (WHO, OECD, Council of Europe) and EU institutions started to think about the implications of xenotransplantation and how to regulate this potential new technology. Xenotransplantation, however, for several reasons was not an uncontroversial technology. In the aftermath of food crises, the GMO conflict and blood scandals connected to HIV and hepatitis, xenotransplantation not only raised serious risk problems – connected to so called xenozoonosis – there were also basic human rights and animal welfare at stake which were hotly discussed not only within science but also by different NGOs. In this situation many countries and international organizations carried out Technology Assessment and Participatory Technology Assessment procedures which should

inform policy-makers about what to do. In this paper I will compare attempts of TA and pTA in the OECD, the European Commission and Switzerland. These cases have been selected to contrast expert TA (OECD and EC) with participatory practices in Switzerland (PubliForum). The paper addresses the following questions: Who was included and excluded? In what way? In which settings of TA and pTA was it discussed? How was xenotransplantation framed? What was its impact on policy-making? What can we learn from these examples for negotiating technoscientific futures in complex societies?

Materials & Methods:
The paper draws on an international comparative research project about the impact of citizen participation in knowledge-intensive policy fields (CIT-PART). It is based on three in-depth case studies of the TA and pTA exercises in the OECD, European Commission and Switzerland. For these case studies document analysis of literature and media reports has been carried out. The main source, however, were more than 30 interviews with people involved in pTA and TA either as participants, researchers, civil servants, politicians, stakeholders and practitioners of TA and pTA.

Open Future – Ontological-Epistemological Assumptions in Technology Assessment and Foresight and their Manifestation in Participatory Scenario Processes

A. Bauer (U Natural Resources and Life Sciences, AT)

Ideas about the "future" change, not only with respect to concrete imaginations and visions of the future but also in terms of its ontological and epistemological status. Recent approaches to anticipation of technoscientific futures, such as constructive Technology Assessment (cTA) and Foresight, heavily emphasize an "open and shapeable future" in contrast to a "predictable and steerable future" as promoted by traditional planning and positivistic assessment approaches. Such underlying assumptions have consequences for the design and organization of the processes of anticipation.
The presentation aims at discussing the idea of an "open future" and its consequences for the ways the future is anticipated. In a first step, I analyze on a more abstract level the ontological-epistemological assumptions inscribed in the two instruments of cTA and Foresight. By their institutionalization (through guidelines and textbooks, professional communities, organizations, networks, etc.) the instruments produce and reproduce a more or less coherent and identifiable set of specific ontological, epistemological and methodological assumptions about collecting, weighing and using anticipatory knowledge. Literature and guidance as well as statements by key actors in the Austrian TA and Foresight communities clearly show how the conceptualization of the future as open is used to promote specific modes of anticipatory knowledge generation and to differentiate cTA and Foresight from other forms of anticipation.
In a second step, I show on a more concrete level how the notion of an "open future" leads to particular forms of anticipatory knowledge generation and preferred expertise. An "open future" challenges pure expert knowledge by emphasizing the constructed nature of the future and by promoting interactive knowledge production processes including a wider range of societal actors. A frequently used method for such interactive knowledge production is the scenario workshop. Scenarios aim at the collective imagination of alternative visions and consequently answer well to the idea of an open future. Thus, I analyze in more detail five participatory scenario processes of cTA and Foresight and ask how the idea of an open future is translated into the process design, the methods, the interaction between different participants and the preferred outcomes of the process. I particularly search for episodes of opening and closure of the future. My case analysis shows that also in the context of "open futures" project teams, technical experts and other participants constantly differentiate between aspects that are shapeable and aspects that are perceived as being part of a stable and non-manipulable frame. The boundaries between shapeable aspects and the stable frame, i.e. the open area and the closed area of the future, frequently also mark boundaries between the explorative and the normative, between factual knowledge, interests and values, between the authority of experts, stakeholders and lay persons. I conclude with a critical discussion of forms of inclusion and exclusion, allocations of power and authority as well as manifestations of rationality and technocracy that come along such opening and closure processes.

Materials & Methods:
The presentation bases on a study on Technology Assessment and Foresight in Austria. TA and Foresight were analyzed with respect to their conceptualizations as can be found in handbooks, guidance documents and scientific literature as well as with respect to their institutionalization in Austria. Besides 16 cases of TA and Foresight processes were analyzed of which 5 based on participatory scenario processes. The analysis draws on 20 semi-structured interviews with members of the project teams and representatives of the commissioning authorities. In addition, all project reports and additional material such as journal articles were analyzed, especially regarding their description of the process design and methods applied as well as reflections on the process.

Parallel Sessions
Friday, September 23, 2011
14:30–16:00

Session: **Creating Methods and Spaces to Imagine Futures** Main Hall

Imagining Future Moral Views: A Method for Developing Techno-Moral Scenarios

K. Waelbers, T. Swierstra (Maastricht U, NL)

Most scenario studies explore techno-scientific changes while presuming that our morality (our collection of moral norms, values, desires and routines) remains stable (van Asselt et al, 2010a). However, examples of technologies that have changed our norm and values are numerous: television has changed ideas of beauty, contraception has altered our moral norms on sexuality, email has affected our social routines, and so on. A social embedding of a new technology implies multiple complex techno-moral interactions (see also Swierstra and Rip 2007; Waelbers 2009; Swierstra and Waelbers 2010; Boenink et al, 2010; Stemerding et al, 2010, Waelbers 2011). These interactions are object of study of a newly established field of EPET (Ethics and Politics of Emerging Technologies) studies which aims to identify the mechanisms of techno-moral change and to develop techno-moral scenario studies.

A more inclusive and effective upstream technology policy is in need of a method to develop techno-moral scenarios to help policymakers and engineers to make better choices regarding plausible and desirable techno-moral futures (van Asselt et al, 2010b). This paper offers such a method, based on the idea that the window for techno-moral change opens when the morality (consciously or unconsciously) inscribed in the technology and its techno-social preconditions conflict with the generally accepted morality in society. This starting point grants four types of scenarios:

Scenario 1: technological adaptations are needed to meet some robust moral norms, values and routines before the emerging technology is accepted by society. The developments within such a scenario can be compared with current developments in stem cell technologies: instead of creating embryos, the technology is redesigned to obtain stem cells from adults.

Scenario 2: the technology makes us realize that prominent aspects of our morality are replaceable. Such a scenario might show similarities with the moral change regarding sex, marriage, and homosexuality that resulted from contraception technologies.

Scenario 3: The new technology finds a place in society only after an adaptation of both the technology and our morality. The introduction of the mobile phone followed for instance such a course: the technology altered many social norms but it was eventually also provided with a silent mode.

Scenario 4: the technology remains controversial, because a misfit between the morality of the technology and society occurs. In some parts of society the technology is accepted, but many other groups refrain from it.

These scenarios evolve gradually over time and several stages can be distinguished.

Stage one, destabilization: During the early development and first market introduction, a new technology meets a morality that appears to be quite robust. Sudden fundamental moral change is rare. More common is an increase of our capabilities which brings new responsibilities: if doctors can cure someone with a new technology, they have the moral obligation to do so.

Stage two, controversy: the technology gets increasingly embedded in society. Now, interpretations of existing norms and values may alter, or the balance between competing values may shift. For example, the last decade, the balance in evaluation of privacy and safety shifts, which increases the acceptation of surveillance cameras.

Stage three, restabilisation: the technology has become a full part of society and everyday life, and it has altered some aspects of our morality on a more fundamental level. New norms and values arise and existing norms and values fade. Consider for instance the netiquettes. Scenario four does not have this stage.

