SDN Meeting Report 2010

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SESSION 1: Science and Social Responsibility
Chair: Tim Forsyth (LSE)

Max Fochler (Vienna), *Co-Evolving (Ir)responsibility: On the Co-Production of New Modes of Ordering Research and Science/Society Relations*
This paper, whose empirical evidence came from the *Living Changes in the Life Sciences* research project in Vienna, addressed how scientists are and should be made responsible to society. It scrutinized assumptions of 'Mode 2' knowledge production, which claims to produce more societally responsive forms of knowledge. Researchers today live within two discourses: one of 'new public management', including notions of effectiveness and accountability. The other is characterized by a demand for engagement with the public and for scientists to engage with ethical issues and do reflexive work.

Fochler focused on how the concept of mobility guides and reshapes research culture. Mobility of researchers has become a valued commodity within the new public management discourse. For instance, international mobility for more than one year is highly prized within policy documents. While early career mobility, particularly during and shortly after one gets a Ph.D., is seen as a positive, it also has negative consequences; too much mobility does not allow one to settle, raise a family, or get a permanent job. Institutionally, there is also the negative consequence that highly mobile researchers do not tend to put in effort to maintain the institutions in which they (temporarily) reside. While the European Union may want a highly mobile research market, creating one favors a disengagement of researchers from their local institutions.

Questions: Why does responsibility have to be related to locality? Why couldn't a researcher be responsible to universal ideals? It does not necessarily need to be. At the moment, however, Fochler's material not have much supporting evidence for this. Polyani has argued that it is hard to disembed people. What other connections are people embedding themselves in? Fochler did see some deep embedding within narrow lab contexts, such as researchers "camping in the lab."

Maia Galarraga (Lancaster), *Generating Ontological Responsibility in Climate Engineering*
Lots of narratives are being muddled together in discussion on geoengineering. One such narrative constructs geoengineering as a 'parachute strategy' that can just come in with a solution ready-made. Another narrative tries to construct geoengineering as a 'plan B' for addressing climate change. Galarraga is looking for a framework in which society is responsible for the use of geoengineering technology.

While the traditional mechanistic model for modifying weather is contested by an earth systems model, both assume that weather exists within a contained system.

Geoengineering methodology has historically been focused on how to forecast weather, and then assumed that if we know enough about the weather, we should be able to control it. These models tend to emphasize physical parameters over biological ones, and the present state of the system over its historical variability. Geoengineering researchers are attempting to dissociate themselves from the label of 'weather modification', as that label has been used primarily within a military context. Policymakers also exclude weather modification from geoengineering discussions because they believe it does not have global impact. However, surely there is a primary concern with regional impacts as well.

Questions: Why are the physical and atmospheric sciences dominant in this case? How is it similar to climate change? How do you begin to measure on a local scale? While it does make sense to start with something you can predict, there are assumptions embedded in those predictable framings. We should instead start with the messy situation, rather than 'first principles'. In response to another question, Galarraga pointed out that researchers are actually considering social actors, but not very seriously. Another participant pointed out that contested technology like geoengineering is often smuggled in through a call for "keeping all options on the table." These contested technologies then often become dominant.

Steve Jackson (Michigan), *Collaborative Economies: Rethinking Governance in Collaborative Science Networks*
Jackson discussed preliminary results from a five-year project on patterns of organized governance in large-scale science networks, with a principal focus on ecology and the earth sciences. He presented a conceptual framework consisting of several "moments" of transformation:
- Moments of extension: What happens when collaborations extend to include new sites or disciplines.
- Moments of standardization: In many cases, standardization is the goal of these networks.
- Moments of codification: Why are networks moving towards more formal governance structures?

There has been increasing concern by funding bodies around the nature of collaborative governance using cyber-infrastructures. Jackson described two 'parables' in the US of large-scale governance failures that frame the NSF's perception of the problems with large-scale collaborative science networks. The first is the Laser Interferometer Gravitational Observatory (LIGO), which is a large-scale attempt set up across the US to detect the presence of gravity waves. It has become infamous in US NSF circles as the leading example of enormous cost overruns stemming from failures in governance. The second is about not always wanting what you asked for. The Network for Earthquake Engineering and Simulation (NEES) got funding through the NSF, but only asked for money to set up the project, not for ongoing operating and maintenance costs. As a result, NEES has bankrupted most of the directorate. Another important factor that has shaped the NSF's perception of large-scale governance was a study of large-scale collaborative networks that found the more institutions involved, the more likely the network was to fail. This goes against everything the NSF previously thought.

Current governance ideas are generally too formalistic, decisionistic, dematerialized, and managerial. Jackson is employing the idea of 'collaborative economies', which imagines collaboration not through structures and networks, but through ongoing flows. The goal of the project is to figure out how to create local and temporary alignments of the flows of several different economies: e.g. financial, material, credit, symbiotic, and moral.

Questions: Jackson pointed out that he is adopting a loose understanding of 'collaboration' to gain a wider field of study. When asked whether the goal of the project was to change the institutions that provide the funding, Jackson said tentatively—since this is still early on in the project—that funding bodies in the US and EU might be guilty of a kind of gigantism in the way they fund large-scale collaborative networks. In response to a question about the degree to which resources were put into collaboration rather than actual research, Jackson pointed out that many of the people in these networks do not even know they are part of a larger network.