Materials & Methods:

Methods

This paper itself presents elements of a new method for developing scenarios that include not only technological change but explore also possible techno-moral interactions. For developing these elements, we used the classification of aims and methods of existing scenarios (Notten 2003). We aim to develop an additional method for developing scenarios which have the goal of normative exploration (i.e. provide information for informing the choices of policy makers and other actors). The scenarios are about long term forecasting, and they are based on technological developments in the western culture. The data such a method uses are qualitative and intuitive and are obtained from participatory approaches (such as interviews and workshops) and desk research.

The method presented here results from an ongoing research line (see also materials) which is based on two starting points.

1) NEST-ethics (Swierstra and Rip, 2007) which presents the idea that in public debates the techno-moral debate commonly evolves over time from an initial rejection of the mind blowing technological expectations (such as intelligent designer babies) to the (partial) acceptance of more modest, but none the less important innovations (such as the prevention of certain serious mental diseases amongst newborns). This line is mainly on controversy studies.
2) A revised version of Latour's ANT (Waelbers 2011) in which the possible future interaction between humans as moral actors and technologies as social factors is central. This line is mainly on interaction studies.

Materials

In this search for a new, comprehensive method for developing a rational set of scenarios for techno-moral change, we combine the knowledge and experience we

have obtained during the five projects in which we developed one or more scenarios:

- the intelligent home of the future (Waelbers, forthcoming)
- the obesity pill (Swierstra 2008; Swierstra 2011)
- the intelligent car of the future (Waelbers, 2011)
- the Google power meter (Swierstra and Waelbers, 2010)
- nano-technologies (Swierstra, et al, forthcoming; Boenink, et al, 2010;)
- genetic testing (Stemerding et al, 2010)

Literature

M. van Asselt, S. van 't Klooster, P. van Notten and L. Smits (2010a) Foresight in Action: Developing Policy-Oriented Scenarios. The Earthscan Risk in Society Series. London/Washington, D.C.: Earthscan.

M. van Asselt, A. Faas, F. van der Molen and S. Veenman (2010b). Uitzicht: toekomstverkenningen met beleid. Wetenschappelijke Raad voor het Regeringsbeleid. Amsterdam, Amsterdam University Press.

M. Boenink, T. Swierstra, D. Stemerding (2010), 'Anticipating the interaction between technology and morality: A techno-ethical scenario study of experimenting with humans in bionanotechnology', Studies in Ethics & Law of Technology 2010 (4) no. 2, art 4.

P. van Notten, J. Rotmans, M. van Asselt, D. Rothman (2003). An updated scenario typology. Futures 35

D. Stemerding, T. Swierstra, M. Boenink (2010) Exploring the dynamic mutual interaction of technology and morality in the field of genetic susceptibility testing: a scenario study. Futures [Online publication: 25-JAN-2010.

T. Swierstra, and A.Rip (2007). Nano-ethics as NEST-ethics: patterns of moral argumentation about new and emerging science and technology. Nanoethics (1) 1

T. Swierstra (2008). Ook de pil is techniek. Over onze toekomstige moraal. In De kwestie. Werkboek Ethiek voor de gezondheidszorg, edited by I. d. Beaufort, M. Hilhorst and e.a. Den Haag: Boom.

T. Swierstra and K. Waelbers (on line first, 2010) Designing a good life: a Matrix for the Technological Mediation of Morality. Journal for Science and Engineering Ethics

T. Swierstra, M. Boenink, K. Waelbers, D. Haen, F. Lucivero and A. van Wynsberghe (forthcoming). Broadening Societal dialogue on nanotechnology: writing techno-ethical vignettes and scenarios on nano-technology (provisional title).

T. Swierstra (2011) Behaviour, Environment or Body: Three Discourses on Obesity. In. M. Korthals. Genomics, Obesity and the Struggle over Responsibilities. Dordrecht, Springer.

K. Waelbers. (2009). Technological delegation: responsibility for the unintended. Journal for Science and Engineering Ethics (15). 51-68.

K. Waelbers (expected 2011). Doing good with technologies: taking responsibility for the social role of technologies. Dordrecht: Springer

K. Waelbers (forthcoming). The family of the future. In: P. Kroes and P.P. Verbeek. Moral agency and technical artifacts. Springer book series Philosophy and Technology.

Deliberating Futures: Pathways, Locales, and Imagery in the Imagination of Techno-scientific Change Expertise and Politics

S. Davies, C. Selin, G. Gano, Â. Guimarães Pereira (Arizona State U, US)

Both the imagination and the unfolding of technoscientific futures are shared, enrolling and affecting diverse publics and populations. It has become a truism, then, to say that these groups should be involved in decision-making and reflection on the futures technoscience is creating. Whether expressed as upstream engagement, anticipatory governance or constructive technology assessment, the social technologies of deliberation are gaining an ever-stronger foothold in contemporary policy and research on the creation and management of futures. These social technologies are themselves continually under construction, with critiques of – for instance – lack of policy relevance, dominance of technical knowledges, and banal proceduralism being fed back into theory and practice.

One such critique – derived from political theory assessments of deliberation – is of engagement activities as overly discourse-oriented, to the exclusion of the affective and material. Deliberation should, it is argued, take better account of the places and spaces in which technoscientific development occurs, as well as the objects which participate in it and the affective ties they create. Based on this thinking we report, in this paper, on one experiment that sought to construct a deliberative space in which place, materialities, and futures could conjoin. The 'Finding Futures' project asked participants to tour an industrial site in Lisboa, Portugal, with an eye to its past, present and future; in doing so it sought to explore the degree to which deliberation can be disentangled from 'reasoned argument' and instead be prompted by the experience of place. Our analysis explores the experiences of participants through the use of interview data as well as the outputs of the project: sets of images and words with geospatial tags used to create an immersive environment (an imagined past/present/future-scape). Can these creative and affective moments be understood in terms of deliberation? What do participants take from, or resist in, this kind of process? How might such experiments relate to broader moves towards hybrid decision-making in techno-science policy? We explore these questions in our analysis, reflecting on the diverse ways futures can be created and governed within participatory processes.

Materials & Methods:

This is a qualitative study, drawing on deliberative theory and on work in STS and other social science which has emphasised the importance of the material and affective in the construction and negotiation of knowledge. As well as the experimental deliberative space itself – designed and organised by the authors – it will draw on ethnographic methodology and, in particular, make use of video interviewing in order to explore participant experiences.

Technologies of Imagination: Creating a Space for Public Engagement with Emerging Technosciences

M. Strassnig, U. Felt, S. Schumann, C. Schwarz (U Vienna, AT)

This presentation introduces a group discussion method for public engagement and qualitative research on emerging technologies. The wider context and relevancy our method ties into the debates on the increasing attention public engagement methods have gained in the governance of emerging technologies. We took the example of nanoscience and -technology as a emerging field which challenges public engagement efforts in multiple ways: For example, the unclear nature of the object itself; or by prematurely closing down or narrowing certain dimensions of the issue – often by delivering more or less concrete scenarios and trajectories – but at the same time providing the impression of open decision-

making. These and other observations triggered our interest in developing a new approach for addressing emerging technosciences such as nano: It should allow citizen engagement in the context of a largely missing public debate, as it is the case in Austria, without the need to depart from ready-made future scenarios. Further, the method is supposed to contribute to qualitative research by focusing on the very processes through which people engage with complex new issues, the argumentative resources they use, the socio-technical assemblages they create, and the value systems they relate to. Besides, having a better understanding of such processes could provide an essential reflexive input for research and policy-making with regard to emerging technologies.

The method itself makes use of card sets and a deliberative choreography in order to facilitate citizens' individual and collective imaginations of nanotechnology in the Austrian context. Our aim is to better understand how citizens develop and negotiate positions on unfamiliar technologies, what resources they employ and what role card material can play in this process. By drawing on concepts from STS, the paper discusses the design of the method/setting and its presumptions ("script") as well as how citizens in four discussion groups re-interpreted (elements of) the setting (their "de-scription"). The method's potential lies in balancing individual and collective phases, showing participants' modes of ordering, addressing non-chosen cards/issues, enabling citizens to scrutinize expert positions and enhancing their capacity to imagine how nanotechnology could develop in the future.