David Winickoff (UC Berkeley), *Private Assets, Public Mission: A Moral Landscape of University Technology Transfer*
Technology transfer offices in universities are a boundary organization between the state, academy, and industry. Such offices are at the center of a new role of universities as 'active commercializers'. Technology transfer raises important questions about the core mission of the university. Making university knowledge proprietary is an uneasy fit with traditional understandings of the university as an institution of learning and teaching in the public interest. Intellectual property policy at universities, a crucial element of academic-industry linkage, has become a site where different visions of the university are in competition in the current age of privatization.

The 1980 Bayh-Dole Act endowed universities with the right to own and license patentable inventions arising from federally funded research. This propagated the idea of universities as not just creating knowledge, but also commercializing it. Patents have become thorns, not treats, for universities by creating an 'anti-commons' that does not allow the sharing of knowledge. Winickoff argued for creating a 'free zone' of sharing, but said it was still unclear what needs to be changed to do that. Tech transfer debates, Winickoff concluded, not only reflect but also help to produce debates about the obligations of the university in the era of globalization.

Questions: These drew out the different ways of looking at what universities were versus what they are becoming. What different moral logics are being employed? How can universities place more emphasis on 'civic education'? Could we look at universities as mediators of the public good? In relation to this point, Winickoff pointed out that patents are power over knowledge, and therefore a good lens for looking at a university's relationship to knowledge.

SESSION 2: Science for Consumption
Chair: David Guston (ASU)

Xaq Frohlich (MIT), *Imagining consumers, constituting subjects: Making sense of "consumer confusion" and the history of U.S. nutrition labeling*
This paper provided a history of 20th century nutrition labeling in the US by exploring the "food consumer" as a conceptual persona. Does the consumer speak? How does the FDA imagine consumers? Frohlich defined three regimes of nutrition labeling: 1. standards of identity and ordinary consumer; 2. voluntary nutrition labeling - neoliberal governmentality; and, 3. the nutrition facts panel - standardizing information.

The first regime focused on distinguishing ordinary from special consumers who consume special dietary foods tailored for particular patient groups. The second sought to define standards for all food consumers, i.e., the healthy, who all have a risk of getting diseases. During this period both the political left and right wanted new nutrition labels. The left wanted to have "a right to know" what they were consuming, while the right sought to eliminate the 'imitation' standard to make markets for new, nontraditional foods. A political settlement was reached when the third regime instituted a "nutrition facts panel" on all food products. Frohlich defined the "commensurated consumer" as the ideal reader of the facts panel in a population. Ultimately, the nutrition label became a composite of special interest consumer concerns (elderly, mothers, and aging men). Frohlich concluded that this work signaled a shift from consumers 'knowing' food to how consumers read foods. Further, nutrition labeling could be used as a platform for a new food 'biosociality' (Nik Rose). Lastly, these shifts indicate how public health can be reframed as a consumer problem with a particular ethics of personal responsibility.

Questions: Most focused on broader issues of how we label anything in the marketplace. How does marketing and recent work with 'choice editing' intersect with this history? Do the STS questions of expertise also apply to the experts crafting the market? What kind of devices/proxies, such as such as the recent European parliament proposal to use "traffic lights" to indicate levels of salt, fat and other nutrients, gain traction in this context? One example, mentioned by the author, was the effects of trans-fat labeling in the US: this has now caused a dramatic shift in the food industry to all types of oils, which may or may not be healthier for the ordinary consumer. The idea of niche markets and using labeling to engage certain specific types of consumers was also mentioned.

Alastair Iles (UC Berkeley), *Making Electric Cars: The Knowledge Politics of Companies and Drivers*
This paper focused on role of "user knowledge" in shaping the design of electric car in the US. Users are traditionally considered as agents with significant purchasing power, however the definition of users is much more complex, Iles argues, than imagined by the designers. His work aims to answer how various institutions—NGOs, companies, and the state—construct users.

Users embody much lay knowledge that can shape the design; however, the author describes modern practices of ignoring the driver learning experience in electric car design. Companies "prescribe cars to the consumers—treating consumers as reactive masses." In car design, there is a tension between individual versus socialized behavior when driving electric cars. This can manifest itself for example as 'range anxiety' over

how far the car can run without recharging its battery and preoccupation with where electric cars will be charged. Designing cars, Iles argues, could benefit from including broader social considerations, since companies design to narrow specifications that they think societies can manage. For example, the Chevy Volt car has a small battery coupled with a gas engine, and this technology constrains what drivers can do.

Questions: One comment pointed out "technology momentum" (Hughes), citing an example of how gas and electricity infrastructures in prior design of power systems shaped future choices. This framing plays a central role in crafting the standards for success. Another person asked whether companies simply meet consumer wants or actively shape them. Another line of questioning wondered whether the author took into account the battery power suppliers. Are power suppliers thought of as consumers as well? Does their network configuration shape the behavior of electric car companies? A set of questions asked how companies do market research and incorporate those results into decision-making. Other questions went into broader contextual directions: why not incentivize public transport infrastructural changes, and is the electric car simply considered a panacea? What about the burden on the power grid, since the generation on the electricity could be just as unsustainable as the gasoline powered cars? The author agreed that theses are important aspects and suggested more research at other sites of production could provide a thicker description of this emerging field.

Javier Lezaun (Oxford), *Coexistence and Political Intensification: Bees, Beekeepers and Transgenic Crops*
This paper analyzed the 2003 European Union coexistence policy on genetically-modified crops. Coexistence was defined as a system where transgenic crops can "coexist" with conventional and organic farming. Underlying this choice was a principle that the ability to maintain different agricultural production systems is a prerequisite for providing a high degree of *consumer choice*. This practice is one of 'excluding exclusion' where there is a mandated cohabitation of different forms of life. Coexistence required a 'gardenification' of the European landscape, where all areas contain a particular 'gene flow' that should be calculated and managed. Complex computer models are used in these analyses, creating maps of how pollen travels in various locales. After practicing this science, different EU states introduced different sets of separation distances between GM plots and conventional agricultural plots. One complex object in the models of gene flow are bees—whether they should be included and if so, how. Coexistence experts insisted that immobilization of beekeepers was the only way to manage gene flow. However traditional practices of beekeepers involve moving bees through different parts of the landscape to make different types of honey. Contending that the whole idea of coexistence is bankrupt, beekeepers in 2008 marched in protest in Munich following a legal case involving coexistence.

The paper interprets 'coexistence' as a form of bureaucratic agnosticism: rather than making a definitive or irreversible choice, the EU proclaims the possibility of peaceful cohabitation. The policy of coexistence is presented as a guarantee to 'consumers'—"the most abstract, distant, and easily ventriloquized of actors"—yet studiously ignores relations of proximity and vicinity. In summary, coexistence produces a regulatory

system of incredible complexity, founded on the "necessary exclusion of uninvited thirds." Beekeepers are the uninvited yet unavoidable guest at the 'coexistence table'.

Questions: What is the connection between mobility and exclusion in Europe? The bees and beekeepers are not so much the story. Is it rather about the EU in the making? Which boundaries are worth keeping when constituting the EU? Citing Tallacchini's work with xenotransplants, visions of Europe can be articulated in all sorts of places involving science and technology. Is this story about what has to be excluded for the right type of mobility to occur for Europe? What has to move or remain stable—genes, bees, and beekeepers—for this political and economic union (i.e., a standardized market) to happen? Lezaun agreed that bees could be thought of as constitutive of the normative visions of EU. Another question asked why so much attention was paid to bees and beekeepers. The author contended that policymakers did not choose to pay attention to bees (they first were occupied with wind). There was a technical shift to "landscapes" in policy analysis, and the beekeepers were uninvited guests. One comment mentioned that is was important to note how hobby beekeepers were constructed as professional beekeepers. The author briefly cited M. Serres's politics of parasitism as a potentially interesting analytical framework for this phenomenon.

Integrative questions focused on how issues get framed as individual versus collective. The health and the environmental issues highlighted by the papers in this session can be framed either as collective infrastructural projects or as projects where every individual has an obligation to build up its own capacity. The mixture of public and private is front and center. The US federal labeling mandate, for example, can be thought of as an infrastructural change that requires public collective resources and significant standardization. One commenter mentioned that public democratic questions are getting funneled into market consumer questions. Are there parallels in carbon markets or in recycling efforts? In consumer/market rhetoric, framing 'choice' as an individual act is not entirely accurate, since it is not clear how much agency the typical consumer may have. It might be useful to analyze more globally the political environments in which market discourses erupt. For example in Germany, a political culture heavily influenced by Habermas produces a distinct microenvironment, patterning how citizens/consumers constitute themselves.

SESSION 3: New Regimes of Participation
Chair: Ulrike Felt (Vienna)

Adrian Ely (Sussex), *Innovation, Sustainability, Development: A New Manifesto – Reflection on an (Ongoing) Experiment in the Politics of Innovation*
This paper briefly revisited the influential STEPS manifesto of 1970, which called for the participation of developing country citizens in designing technologies for development, and called into question the then prevailing model of technology transfer. Ely then described a new manifesto process, the STEPS symposium of 2009, which called for broader and more radical forms of consultation and deliberation around science, technology and innovation. Selected partner organizations and publics around the world were invited to respond to a draft manifesto and position papers, or perhaps to come up

with their own manifestos. The main objective was not to produce consensus but to look for different viewpoints and to allow differences to remain clear. Responses varied from the Venezuelan partner organization which reported that participants were happy that people were being asked to talk about science and innovation at all, to an Indian NGO which generated its own alternative manifesto calling for greater involvement by rural women in designing technologies which could incorporate what they already knew. Ely remarked that the goal of the project was not to generate a mandate or to speak for representative publics, but to generate political debates, encourage new alliances between participating organizations, and perhaps to generate broader mobilizations when the New Manifesto is unveiled in a few months.

Questioners focused on the power of the multimedia as opposed to the case studies which were published alongside the manifesto, and which may have framed the responses from participants.

Clare Marris (LSE-BIOS), *Synthetic Biology in the UK: How to Extend Epistemic Authority*
This paper described the practices of consultation and deliberation which have come to be embedded in the emerging field of synthetic biology, at the collaborative BIOS research network run by Imperial College London and LSE. Marris reflected on the narrow role which publics and social scientists are allocated in emerging practices of consultation in synthetic biology. Partly as a result of dramatic scandals in the technoscientific arena in the 1990s, public consultation has now become standard in UK science policy, arising from a 'fear of fearful publics' by scientists and policymakers. Such consultation usually takes the form of seeking out selected 'representative' publics and running focus group exercises. In spite of a rhetorical invocation of possible public concerns, ranging from environmental health and safety through the rise of possible biohackers, the role of the public was usually circumscribed to expressing ethical and social concerns, re-inscribing the traditional fact/value separation, with scientists responsible for facts and publics for values. There is perhaps however a possibility for opening up the process of technology appraisal because social scientists are being incorporated in synthetic biology research networks from their very beginning, and because engineering is one of the participating disciplines, and engineers have traditionally been concerned with application and implementation, which require a more active role for technology users. Overall however, synthetic biologists do not allow publics to take part in knowledge making but see their role as contributing values/ethical concerns. This paper, like those by Thorpe and Reardon, commented that the metaphor of 'upstream engagement' has the effect of entrenching the idea that technological deployment is unstoppable, so that deliberation has the goal of affecting a predetermined flow of technological change, rather than of asking whether technological change is desired at all, and if so, in what direction it might proceed.