Materials & Methods:
Qualitative analysis of four longer discussion group settings (see above) consisting of 6 citizens and a moderator in Austria. Each group focussed on a different area of nano applications: food, medicine, ICTs and surveillance, consumer products.

Session: **Environmental Futures** Edu4you SR 1

UK Bioenergy R&D for a Low-Carbon Economy: A Master Narrative with Diverse Imaginaries

M. Farrelly, L. Levidow, T. Papaioannou (Open U, UK)

Bioenergy R&D has been widely promoted as a means to develop innovative substitutes for fossil fuels, thus minimising GHG emissions and enhancing energy security. In the UK these aims have been linked with a Low-Carbon Economy (LCE), a widely accepted concept encompassing diverse meanings and priorities. LCE can be analysed as a master narrative encompassing diverse imaginaries of a future society. Each imaginary links technoscientific progress with a future economic community which has common interests (Jessop, 2005).

In this way, LCE also accommodates tensions among different priorities for R&D and biomass utilisation. Within public policy, for example, some advocate engineering improvements for short-term maximum conversion of biomass to bioenergy, e.g. in order to fulfil statutory targets for renewable energy. Others advocate R&D towards 2nd-generation biofuels and industrial biotechnology, so that innovative methods can make better overall use of the biomass. The latter vision aims to overcome societal conflicts over 1st-generation biofuels (especially food versus fuel) through greater efficiency, thus assuming or implying that the current conflicts are due to inefficiency. These solutions take for granted the current infrastructure for energy distribution and usage as a baseline for substituting bioenergy, to be produced on an agro-industrial scale.

Tensions arise also between commercial aims versus sustainability. A transition to a LCE depends on socially shared knowledge of innovative solutions, but a policy aim is privatisation of technoscientific knowledge via IPRs for licencing worldwide. Commercial drivers are structured into public-sector research by requiring industry involvement in each project. Expectations for commercial exploitation may generate different trajectories than a pursuit of the most environmentally sustainable bioenergy.

A fundamentally different narrative is Zero-Carbon Britain (ZCB), promoted by alternative technology networks outside the public policy system. For the agricultural sector, this means a diffuse, small-scale production of bioenergy which would both stimulate and depend upon integrated farming systems with low external input. This alternative narrative envisages an infrastructural transformation to achieve the energy goals.

As a central question, the paper asks how some imaginaries (rather than others) get selected as a basis for funding and wider policy changes to promote specific energy and economy futures.

The above analysis will draw upon theoretical frameworks from Cultural Political Economy, Sociology of Technological Expectations, and Critical Discourse Analysis as well as empirical evidence from relevant policy documents and interviews with key stakeholders in the area of bioenergy.

Materials & Methods:
The materials are published documents from a diverse body of „stakeholders" in UK bioenergy R&D suplemented with interview material from people in those organisations (e.g. Department for Energy and Climate Change; Biotechnology and Biological Sciences Research Council).

The STE concept of „expectations" is the focus for textual analysis within a critical discourse analytic framework.

Fuelling Expectations: Promoting Biofuels in the UK

P. Berti (U Exeter, UK)

Drawing on insights from the sociology of expectations, this paper analyses the exchange of expectations on biofuels technologies as occurred in a consultation of the UK government. Sociologists have observed that actors tend to optimistically exaggerate their statements of technological expectations in order to catch the attention of other actors. That phenomenon generates 'cycles of hype and disappointment' which entail costs for the actors involved. Understanding how to reduce the volatility of expectations is a common concern among sociologists of expectations. Brown suggests investigating the 'situatedness' of expectations along their temporal and spatial dimensions as a possible analytical approach (Brown 2003; p.10). This paper aims at exploring the spatial dimension of technological expectations in reference to the actors closely involved with biofuels policies in the UK.

Technological expectations might differ because of the actors' asymmetries in their access to relevant information (Brown, 2003; p.5). The phenomenon of actors adding hype to their statement suggests that technological expectations might also differ because of the actors' peculiar and heterogeneous interests in promoting a technology. This paper investigates how the actors' level of involvement in the technology influences their statements of technological expectations. Such an involvement is here conceptualised as positively correlated to the level of resources that those actors have invested in that technology. Resources should be intended in a broad sense: not only in terms of differentials in the amount of time, skills, experiences, physical and human capitals, and so on, but also in terms of favourable conditions, such as specific situational advantages that some actors have with respect to others. I argue that specialising resources in a technology implies entering in a sort of personal development path where the costs of shifting technology (or simply activity) increase along the way. This technological lock-in links the maintenance of value of those resources to the successful development of the technology. Such interdependence should drive actors to advertise their technology in their attempt to foster its development and, in that way, to maintain the value of their resources. As such, the level of involvement of actors with a technology is a crucial factor in determining their propensity to promote it. I further argue that instilling trust in the audience is a precondition for the actors to get a hearing. Actors are constantly engaged in building a reputation providing them with authority. The final argument is that the actors' reputation might eventually affect their selection of the representations to publicly disclose. I investigate these relationships through a qualitative analysis of the websites and responses of the participants to the UK government consultation selected for the analysis. A consultation might be thought of as a survey that the government uses to consult stakeholders and as an occasion that stakeholders exploit to influence the government about a specific policy debate. The analysis focuses on the participants' representations of technological expectations and relevant facts and on the information they provide about themselves in their attempt to instil trust as sources of information.

Brown, N., 2003, Hope Against Hype - Accountability in Biopasts, Presents and Futures. Science Studies 16, 3-21.

Materials & Methods:
Discourse analysis of websites and written responses of the actors participating to the consultation on biofuels policies organised by the UK government on the 15th October 2008. The consultation collected 89 responses, which were obtained through direct communication with the UK Department for Transport (DfT).

Session: **Social Science/Ethics and the Governance of Futures** Edu4you SR2

The Imitation of the Future: Nanomedical Innovations and STS

M. Schillmeier (LMU Munich, DE)

The presence of nanomedical innovations is very much future talk driven by high expectations. Current nanomedical research agendas articulate the possibility of a thorough change of medical health practices (diagnostics, therapy) by applying nano-scale processes, structures and technological systems. Nanomedical innovations (like other nanotechnologies) magnify the complexities of small-scale processes that not only facilitate healthy working bodies but also name the sites where malign and often life threatening processes generate and disseminate. Still, the nano-scale as well as the effects of nano-scale techno-medical innovations that relate 'nano' with 'bio' are very much unknown. Drawing on empirical material, this presentation discusses the different ways nano-medical practices deal with the 'unknown' and how different actors within nano-medicine enact their own uncertain future. In both cases, nano-medical practices demand rich skills of imitating futures that govern their presence. It names the complexities of the stability and sustainability of scientific practices, which are defined by their possible and virtual futures. Such a diagnosis highlights the inextricable conjunction of science in the making and societies in the making where not only possible futures with its heterogeneous actors are en- or disabled, but whereby the future itself plays a major role in constructing their presences and agencies. Concluding, the paper interrogates the role of the social scientist and her/his conceptual tools analysing these processes.

Materials & Methods:
Qualitative research (Multisited ethnographies, expert interviews etc), ANT.

The Governance Tools of ELSI/SEI: What can/do they Contribute to the Social Science Understanding of Science?