Jenny Reardon (UC Santa Cruz), *The Postgenomic Condition: Technoscience at the Limits of Liberal Democratic Imaginaries*
This paper called into question the imagination of what democracy is in the field of genomics, and among STS scholars concerned with democracy and technology. The field

of genomics has increasingly incorporated forms of public deliberation and consultation into research designs, but they have done so under very circumscribed definitions of the roles of research subjects, who are allowed to reflect upon the conditions of research but not upon the definition of racial categories. Genomics has been promoted as inherently anti-racist and researchers have adopted a liberal model of the democratic subject, in which subjects can call researchers to account, but cannot meaningfully criticize the political and economic conditions of knowledge production. For example Oprah Winfrey must accept the objective reality of not having Zulu genes, but cannot ask whether this result is caused by the lack of access to databases which sample Zulu populations (either because databases are private, or because genome mapping is privatized and balkanized). This can contribute to a neoliberalization of race, in which individuals use genomics to gain access to racial categories that allow them to secure resources, but are not allowed to question how genomic knowledge is made or what racial categories count and might be covertly incorporated into genomic research.

Reardon reflected that STS researchers need to unpack a relatively unthinking commitment to 'democracy' that may implicitly reflect liberal theories of political action, and that we need to pay attention also to institutions and distributive justice. It is important to ask why some people have resources and some don't, and what it means for ordinary language about democracy when we think about a world in which we are all living inside experiments.

Charles Thorpe (UC San Diego), *From Public Engagement to Democratic Planning*
This paper reflected on the impact of the concept of 'upstreaming' public deliberation in science and technology research and design. Like previous presenters in this session, Thorpe reflected on the ways in which the metaphor of 'upstreaming' circumscribes the role of people in technology policy and design. He pointed out that democratizing science and technology requires linking technology with action, and that for this to occur, deliberation must also allow people to engage in planning. At present, citizens are not allowed to engage in redefining production and property regimes, so that technology planning in practice takes place through the power of markets. Because markets allow those with the most money to speak loudest, they are inadequate versions of democracy (contrary to market boosters and those who celebrate entrepreneurial technological design). Planning has always taken place (e.g. in science research budgets), even in societies which claim to have relinquished the desire to plan economies. Democratic planning is therefore a necessary though not sufficient condition for democracy.

Andy Stirling: There is an assumption that participation is the same as democracy, but the emphasis on planning then shuts down the imagination and strengthens closure and control. The market and planning are both about rational closure. Thorpe answered that planning is already happening, so we need to see social agency as being defined by its ability to affect the planning that is already being conducted by corporations and others. We need a pluralistic definition of agency, which requires us to think about democratic planning.

Mark Brown: The word "democratization" is being used to stand for many kinds of

things, e.g., allowing gays in the military does not make the US army a democratic institution. These multiple kinds of openings are elements of democracy but they are not sufficient to encompass it.

SESSION 4: Roundtable:
Scientific Advice and the Crisis of Credibility in Contemporary Democracies. This session offered a venue for interaction between policymakers and practitioners, and Science Democracy Network members.

Brian Collins, Chief Science Advisor for the British Department for Transport and the Department for Business, Innovation, and Skills, gave a brief history of science advice in the UK since World War II. Early on, there was a large focus on providing operational analysis, and the organizations providing advice contained almost no economists. This shifted in the following years, and at one point almost all scientific advice consisted of how to spend public money for science. The pendulum has begun to swing back again, however. The role of a Chief Scientific Advisor is more about synthesis than analysis. It is also about brokering communities together. Collins pointed out that 70-80% of what humans have discovered has been discovered in the past generation. How are we going to pass this vast amount of knowledge onto the next generation? Intergenerational equity for human knowledge is vastly more complex now than it was 50 years ago.

Miles Parker, from the Department for Environment, Food, and Rural Affairs (Defra), asked, "What gives the government the license to operate on science policy?" His answer was its ability to influence events and win arguments, both of which require knowledge and evidence. Government departments stand on fall on three factors: luck, competence, and credibility, both with the public and with those who form national scientific opinion. The Ministry of Agriculture, Fisheries and Food, predecessor to Defra, lost credibility through its mismanagement of several disasters, most notably the fallout from Chernobyl and the BSE and foot-in-mouth outbreaks. Parker argued that, while knowledge specialists are very useful to the policy process, policy moves with such speed that there need to be systems in place to provide more timely advice.

Richard Jones, Professor of Physics at the University of Sheffield and member of the Royal Society, pointed out that science is not an autonomous force. It is directed through funding agencies, scientific communities, and users of research. But where does the public come in on debates about science funding? There are two issues which must be addressed: the first is how to identify 'the public'; and the second is how to figure out which questions to ask (and who should do the asking). The Economic and Social Research Council has performed some studies on connecting public understanding and health research, and there are calls for public engagement in synthetic biological research. However, there is also substantial opposition to these initiatives. Scientists often feel these endeavors infringe on their research. Policymakers often think they infringe on democratic processes, which should be the primary way the public informs technological decisions. Market fundamentalists believe that they are unnecessary because the market is how people express their preferences for technology.