A. Viseu (York U, CA), B. Lewenstein (Cornell U, US)

Since the late 1980s advent of the Human Genome Project, many national and international governments have included funding for research on "social and ethical issues" (SEI) or some variant of that label in their development of large and emergent research and development projects. SEI funding has become a common theme in emergent technologies and scientific governance, but its possible effects and value of that funding are not well understood. Scientists, science policy actors, science policy analysts, and science-studies researchers come to emerging technologies with different motivations and interests, and the outcome of their interactions can be read as "successful" or "powerful" or "meaningless" or "captured" or any number of other characterizations, depending on one's perspective. This paper seeks to understand more fully how the different models for funding for SEI are structured, what they aim to accomplish, what they have accomplished, what they might accomplish, and what they cannot accomplish—and whether even talking about "accomplishment" is the appropriate perspective to take on this issue.
To address these issues, this paper will begin by describing what we mean by "emerging technologies" and identifying recurring issues in that category, with a focus on the characteristics that make it possible or necessary to include SEI funding. The next step will be to explore the multiple meanings of labels such as "ethical, legal, and social issues (ELSI)" and "societal and ethical implications (SEI)". The analysis will then identify and review

two major areas of research—the Human Genome Project's ELSI program, and the National Nanotechnology Initiative's SEI. This analysis will revolve around four tools of governance that we have identified as organizing for ELSI/SEI, namely, (1) mandate and goals (or, What is ELSI/SEI expected to do? What counts/does not count as ELSI/SEI?), (2) organizational structure and funding mechanisms (or, How is ELSI/SEI implemented and managed?), (3) research portfolio (or, What activities and research were/are conducted under ELSI/SEI?), and, (4) ELSI/SEI and after (or, what are the ripple effects of the ELSI/SEI programs?). We will conclude by highlighting and addressing common themes.

This paper sheds light on the mechanisms of governance of emergent technosciences—how they are structured and what they can/cannot do. In so doing it also contributes to the ongoing debate about the meaning and implications of different stances toward the relationship of the scholarly and policy worlds (e.g., (Joly & Kaufmann, 2008; Roelofsen, Broerse, de Cock Buning, & Bunders, 2010; Scott, Richards, & Martin, 1990; Webster, 2007; Woodhouse, Hess, Breyman, & Martin, 2002; Wynne, 2007), as well as the relationship of social and natural sciences.

Materials & Methods:

This paper revolve around the qualitative analysis of two projects/programs, the Human Genome Project's ELSI, and the National Nanotechnology's SEI. Analysis of the HGP project has been concluded and relied mainly on historical and published material (reports, scholarly articles, websites, etc). The nanotechnology analysis section will rely on similar sources, however, because this is an ongoing project the kinds of conclusions we can take are different and less definite.

Desirable Future Technologies: Broadening Moral Imagination in Ethical Technology Assessment

F. Lucivero (U Twente, NL)

Techno-scientists aiming at steering technological development in some specific direction often refer to the desirability of some emerging technology to justify, for example, why society should invest on it. In doing this, they mobilize a set of allegedly shared and uncontroversial values. In this paper, I will present the example of techno-scientists' promises on a device for early diagnostics of colon-rectal cancer, known as the "Nanopill", currently under development at University of Twente. In this case, developers emphasize how the technology is cost-effective and accurate, providing the user with early, comfortable and reliable screening, and society with fewer costs. In this sort of "rhetoric of innovation", techno-scientists stress both the revolutionary character of the new technology and how it addresses a set of traditional social needs. However, the appeal to a need for early, cheap and easy diagnosis doesn't seem to be a particularly innovative or revolutionary goal, but rather a common repertoire in expectations on biomedical technologies. So, on the one hand the technological innovation is emphasized and often hyped, on the other hand the vision carries a conservative and rhetorical ideal of what is valuable for society. This follows a common pattern of moral argumentation about new and emerging technologies (Swierstrac&cRip 2007). In order to attract the consensus of the audience, techno-scientists present the technology as promoting the values of a situated society in space and time, for example by referring to autonomy, control, responsibility, and economical value.

These expectations are often the starting point of current practices of technology assessment that aim at governing technologies towards a more desirable technological development. These participatory/constructive TA practices focus on improving the dialogue and participation of stakeholders at an early stage of technological development to anticipate trends and intervene timely (Schot 1992). In such dialogue, questions of desirability of an emerging technology play an important role. However, these questions might be ill-posed if they are asked along the lines proposed by the strategic rhetorical discourse of techno-scientists. How well do these discourses point out the way the technology will be embedded in social practice? To what extent is it plausible to expect that those claimed values will be promoted by the technology at stake? These desirability-statements require to be assessed.

A key-point of such assessment is that techno-scientific expectations are framed according to an here-and-now morality, without accounting of the fact that technologies change the morality and the same standards of what is desirable. This co-evolution between morality and technology (Swierstra et al. 2009), which mutually shape each other, is important to explore for a society who wants to be more reflexive about the normative dimensions of expectations and the possible moral implications and ethical challenges that new technologies can bring about.

In this paper, I will discuss the possibilities and limitations for broadening our prospective when reflecting prospectively about the desirability of emerging technologies. I will analyse the co-construction of morality and technology in expectations on the "Nanopill" and show some ways of broadening our considerations on its desirability, beside the ones suggested by techno-scientists. "NEST patterns" and "techno-moral changes" provide some conceptual tools to broaden the space of discourse on desirability and to point out questions and problems that would otherwise remain hidden behind the heavy rhetoric of the future. This exercise is meant to have the ultimate aim of broadening the space for deliberation on emerging technologies.

Materials & Methods:

Techno-scientists' expectations on the "Nanopill" have been collected and explored during a 3-month engagement with researchers in the BIOS group at the MESA+ Institute, University of Twente, through interviews, participant observations of lab practices, and review of scientific literature. Additional interviews have been conducted to explore these expectations among various potential stakeholders differently engaged with the "Nanopill" (diagnostic companies, care payers, care providers, legal advisers, clinicians...). The assumed and declared values in these expectations have been pointed out with discourse analysis. Finally, through a brainstorming process with colleagues from the department of Philosophy, at the University of Twente some patterns of techno-moral change have been pointed out.

Parallel Sessions
Saturday, September 24, 2011
10:30–12:30

Session: **Reflecting Anticipatory Governance** Main Hall

Governance of and by Expectations

K. Konrad (U Twente, NL)

Various studies, particularly within the sociology of expectations, have examined how expectations create shared and contested socio-technical futures, coordinate innovation actors and contribute to shaping technologies and socio-technical systems. At the same time, expectations are themselves continuously coordinated and shaped in public discourses, in professional communities and in organizations. Furthermore, policy and corporate actors increasingly initiate dedicated forms of systematic envisioning and assessment, largely under headings such as roadmapping, foresight, technology assessment or future-oriented technology analysis, which do more than mapping out possible futures: they explicitly aim at coordinating actors and supporting priority setting and strategy building. In parallel, a professionalization and commercialization of expectation-building has taken place with experts and "promissory" organizations such as consultancies and other forecasting agencies playing a decisive role in organizing expectations in specific fields, and creating and serving a market for technological expectations. Hence, expectations play a decisive role in 'governing', that is, coordinating and shaping innovation processes and they are themselves 'governed' in distinct ways.

The paper proposes the concept of governance of and by expectations, in order to capture a) the different modes of shaping and coordinating expectations, ranging from the seemingly 'unbound' expectations in societal discourses to expectations 'tamed' in dedicated foresight, visioning, forecasting and technology assessment processes (governance of expectations), and b) the different modes of how expectations coordinate and shape socio-technical developments (governance by expectations). This conceptualization provides a comprehensive approach which sharpens our attention for different modes of producing and coordinating expectations, which at the same time is broad enough to capture, compare and relate these different modes. This analytical perspective opens up a number of important questions. What are the specific roles and effects of different modes of governing expectations in coordinating and shaping socio-technical developments and how are different governance modes related? For instance, what is the specific role of collective expectations and expectation dynamics in public discourses compared to expectations shaped in systematic foresight, vision-building or TA processes and how do both 'governance modes' influence each other? That is, does it matter for the performative role of expectations how they are produced and coordinated? If it matters, how and why does the governance of and by expectations evolve and change over time – as a general trend and within specific societal settings as technology fields, societal spheres and organizations? And to what extent is it possible to modulate and shape these processes?

The paper elaborates the concept of governance of and by expectations and applies it in order to investigate changes in the governance of and by expectations for two illustrative examples: stationary fuel cells and nanotechnology. It shows that changes were induced by the reflexive relations between expectations and the actors and institutional arrangements within an innovation field, as expectations which emerged within a given societal domain fed back on the structure that shaped them. It concludes with an outlook on further needs for research and possible applications of the approach.

Materials & Methods:

The results for the fuel cell case are based on a study which investigated the dynamics of fuel cell expectations and their interaction with innovation and discourse activities of fuel cell actors on the basis of qualitative interviews and discourse analysis. The results for the nanotechnology case are so far based on secondary sources (primary investigation will take place within a PhD project starting soon).

Taming Time in Columbia: Technoprophetics and Technopolitics

E. Rueda (U Javeriana, CO)

Currently there are two different ways of technological prediction in Colombia. The first one comprises health predictive technologies. Both in genetics and neurosciences health futures can be anticipated through the identification of genetic and neurochemical markers. "Crystal Balls" seems a useful metaphor to go deeper into these kinds of practicing "prophetics" and experiencing their effects. The second way of gazing the future is prospective modelling: Computer-based modelling of species extinction or genetic contamination are ways of picturing a credible future.

The paper explores how both in genetics/neuropsichiatry and biotechnology predictive technologies let experts to transform uncertainties in measurable risks. Both cognitive reductionism (many uncertainties are hidden or reduced) and technological optimism play a role in achieving this transformation. Taming uncertainties in this way is crucial to make the future symbolically manageable. Framing the uncertainties in terms of known risks pursues reinforcing the belief in the power of technology to ground specific regulations.

By examining the way in which predictive testing and prospective modeling (bioprospection with regard to GMOs) is used and applied in Colombia the lecture clarifies how predictive technologies and their outcomes are used to legitimate specific policies.

Materials & Methods:

The materials in which this paper is based include interviews with geneticists. neurol-

ogists, psychiatrists, biologists and prospective ecologists. Bibliography includes specialized articles on the topics of both how predictive testing in genetics and neurosciences is "put in action" and how prospective modelling cannot evade value-laden assumptions. Methods for researching how prediction become usable in policy include interview analysis, institutional analysis (i.e. cancer genetic clinics and Colombian center for Agriculture) and application of theoretical concepts such as "cultural monster" or "Crystal balls".

Obesity – A Present Problem Endangering our Future?

K. Felder (U Vienna, AT)

Today obesity is one of the most important but also most complex public health issues, and it is also in the center of a variety of scientific debates. The framing of obesity as a public health issue strongly ties into discourses about societal developments and future collective problems. Demographic tables of constantly rising body weight in various global and local contexts are used to depict an alarming development. In the Austrian public discourse this fear of a dystopic obese future is accompanied by nostalgic tales of slimmer and better pasts, where families used to eat together and children spent their time running around outdoors. These examples show how the ways in which obesity is conceptualized and understood as a problem are deeply permeated by a rather specific set of temporal narratives as e.g. predictions based on numbers and assumed temporal developments of the phenomenon. How we talk and think about obesity is deeply bound to these imaginations of societal futures and how our society should and will develop.

In order to better understand public discourse, it is promising to look at policy documents as they have considerable impact on public debates: They are characterized by a strong future orientation, presenting and rhetorically constructing different futures e.g. through establishing specific points in time, or through charting trajectorial developments and specific time-spans. Analyzing policy documents and reflecting on these various conceptualizations of futures might lead to a better understanding of how the phenomenon of obesity is constituted and discussed in public discourse – a task especially salient as the thinkable ways of how we deal with a phenomenon are predefined by the ways in which we frame it.

Analyzing policy documents must give due consideration to the fact that they are embedded within a specific local and cultural context and tied to specific forms of knowledge and knowledge production. Futures and scenarios presented in these documents are neither simply given nor stable entities, but are actively produced and shaped by different actors and agendas. According to recent literature in the sociology of expectations such futures do not only define the present but can be regarded as creating material trajectories that unfold as anticipated by the speculative processes and eliminate other possible ways of dealing with a phenomenon. In order to develop a more fine-grained understanding of these underlying discursive elements of the public discourse, I want to analyze how futures are presented and rhetorically built in selected documents, which have become important in local and global discussions on obesity.

Materials & Methods:

Employing a grounded-theory oriented approach by using coding procedures and theoretical sampling, I will systematically explore future scenarios and accounts on the way obesity develops as presented in various national and international policy documents on strategies, action plans and interventions in regards to obesity. My approach will be twofold as I not only want to grasp the multiple accounts of futures but also the narratives on trajectories that will lead or have led to what is seen as the on-going obesity epidemic. By carving out these omnipresent but often unquestioned discursive elements I want to further our understanding of how temporal modes of ordering intertwine with the ways we talk about obesity and thus imagine a specific phenomenon and its solutions.

The Governance of Emerging Technologies: Governing the Borders, Relevance and Acceptance of Nanotechnology

P. Schaper-Rinkel (Austrian Institute of Technology, AT)

Nanotechnology as an emerging technology was constructed, shaped, and negotiated through specific discursive and institutional practices within diverse cultural and social contexts and established in multiple policy arenas through funding programs and regulatory practises.

This paper discusses the future oriented practises such as forecasting or participatory foresight that are used in different phases of the ongoing process. The future oriented practises are examined as new modes of governance in which a particular rationality of governing is entangled with new tools and instruments of involving stakeholders in rule-setting for funding and implementation of regulatory frameworks. Furthermore it analyses how expectations with regard to future change along the dimensions of technoscientific and governance innovation are entangled through these processes. I use Foucault's theoretical framework of governmentality to analyse the establishment of a new governmental rationality.

In the 1990s innovation related to nanotechnology was promoted mainly to increase national and European competitiveness, while today emerging technologies are expected to serve a multitude of national and European policy objectives such as 'smart, sustainable and inclusive growth'. Emerging technologies are also related to discourses surrounding what is called 'Grand Challenges' at the intersection of science, society and policy. As expectations and promises broadened, the range of those invited to participate in technology related governance processes broadened as well.

The paper focuses on three chronologically overlapping areas of governing nanotechnology. First, governing the boundaries of nanoscience and consequently defining the field itself dominated early 'forward looking activities', notably so called Technology Analysis and Technological Forecasting. Second, in governing the comparative relevance of various nanotechnologies promises and expectations were generated and specified in two-way scenarios: Anticipated future nanotechnologies were embedded in future societies, which were in turn imagined as societies in need of nanotechnologies. Third, governing the acceptance of nanotechnology became the focus of more recent governance processes targeting risk dimensions and regulatory frameworks.

Governing these three interrelated dimensions of emerging technologies is intertwined with increased use of 'forward looking activities', which are themselves heterogonous. Early activities were exclusively expert-driven processes (technology analysis), whereas over time, increasing public attention created space for more participative practises. Participation became what Foucault terms a 'political technology'. That is, in the governance of emerging technologies participation is

used to manage and control the funding and regulation of emerging technologies, and to enable and bound public engagement. Analysing different processes over time, we can identify an emerging paradox. The number of stakeholders involved is increasing, while the binding significance of the policy recommendations, for example with regard to funding & regulatory frameworks, is decreasing.

Materials & Methods:

This paper draws on a wide range of sources, including official documents, foresight reports, foresight databases and interviews, especially from the US, Germany and Europe. The governing of borders, relevance and acceptance of nanotechnology is examined through the theoretical lens of Foucault's notion of governmentality. This paper offers an example of how governmentality can be a useful tool in understanding the development of emerging technologies.