Lindsey Colbourne, Head of Public Dialogue for Sciencewise Expert Resource Centre for Public Dialogue In Science and Innovation, described her role as finding ways to engage people around complex issues, mainly about sustainable development. In the 1990s, she conducted projects of 'co-creation' to bring people together to deliberate and actually do work. In the last decade, she moved away from stakeholder dialogue to work on representative samples of the 'untouched public', leapfrogging stakeholder interests. Sciencewise has been championing that role for several years. The challenge now, Colbourne postulated, is to bring public involvement together with groups like Sciencewise. Key to this is generating a constant feedback loop at the local level between the public and governing bodies.

The panelists were asked to look to the future of the involvement of science with policy. In particular, when British policy is shifting to a state of austerity, does scientific investment seem too extravagant? Collins pointed to the need to understand the different 'heartbeats' in parts of society: some parts operate on a daily cycle, some over months or years. There is an important need, he asserted, to get politicians to understand that the pace of change cannot operate on only a short time scale. Parker pointed out how the current coalition government was actually providing discrete problems for departments. He was upbeat about the budget cuts that are coming, pointing out how such cuts often force departments to be more inventive. Jones argued that, in the last ten years, there has been a shift in resources from departmental research to academic research. This has led to less science being of policy relevance. Parker seconded these points, and Colbourne pointed out the need to develop methods of shifting through the increasing amounts of information that policymakers have available to them.

After the panelists concluded their remarks, SDN members had a chance to comment. In response to a question about how social science has been used to date in policymaking on issues of science and technology, panelists responded that, while interdisciplinarity is not a goal of policymaking, most of the problems that departments deal with are multifaceted. As a result, they have been seeking ways to get disciplines working together in providing policy advice. There is also an initiative within the Department of Transport to have sociologists study why people make journeys today, and how the transport system might be reshaped to better aid those journeys. In response to a question about how to avoid the mistakes of the past, the panelists pointed out that framing the issues is of key importance. Departments should provide an initial framing that is then re-framed with a wide variety of people. There were also suggestions for more continuing engagement practices with local publics.

In commentaries from SDN members, **Brian Wynne** discussed how it was useful to look back on the Brent Spar episode and how little policymakers seemed to have learned about alternative problem framing from it. With synthetic biology on the horizon, and particularly with Craig Venter's claim to produce a 'minimal functional genome', there are a lot of questions to be asked about the types of society and environment we want to live in, and how these developments with fit with those visions.

Andy Stirling laid out three possible roles for STS in engaging with policymaking:

- The Skeptic: this role takes seriously the scientific mission to question assumptions and open up new areas of inquiry. Such was the case with the Agricultural and Environmental Biotechnology Commission, initially set up by Defra to create a firewall with the public, but instead broke through barriers to point out important questions that were not being asked.
- The Joker: this role provides a way of speaking 'truth' to power in the medieval sense, where the 'truth' is that science is about power as well, and the more knowledge we have, the less we actually know.
- The Dance Partner: while Stirling was not too happy with the name of this role, it is perhaps the most important. It encourages thinking about intervention and experimentation in the policy process, but also with entrepreneurship. It has a focus on generating new kinds of hybrid science-policy-public knowledge. It involves not only talking, but also *action* by the STS researcher on the policies discussed.

Clark Miller discussed how, in the US, the credibility crisis is a bit more serious than it appears in the UK. With 9/11, two wars, hurricane Katrina, and now the oil spill, it looks like US institutions are incapable of grappling with the challenges that society faces. That is combined with a culture within US government departments that does not encourage institutional experimentation. We are now in a constitutional moment, and the UK is part of it. Many of these issues do not adhere to nation-state borders, and they raise deep questions about human identity and the nature of the world in which we live. Scientific advisory process in the US needs to be developed, but that redevelopment should be done in partnership with British and other colleagues. Americans have much to learn from Britain on reshaping the science-policy interface.

Sheila Jasanoff then offered a few synthesizing points and a wish-list for the panelists. Jasanoff's wish-list included:
- How to focus research funding to encourage a productive 'clash of temporalities' between policymakers and expert advisers;
- How to foster scientific hybridity, even within the natural/life sciences, let alone with the social sciences and policymakers;
- How to open up the more traditional scientific community to accepting the value of STS research;
- How to cultivate relationships with the media so as to not exacerbate the (mis)understanding of science.

SESSION 5: Technologies of Security
Chair: David Winickoff (UC Berkeley)

Jay Aronson (Carnegie Mellon), *Civilian Casualty Estimation in Times of Armed Conflict*
This paper focused on the quantification of the number of casualties in Iraq and raised the political implications of quantification. Successive wars in which the U.S. was involved – especially the Vietnam War – transformed the number of casualties into a public issue: body count became an issue for policy-makers as it could make support for war dwindle. Aronson argued that the U.S. government has been dealing with the issue by maintaining

ignorance about quantified numbers. The example of the first Gulf war shows that media coverage is no guarantee for transparency about numbers: while a "clean war" based on military technologies of surgical precision was pictured in the media, the huge number of conventional weapons was not visible, and the number of civilians killed remained unknown. Indeed, counting relied on underestimated sources, such as body count in hospitals. Lots of methods are used to quantify the number of casualties. They are mobilized by research groups coming from different disciplinary areas, and have used various sources and methodologies. Yet the fact that these groups do not communicate about the data they use makes it difficult to pursue a meta-analysis of the results. Aronson argued that such study would matter, as it would shed light on such crucial political issues as the number of civilian deaths or the effectiveness of the counterinsurgency strategy. The paper proposed some recommendations: organizations and agencies should be encouraged to produce numbers, government bodies should set standards for data sharing, comparative analysis should be performed in order to identify the choices made by each methodology.