Session: **Role of Users and Designers in Constructing Futures** Edu4you SR1

The World is the Interface. Or, is it? Investigating the Nature of the 'Nature' that is Invoked in Ubiquitous Computing Discourses

C. Kerasidou (Lancaster U, UK)

'Machines that fit the human environment instead of forcing humans to enter theirs will make using a computer as refreshing as taking a walk in the woods'.
Mark Weiser on ubiquitous computing (1991:11)

In the late 1980s, ubiquitous computing made its first appearance in the labs of Xerox PARC as a radical human-centered reply to the machine-centered personal computer. Based on the idea of spreading computation ubiquitously, but invisibly, throughout the environment, its proponents aim to shift the focus from the personal computer per se to the ways that it can enrich users' everyday experience. Since then, a number of industrial and academic research centres around the world have set out to study this human-centered technological paradigm under different names such as Pervasive Computing, Ambient Intelligence, Tangible Computing, etc.

The above sketchily sets the stage where my own story takes place; a story which, instead of granting these technological initiatives the self-proclaimed status of exemplars of innovative and cutting-edge technologies, follows Suchman's lead (2007: 226) and seeks to trace the cultural imaginaries that have inspired and continue to inspire ubiquitous computing, and that it works in turn to enact and materialize. In that way, my critical focus changes from assuming the futures and the relations that these technologies project and then considering the consequences for the subjects involved (while the objects remain invisible and passive), to the prior and more immediate question of what kinds of relations, ontologies and agencies are assumed to be desirable in these futures?

Under this light, my paper focuses on the notions of everydayness, familiarity and naturalness that ubiquitous and tangible computing appear to invoke. According to Dourish, one of their critical features that they share is that 'they both attempt to exploit our natural familiarity with the everyday environment and our highly developed spatial and physical skills to specialize and control how computation can be used in concert with naturalistic activities' (2001a: 232). Here we see the idea of a universal and homogeneous human collective being naturalised on the grounds that we all share the same tactile and physical skills which are manifested through our physical, natural, intuitive interactions with everyday and familiar objects. Tangible computing then, as Dourish writes, seeks to capitalise on these, now naturalised and unquestionable, skills in order to build natural computational interfaces that fit seamlessly within our everyday, real world (2001b: 17). Exploring and reacting to these arguments, this paper seeks to ask, What is the nature of the nature that is invoked here and what is at stake at adopting a universal language of natural familiarities, natural skills and everyday environments that, as the story goes, we all share?

Literature:

Dourish, P. (2001a) 'Seeking a Foundation for Context-Aware Computing', Human-Computer Interaction, Vol. 16, pp. 229-241.
Dourish, P. (2001b) Where the action is: the foundations of embodied. MIT Press: Cambridge, Mass.
Suchman, L. (2007) Human-machine reconfigurations: plans and situated actions, Cambridge University Press.
Weiser M. (1991) 'The Computer for the 21st Century', Mobile Computing and Communications Review, Vol. 3, Num. 3.

Materials & Methods:

Through the lenses of STS and feminist technoscience studies, I critically look at the work (books, journal and conference papers, technical reports, technological artefacts) produced by designers, computer scientists and technology theorists within the broader field of HCI and Ubiquitous Computing. Acknowledging the performative nature of technological stories, I attempt a close and careful reading of the stories that ubiquitous computing is telling, and a re-telling, a telling differently, of these same stories in order to 'tease out' further or different connections, responsibilities and futures having as my guide the question, 'What kinds of futures do the Ubiquitous Computing discourses try to enact?'.

140 Character Ethics: An Analysis of Contemporary Narrative Forms Used to Express how the Future "Ought" to be

M. Boenig-Liptsin (Harvard U, US)

The wildest futures of tomorrow are expressed in tangible discourses today. Who talks about the future and what narrative forms they use to talk about it constitutes the epistemic/technical "is" that is co-produced together with the normative/ethical "ought." I draw upon my experiences as participant of Singularity University (SU), an institution in the Silicon Valley dedicated to anticipating and acting upon socio-technical futures, to analyze how scientists, engineers, and entrepreneurs utilizes discursive practices and narrative forms to institutionalize a particular way of thinking about and realizing the future. Specifically, I focus on the practice of collaborative brainstorming with Post-It notes and online forums like Twitter used extensively at SU for problem-solving and commenting on current events. Both practices are characterized by

the enforced brevity of their message (3x5 inches of space or 140 character limit), their mobility (whether physical or virtual), and their networked significance (messages take on a new meaning when considered in relation to other messages). These qualities make Post-It and Twitter useful for problem-solving and real-time commenting, but what happens when ethical statements, such as normative statements about what the future "ought" and "ought not" to be, are expressed in Post-It or Twitter form? I draw upon Science and Technology Studies (STS) literature of inscription in science and technology (Timothy Lenoir and Brian Wynne), theories of political discourse and language (Ludwig Wittgenstein and Ju□nger Habermas), feminist critiques of scientific language (Carol Cohn and Judith Butler), as well as the broader tradition of narrative ethics, to argue that the narrative forms we use to talk about the future matter for the kind of future that is realized. The SU case study suggests that the narrative form is a powerful instrument for governing the future, whose influence social scientists should strive to understand in order to effectively use it in their own interventions.

Materials & Methods:
I use qualitative ethnographic methods as participant-observer in the Singularity University. My materials are the specific discursive practices of students and faculty and the narrated products (in diverse media, e.g. edited documents, note cards, on-line messages) of their thoughts about the future, which I examine in light of STS and philosophical literature.

Knowledge within Participatory Technology Developments: Sense-making of Simulations by Converting User-Expertise to an Engineering-Resource

D. Compagna (U Duisburg-Essen, DE)

The Scenario-Based Design as an instrument for participatory technology development – according to the euphoric descriptions in the literature (Carroll ed.) – at first sight offers significant potential for an early inclusion of future users. Especially the obvious clarity together with an iterative process of coordination and the proceeding of pilot applications ensure an ideal exchange among users and designers. Ultimately, this proceeding should allow an optimal balance with regard to the social desideratum and the technical feasibility. In the course of a three-year research project this proceeding has been almost completely accomplished. In the process, particularly two predetermined breaking points became visible, which, in respect of both the scenario development and the role of the users during the pilot applications, infiltrated the ambitious aims of the procedure: The technical limitation and the scenarios' 'independent existence' lead to an imbalance in favour of the designers' interests and orientations during the scenario modelling, whereas the pilot applications are marked by the purpose of a user configuration rather than a technical adaptation to the social context.
In the mentioned case study the "Scenario-Based Design" (Rosson/ Carroll) has been examined as a procedure for a participatory technology development (the application of service robotics in a stationary nursing facility). The particular significance of the scenarios – which function as a central instrument of the proceeding – is that they cannot be characterized appropriately, neither as 'Boundary Objects' (Star/Griesemer) nor as 'negotiation screens' (Pinch/Bijker). With the help of the Actor-Network Theory the scenarios can be described adequately: As 'Obligatory Passage Points' (Callon) they represent constitutive hubs in the network formation of the innovation programme. The differing orientations and aims of the involved actors in the technology genesis process (engineers, computer scientists, product designers, social scientists and future users) can be accommodated through the conceptualization of the scenarios as actants (Law) and also through their specific to function as translating instances (Latour) in the successful consolidation of the network as an entity capable of acting (Latour; Callon).
Likewise, unintended phenomenons and those which impede the intention of a demand-orientated technology development are identifiable. This is made possible when the symmetry premise of the 'ANT' is not being kept stable throughout the whole process, but when the temporal procedure of a 'dance of agency' (Pickering) is taken into consideration. The social scientists and designers fostering the exchange are translated by the dominant programme of the efficacious and authoritative scenarios, whereas the potential users (senior citizens in a nursing facility) are being reconfigured (Woolgar) and will join the process – the scenario formation and the pilot applications – as 'border crosser' as a whole (Bowker/Star; Suchmann).

Materials & Methods:
Materials: Assistant Robots, Automated Guided Vehicle.
Methods: Scenario Based Design, Grounded Theory.

Session: **Producing Futures in Research** Edu4you SR2

Monitoring and Preventing: On the Role of 'Socio-Scientific Imaginaries' in the Co-production of Science and Society

T. Völker (U Vienna, AT)

In recent years authors more or less closely connected to the so-called sociology of expectations have pointed out the importance of future-related rhetoric in processes of establishing new technologies and the emergence and stabilization of (mostly techno-)scientific fields. Statements about possible futures thereby are not regarded as mere fantasies. Rather their performative properties are highlighted, meaning that future-related statements might lead to positioning of different actors and the articulation of particular research or development agendas. Collective imagination – i.e. the production and stabilization of ideas about a particular future state of affairs - therefore is regarded as a powerful cultural resource in the constant (re-)production of social order.
While most contributions that emanate from the sociology of expectations deal with technologies or techno-scientific developments, I will look at a field where knowledge production itself is at stake. Transdisciplinarity is a notion frequently used to describe attempts of 'opening up'

or 'democratizing' knowledge production. Situated within the debate on changing relations between science and society - captured with notions such as 'mode 2' or 'post-normal science'- transdisciplinary knowledge production has been already anchored in several research programs.
For my presentation I will use Sheila Jasanoff's concept of 'socio-technical imaginaries' to look at policy documents of an Austrian research funding program with the explicit goal to foster transdisciplinary knowledge production in sustainability research. The concept of 'socio-technical imaginaries' directs attention to the role of imaginative resources in the co-production of scientific and social orders. Its explanatory power lies in the analysis of processes through which some orderings are co-produced instead of others.
I will slightly re-coin Jasanoff's notion and use it as 'socio-scientific imaginaries'. Using this notion I aim at directing attention to imaginations of good and attainable futures of society and how these imagined futures shall be encompassed through specific relations of science and society and a particular kind of knowledge.
With the notion of 'socio-scientific imaginaries' I thus put knowledge at the center of interest as ideas about knowledge are intensely discussed in current debates on changes of knowledge production. Drawing on cultural imaginative resources the distribution of epistemic authority is discussed as well as questions like who can be regarded as knowledgeable actor, who are possible users and beneficiaries of particular knowledge and what are acceptable goals and purposes of knowledge production.
In my presentation I will describe the socio-scientific imaginaries of a particular research program in Austria where a particular relation of science and society and along with that a particular idea of knowledge production is employed in order to realize a specific envisioned future state of society. Put differently I will look at transdisciplinary sustainability research policy as a site where imaginations about the future of society become deeply entangled with a specific idea of knowledge production and knowledge itself.

Materials & Methods:
The presentation will be based on material produced in the project "Transdisciplinarity as epistemic culture and practice", which is conducted at the Department of Social Studies of Science of the University of Vienna and aims at developing an empirically grounded understanding of transdisciplinary research practices. In doing so, projects of the Austrian research funding program proVISION, which explicitly has the explicit agenda to foster transdisciplinarity in the area of sustainability research, are investigated.
I will present results of an analysis of policy documents from the research funding program and additionally -for contextualizing purposes - international policy documents related to the issue of sustainability. The analyses are carried out applying a Grounded Theory approach.

Only a Question of Times? Temporealities within Systems Biology Research and its Governance

K. Kastenhofer (Austrian Academy of Sciences, AT)

Karen Barad (2007) in her epistem-ontology (Barad 1998) puts material-discursive phenomena centre stage. According to her analytical approach "relata do not pre-exist relations; rather, relata-within-phenomena emerge through specific intra-actions." (ibid, 140) Within research fields such as systems biology a plethora of such intra-actions takes place, constituting a variety of phenomena of different kinds. In all of these phenomena, "time" is attributed a specific identity and role because time, like other relata, does not pre-exist these phenomena, but is newly constituted in each intra-action.
When systems biologists talk about temporal aspects or refer to time, such different phenomena-based conceptualisations of "time" can be traced. "Phenomena" thereby include real and envisioned intra-actions. Delineating connections between phenomena-within-research, envisioned phenomena, research practices (that are connected to the co-construction of such phenomena) and explicit references to time allows for a more comprehensive understanding of different temporealities of the epistemic culture of systems biology. Understanding the temporealities of a specific research field also constitutes the basis of any attempt to understand the (divers) logics present within this field and to interact with the field, be it along inter-disciplinary, epistemic terms or along societal, regulatory terms.
The presentation is based upon empirical results stemming from the research project "Towards a holistic conception of life? Epistemic presumptions and socio-cultural implications of systems biology" (1/2010-4/2013, BIOGUM, Univ. Hamburg & ITA, Austrian Academy of Sciences). It draws on 32 interviews with systems biology researchers in the UK and Austria, several laboratory visits, analyses of research papers and participation in international conference. It outlines different temporealities that occur within systems biology research practices and theoretical conceptions of systems biologists. Thereby, the diversity of different, coexisting temporealities within a research context is illustrated. Furthermore, the presentation delineates the specific role time plays within the paradigm and identity of systems biology. Against this empirical background, inter-disciplinary collaborations, trajectories of innovation, regulatory discourse and governance processes are discussed.

Materials & Methods:
The presentation is based upon empirical results stemming from the research project "Towards a holistic conception of life? Epistemic presumptions and socio-cultural implications of systems biology" (1/2010-4/2013, BIOGUM, Univ. Hamburg & ITA, Austrian Academy of Sciences). It draws on 32 semi-structured interviews with systems biology researchers in the UK and Austria, several laboratory visits, analyses of research papers and participation in international conference. All data were gathered by the author between 1/2010 and 4/2011. Interview transcripts, field notes and documents are analysed in accordance with Grounded Theory.

Literature cited:
Barad, K. (1998). Getting real: technoscientific practices and the materialization of reality. Differences 10(2), 87–128.
Barad, K. (2007). Meeting the universe halfway. Durham & London: Duke Univ Press.

Plan Now, Personalize Later: Examining Emergent Prioritization Processes at the Interface of Comparative Effectiveness Research and Personalized Medicine

A. Hoffman (McGill U, CA)

Is genomics and personalized medicine (GPM) the future of health care? And if it is, which instances of GPM will compose what kinds of futures? These very questions are of increasing importance as new, costly, and increasingly complex GPM tools begin to proliferate throughout medical practice. Oncology is perhaps the

foremost domain in which one finds the most promising applications for GPM, but where insufficient evidence of clinical utility and regulatory systems ill-equipped to deal with GPM innovations have together precluded the rendering of useful clinical guidance for these technologies. Whence the advent of comparative effectiveness research (CER), an emergent type of evaluative research that seeks to study how multiple medical interventions for a given indication compare against each other in everyday practice settings. In the United States, the federal government allotted approximately $10 million in funding to a Consortium of seven unique CER research projects that are each studying whether GPM tools are in fact better than their non-'personalized' counterparts in rendering predictive, prognostic, or curative outcomes in cancer care. In so doing, this community of researchers and practitioners aims to shape the future of cancer care by producing an original and distinct body of CER evidence that can be deployed in governing the use of GPM tools in oncology going forward. Yet for this to happen, those working in CER must initially decide which GPM technologies should be evaluated in the first place.