The author himself is involved in the making of indicators of war casualties. The discussion that followed the presentation addressed several analytical approaches that can therefore be considered. As many STS studies have shown, indicators are political constructions as much as technical instruments. The ethnographic study of the production of a robust indicator could shed light on the construction of indicators in the case of the quantification of war casualties. Another topic of interest for fieldwork relates to the strategic production of ignorance: as the paper hints, ignorance in this case seems to be a conscious political choice. Examining the details of the processes through which the number of war casualties is made difficult to objectify appeared a fruitful way to make sense of this empirical case.

Sam Evans (Harvard), *Imaginaries of State Security*
This paper used a long-term historical approach to study export control of "militarily significant" goods, and relate it to different imaginaries of the State. The first period that the paper identified is pre-World War II, during which the creation of the nation state made it necessary to ensure export control for the protection of the State. States needed to control export of the goods that could be used against them during a war, while ensuring free trade on other goods. The goods to be controlled were those required to maintain the territorial integrity of the state. During the Cold War, the logic of export control consisted less in controlling the borders than in enforcing an ideology: export control was a means to control the threat of Communism. Hence the technologies that were supposed to be controlled were those that could be used as resources for Communism to spread across countries: nuclear weapons, but also dual-use technologies and large technical systems. The idea of containment is now breaking down, as the development of "anomalous technologies" (biotechnology, emerging technology, cybertechnology, terrorist technology) forces the meanings of control and state security to be reconsidered. The imaginary of nonproliferation is then the standard. It leads to shifting the identity of the enemy, from other states or other ideologies to less defined (terrorist) groups.

The discussion helped clarify that sociotechnical imaginaries of state security rely on material devices used to control exports, constructions of threats and enemies, and representations of the state itself, as independent and self-defensive. Questions were asked about the relevance of the category of "anomalous technologies." As an actors' category, it may prevent the analyst from deciphering issues of power allocation.

Ben Hurlbut (Harvard), *Containing Potential: Human Cloning, Moral Risk and the Legacy of Asilomar*
Like the previous one, this paper problematized the notion of containment. It focused on the legacy of the Asilomar conference, during which scientists gathered to discuss potential hazards of recombinant DNA research. The memory of Asilomar is frequently invoked, and has become a success story of managing technologies in which an autonomous scientific community provides a perfect example of responsible science. Hurlbut argued that the legacy of Asilomar can be understood as the crystallization of the "right ordering" of public institutions within an American imaginary of containment, that is, a demonstration of an ideal arrangement between technical experts, political actors and public opinion, in which autonomous science is to make decisions about the future of technological development. Current scientific developments and their discussion in public arenas solidify the imaginary of containment activated by the Asilomar conference. The cloned sheep Dolly might be the best illustration of a process that describes scientific change as inevitable, while law, norms and, more generally, public reasoning, inevitably lag behind. Within this approach, concerns are formulated as risks to be contained, the issue being not about the risk frame itself but about what the risks are and how to contain them.

The example of biotechnology made participants reflect on the significance of the Asilomar legacy in other technological areas. Current developments in synthetic biology show that the containment imaginary is well entrenched in the making of science policy: risks are the topic to focus on, while autonomous science is expected to provide the necessary tools for responsible research. Yet not all technological systems deal with the containment imaginary in the same way. As was mentioned during the discussion, historical evolution from technology to technology (e.g. from biotechnology to nanotechnology, from nanotechnology to synthetic biology) constructs a set of references that gradually need to be considered in science policy circles.

Kjetil Rommetveit (Bergen), *Biometrics: Technology of (Dis)trust*
This paper proposed to analyze large scale biometric information systems in the EU as a technology of (dis)trust. "Technologies of trust" are those used to authenticate an individual in order to establish confidence in the truth of some claims. Employing the measurement of biological data (fingerprints, iris scans, voice, DNA…), biometrics are based on "something one is" rather than "something one has" or "something one does." As a consequence, the current situation with biometrics is that of technological "slippery slope," in which authorization shifts to accountability as biometrics connect an event to a single individual, and from authentication to identification. The European example shows that the implementation of biometrics relies on forms of political organization in which decision-making is mostly a matter of centralized governing bodies interested in security

issues, while citizens' concerns are framed in terms of user friendliness. Thus, biometrics displaces trust and distrust, and constructs new chains of (dis)trust among European countries and citizens.

The discussion mostly focused on the issue of trust. The notion is complex to deal with analytically. Some participants suggested that STS might be more equipped to study issues of accuracy and legitimacy, as these notions are the outcomes of chains of technical and political elements. On the other hand, using "technology of trust" as an analytical category is a way to account for a system of two-way (asymmetrical) relations between the individual and the state.

<u>Common themes throughout the session</u>
<u>Control and containment</u>
All four papers addressed the issue of control. They discussed control exercised by the state on material objects (e.g. export goods, scientific objects like clones or stem cells), public numbers (casualty numbers), and biological data. As the coproductionist idiom in STS suggests, they pointed to the construction, in this very process, of the state or supranational entities (like the European Union), as well as of the individual (the enemy, the citizen, the terrorist). These processes of control are based, in these papers, on forms of containment: of scientific risks, anomalous technology and terrorist threats, but also of public images (e.g., of the military).

Defining objects for public action
The state appeared as a central actor in this session, as an entity able (or not) to control and act on material objects and public issues. Another coproductionist theme here is the mutual constitution of objects for public action and methods to deal with them: lists and classification of goods are made as methods of control are enforced; scientific issues are framed as delegation to an autonomous science is put in place; biometrical data are produced in order to fit with large scale control systems. The session's first paper offered an interesting counterpoint: in this case, the object for public action (the quantitative number of war casualties) is *not* constituted in order to render public action impossible.

Constructing political categories through technological operations
All four papers in the session offered guidance in the study of political categories, such as the state or the citizen, which differ from traditional political analysis. Rather than trying to locate the state in particular institutions or types of action, the approach that stemmed from the papers bases the study of the state on the analysis of the various trials through which technological systems are put in place to deal with complex issues – this very process also constituting forms of citizenship, and public issues themselves.

SESSION 6: States and Spaces
Chair: Clark Miller (ASU)

Rob Hagendijk (Amsterdam) and **Tiago Santos Pereira** (Coimbra), *Socio-technical Imaginaries and the Future of Europe*

This paper used high-level policy documents from the EU to indicate how sociotechnical imaginaries can be revealed. Imaginaries are defined by Jasanoff and Kim (2009) as: "collectively imagined forms of social life and social order reflected in the design and fulfilment of nation-specific scientific and/or technological projects… Imaginaries… at once describe attainable futures and prescribe futures that states believe ought to be attained."

The presentation started with the 2000 Lisbon Agenda from the EU, which emphasized a new knowledge-driven economy for the EU. This document stated, for example: "the Union has today set itself a new strategic goal for the next decade: to become the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion." A new report, EU 2020 revealed a different imaginary based on "smart growth" (based on knowledge and innovation); "sustainable growth" (based on resource efficiency); and "inclusive growth" (based on employment and territorial cohesion). This document used words such as "Youth on the Move," a "digital agenda for Europe," and "industrial policy for the globalization era." The authors argued that the two documents reveal a change in imaginaries from information and computer technologies and industrial competitiveness towards themes such as sustainability, low carbon growth, and a leadership role in human rights, environment and multilateralism. Reports also show a growth in references to new countries in particular Russia and China, a shift from the traditional vision of Japan and USA as the EU's main competitors.

Questions: Most questions focused on the analytical value of imaginaries. Are they a space for rhetoric (Mathews), or can they represent deeper changes in political viewpoint (Forsyth). Also, how can research on imaginaries include analysis of themes not made explicit in documents? The authors answered by asserting that imaginaries are useful performative expressions of a shared hope for the future, and hence offer more than rhetoric and discourse alone, which might reflect a more historical bias.

Tiago Mata (Amsterdam), *What Doesn't Kill You Makes You Stronger: Public Image, the State, and Research in Economics, 1970-1985*
This paper focused on the history and sociology of economics to discuss the public discourse on economics and the role of the state. The main theme was how the 1981 crisis in US funding for social scientists produced or reflected a change in how patrons of science approach social science. The work of Thorstein Veblen (1999) was used to identify three regimes of scientific patronage and production in the US. First, "Captains of Erudition" (1890 to WW2), referred to the rise of corporate laboratories and liberal arts without a federal role. The "Cold War regime" (WW2 to 1980) described a period when the corporate role was lost because of the rise of arms contracts and the expansion of research universities. And the "Global Privatized Regime" (1980 to today) refers to the outsourcing of R&D; the rise of start ups and venture capitalism; the severing of research and teaching in universities; and privatization of publicly funded research.

In 1981, the first Reagan budget cut NSF funding by 75 percent (although increasing funding to Physics by 22 percent). A lobby group for social scientists, the Consortium of

Social Science Associations, and various economists pointed out that the conservative ideas in the budget came from research economics, and especially from the American Economic Association, located outside DC to indicate its political neutrality. Despite this, Reagan's staff included David Stockman, an economist, who urged a continuation of funding. The strategy worked, because the economists were able to mobilize a narrative of vindictiveness by the state, which in turn fed the growth of supply-side (or Chicago School) economics, which positioned itself as integral to the state. Consequently, economics protected itself from budget cuts in the 1980s by "outsourcing" or privatizing patronage to professional economists linked to the state who were able to inform the NSF. This transition occurred at the same time as the new regime of research patronage, which indicated an end to the discourse of "public" purpose and "national" priorities for social science, and a shift to a more pro-market approach including self-interested campaigning for economics alone.

Questions: One comment (Guston) pointed out that cuts were not just to agencies such as the NSF, but to the policy planning and allocation aspects of these agencies, which also implied a change in how evaluation and allocation were undertaken. Another comment referred to whether the influence of the economists in this process could be called "capture," and whether "influence" was a better word. The author suggested that economists themselves use the public choice school of reasoning that already incorporates the meaning of "capture" and competition, and hence perhaps it is reasonable to use this word.

Andrew Mathews (UC Santa Cruz), *Making Mexican Forests Public: Climate Change Science, State Making and Accountability*
This paper compared the responses to two state-led schemes for forest management in Guadalajara in northern Mexico: adopting reforestation and Payment for Environmental Services (PES). The President of Mexico had promised in 2008 that the country would lead the world in tree planting and in integrating indigenous people into this process. To do this, the state had to invoke an imaginary of public participation in forest management. Opponents of the President called it another form of authoritarianism. NGOs reported that tree planting was not working well, and Greenpeace caught public attention through a mass protest depicting mass reforestation as a graveyard for trees. These protests were met with audits and counter-audits by the state and its opponents, each claiming relative success or failure, but mostly indicating that statistics did not establish trust. Moreover, the opponents refused to liaise with state representatives to avoid being co-opted into state announcements. The PES scheme also met opposition partly because the price was fixed for various carbon, water and biodiversity values, and most people did not trust the state's involvement.