The current study focuses on this latter process, drawing from ethnographic fieldwork at one of the seven Consortium project sites. Here, we find an expansion of socio-technical repertoires that attempts to address the myriad 'evidence gaps' in genomics and personalized medicine. Moreover, this framework also leads to an opening up of novel spaces in the American cancer clinical research milieu where the qualitative and the quantitative are articulated in new and dynamic ways such that futures are rendered predictable and practicable. Qualitatively, there is a newfound emphasis on 'stakeholder engagement,' where it is hoped that by bringing a variety of concerns to bear on the design of CER at an early stage in terms of selecting candidate technologies to be assessed and methodologies to use in their assessment, the data produced by these studies will be more useful in dictating what instances of GPM are 'valuable' to clinical practice and which ones are not. Yet stakeholders are asked to collaborate with a team of academic health economists and to consider additional quantitative results from a highly complex and esoteric hybrid of decision-economic modeling that can be used to prioritize research under conditions of restricted resources by quantifying uncertainty in terms of dollars and then comparing the 'value' of possible future studies. Through analyzing the convergence of the qualitative and quantitative at the CER/GPM nexus, this research elucidates how visions of rather distant futures come to bear on more immediate concerns around technological prioritization, study design, and resource utilization, and how these considerations in turn impact future conditions of possibility for GPM technologies in cancer care.

Materials & Methods:

As briefly stated above, the current study is based on qualitative research conducted at a federally funded CER/GPM project site in the United States. Data has been gleaned from three different sources: first, through semi-structured interviews with key informants involved in the project (including scientific director, project coordinator, health economists, and stakeholders); second, through participant-observation (at conferences, stakeholder engagement meetings, project overview meetings, as well as teleconferences); and third, through archival/document review (including internal documents about process, grey literature, along with the wider body of published literature). Data is coded using methods derived from the grounded theory approach to qualitative research (e.g. Strauss & Corbin 1990).

Explanation or Expectation: Taking an 'Explanatory Turn' in Investigating the Role of Expectations in Science

D. Budtz Pedersen (U Copenhagen, DK)

Expectations are part and parcel of contemporary science and deserve special attention. They go deeper than simple role expectations or estimates of future happenings. The future is co-produced through expectations and guides decision-making and funding distribution in a number of situations. However, when discussing the role of expectations in science often attention is given solely to the promises of technical research (i.e. nanotechnology, biotechnology, synthetic biology). That is, models of science that are envisaged to provide new and better solutions to society, such as therapies, energy systems or smarter materials (Brown & Michael 2003; van Lente & Bakker 2010; Felt et al. 2007; Avadikyan et al. 2003). This paper takes an alternative route, and turns the focus on the role of expectations and explanations in basic neuroscience. Taking into account that scientists in a number of situations (e.g. in grant proposals, media reports and policy statements) have to extrapolate promises of future scientific explanations, the paper opts for an explanatory turn in investigating the role of expectations (Laudel 2006; Haalsten 2007; Irzik 2009; Gerrans 2009).

Hence, the paper investigates a number of examples from contemporary neuroscience in which the use of future-oriented explanations play a crucial role. Most remarkable, these examples show a divorce of the neuroscientific discourse from traditional criteria of scientific evidence (Burge 2010). When scientists engage in the business of promising new lines of research there is (i) a potential loss of epistemic transparency, and (ii) a diminishing possibility of securing any explanatory derivatives against these prospects. Claims of future scientific explanations are, however, highly normative in scientific priority-setting. Even if sometimes deliberatively exaggerated, explanatory expectations are crucial in providing the uplift and momentum upon which a number of recent research programmes depends. In conclusion, the paper argues that current science policy is promoting a number of incentives, specially in the way science is funded, that encourage researchers to promise ever more radical scientific explanations. Accordingly, the paper draws on recent contributions in both philosophy of science and science policy studies.

Materials & Methods:

Materials used in paper are written, published articles, book chapters and policy reports, including excerpt and statements from leading international neuroscientists. The method applied is conceptual analysis and literature review. For references, see below.

References

Avadikyan et al. (Cohendet and Heraud), ed. 2003. The Economic Dynamics of Fuel Cell Technologies, Springer Verlag Berlin.

Brown, N. & Michael, M. 2003. A Sociology of Expectations: Retrospecting Prospects and Prospecting Retrospects, Technology Analysis & Strategic Management, 15/1: pp. 3-18

Budtz Pedersen, D. 2011. A new start for the humanities is required for the 21st century, Danish Yearbook of Philosophy, Vol. 44 No. 1, forthcoming.

Burge, T. 2010. A Real Science of Mind, New York Times (nytimes.com), The Opinion Pages, December 19, 2010.

Elger, C.E. et al. (A. D. Friederichi, C. Koch, H. Luhmann, C. Malsburg, R. Menzel, H. Monyer, F. Rösler, G. Roth, H. Scheich, &

W. Singer) 2004. The Manifesto, Brain and Mind, 6: 30-37.
Felt, U. 2007. Taking European Knowledge Society Seriously. European Commission: Brussels
Gerrans, P. 2009. Bubble trouble, Times Higher Education, (www.timeshighereducation.co.uk/), 9 July 2009.
Haalsten. H. 2007. What to ask of an explanation-theory, Rethinking Explanation, Boston Studies in the Philosophy of Science, 252: 13-26.
Irzik, G. 2009. Why Should Philosophers of Science Pay Attention to the Commercialization of Science? EPSA Epistemology and Methodology of Science: 129-139.
Laudel, G. 2006. The art of getting funded: how scientists adapt to their funding conditions, Science and Public Policy, 33/7: 489–504.
Lente, H.V. & Bakker, S. 2010. Competing expectations: the case of hydrogen storage technologies, Technology Analysis & Strategic Management, 22(6): 693-709
Lente, H.V. & Rip, A. 1998. The rise of membrane technology: from rhetorics to social reality. Social Studies of Science, 28(2): 221-254.

Conference Programme

Governing Futures. Imagining, Negotiating & Taming Emerging Technosciences

Thursday, 22. September 2011

13:00 – 14:00	Coffee Break	14:30 – Parallel Sessions – 16:00	Coffee Break	16:30 – 17:30	Coffee Break	17:45
Ulrike FELT *Welcome Address:* Geographies of Technoscientific Futures: Anticipatory Work, Emerging Technologies and Technopolitical Cultures (Main Hall)		Moral Governance of the Future (Main Hall) Multiple Food Futures (Chapel) Scientists' Imaginations of the Future (Edu4yu SR2)		Barbara ADAM Domain of Faith: The Future as Fate, Fortune, Fiction and Fact (Main Hall)		Reception (Chapel)

Friday, 23. September 2011

9:00 – 10:00	Coffee Break	10:30 – Parallel Sessions – 12:00	Lunch	13:00 – 14:00	Coffee Break	14:30 – Parallel Sessions – 16:00	Coffee Break	16:30 – 17:30	18:00
Andy STIRLING Deliberate Futures: Broadening Out & Opening Up the Politics of the Possible (Main Hall)		Connecting Pasts and Futures (Main Hall) Governing Local and Global Futures (Chapel) TA, Experts and the Future (Edu4you SR2)		Arie RIP Dealing with the Future: From Modernist TA to Reflexively Modern TA (Main Hall)		Creating Methods & Spaces to Imagine Futures (Main Hall) Environmental Futures (Edu4you SR1) Social Science/Ethics & the Governance of Futures (Edu4you SR2)		Bernadette BENSAUDE-VINCENT Futures Embedded in Technoscientific Objects (Main Hall)	Conference Dinner @ Weinhof Zimmermann

Saturday, 24. September 2011

9:00 – 10:00	Coffee Break	10:30 – Parallel Sessions – 12:30	Coffee Break	13:00 – 14:00	
Daniel BARBEN Anticipatory Governance of Science and Technology: Some Critical Reflections on the State-of-the-Art (Main Hall)		Reflecting Anticipatory Governance (Main Hall) Role of Users & Designers in Constructing Futures (Edu4you SR1) Producing Futures in Research (Edu4you SR2)		*Closing Discussion* Host: U. FELT (Main Hall)	*End of Conference*