The state countered by trying to invoke an image of participation in measuring and planting trees. One model of future benefits from PES also factored in assumptions about potential profits from the areas of the country that are predicted to reduce deforestation fastest. These assumptions linked deforestation with the location of indigenous people— which implied hidden assumptions about the nature of deforestation, and the potential

buy-in from indigenous groups that the presenter found worrying because of the model's simplicity and incorporation of preferred social order.

Questions: These focused on the model of indigenity and potential reduced deforestation. How was this constructed? Could the map also offer positive outcomes in terms of empowering indigenous groups (Rayner, Aronson)? Mathews suggested that it could be a positive outcome, but only in terms that were prescribed by the state and included displeasing assumptions about poorer people and visions of progress.

Integrative questions sought to clarify the value of the term "imaginary": does it offer more than discourse or rhetoric? Another question was whether imaginaries hide post-Marxist categories of social marginalization by suggesting a discursive and communal vision (Reardon)? Rob Hagendijk argued that imaginaries offer a level of analysis about capturing desired perceptions and frames for the future that are missing in existing terms. Moreover, they offer a space for looking at how projected futures are contested. Andrew Mathews suggested that "imaginaries are productive"—i.e., that they are creative spaces. We should welcome the term because there is an innate politics in talking about the possible rather than the mundane.

SESSION 7: Political Subjects
Chair: Shobita Parthasarathy (Michigan)

Mark Brown (Cal State Sacramento) and **Silke Beck** (UFZ-Leipzig), *From Politicized Science to Politicized Democracy: Implicit Conceptions of Democracy in Recent Debates Over Climate Science and Policy*
This paper explored how politics of climate change are changing conceptions of democracy, suggesting that climate science and policy are being constructed and justified with reference to various different conceptions of democracy. The authors discussed several different conceptions of democracy in relation to climate change, asking what "climate democracy" might look like—what forms of representation are best suited to contending with the problem of climate change. The linear model of science advice defines democracy away, making the efficacy of science advice the measure of political legitimacy. Cosmopolitanism is problematic because there is not a "people" that exists prior to structures of representation. Finally, an intergenerational approach that focuses on obligations to future generations tends to see democracy as a threat since it is an expression of interests of present, not future constituencies. But democracy can be stretched beyond a principal-agent conception to include representation of non-authorizing constituents. The paper concluded that climate change provides an opportunity for rethinking notions of democratic representation in productive ways that can contend with problems of internationalism and climate justice, and also help identify some limits of democracy for solving complex problems.

Questions: How do accounts of climate democracy related to social movements focused on climate justice? How does this change between contexts—e.g., in South America where intranational disagreements are celebrated as a manifestation of emerging democracy, but when approached on an international level by the same states, they switch

to a discourse of justice? How can we operationalize the idea of democracy when dealing with a radically different array of possible pathways that cannot be pursued together. Answers: the purpose of the paper is to open up a discussion about inclusion and exclusion that is more focused on procedures and less on outcomes.

Erik Fisher (ASU), *Changing Practices: Engagement of Science and Technology Experts in the Making* (presented by David Guston)
This paper described the NSF funded Sociotechnical Research Integration Project (STIR), a version of a laboratory engagement project conceived at the ASU Center for Nanotechnology and Society. The impetus for project comes out of American legislation that mandates integration of social science and humanities research with nanoscale science research in the lab. A challenge for science policy is finding mechanisms for influencing the direction of research. These tend to be limited to controlling funding and regulating technologies downstream. STIR experiments with a "midstream modulation" approach by targeting features of laboratory practice, specifically: 1) the cognitive, social and material coproduction of research practices; 2) the forms of reflexivity of the practitioner. The STIR project places doctoral student from various disciplines in the lab to work alongside and actively engage with researchers about the social significance of their work. The project seeks to determine whether engagement with the researcher can engender increased deliberation and reflexivity in the conduct of research. The method is Socratic engagement with the scientist: What are you doing? Why are you doing it? How could you do it differently? The findings suggest that changes in researchers' approaches can be effected in short time periods. STIR researchers observed changes in scientific and technical practices, in the nature of research agendas, in materials being used, in environmental health and safety practices, etc., thus demonstrating the importance of pedagogy and the ways thinking is shaped in the laboratory.

Questions focused on why the lab was the appropriate site for engendering midstream modulation, and on what sorts of considerations/ responsibilities are appropriate to address in the lab. What do the people in the lab think they're being responsible for? Another question focused on measurement: though the project is ethnographic, it seems to assume that overall effects can be measured. How? Answer: the STIR protocol is lab focused, so doesn't address some of these concerns. But it is also an attempt to see what short-circuiting of the problem of top-down management might look like by intervening in practices in the lab.

Brice Laurent (CSI, Paris), *Representations at Distances: Displaying and Practicing Nanotechnology Debates in the Science Exhibit*
This paper examined how social considerations of nanotechnology are presented in science museums. Science museums play an important role in shaping how technologies are viewed, and they are an element of science policy as policy officials often have a hand in shaping museum exhibits. Each museum incorporates some notion of public understanding of science. As such, they produce representations of nano and society. The paper examined three exhibits, one French, one EU sponsored, and one American. The French exhibit was interactive, and engagement-focused. It allowed people both to interact tactilely with materials and to write and post their responses and ideas. The EU

case explicitly rejected the public understanding of science model, instead seeking to engender "technical democracy" by producing representations of the European public in relation to nanotechnology. The focus was thus less on providing representation of nanoscience and more on how to imagine European society in relation to nano. Finally, in the US case, museums tried to avoid simply providing information to the public—the "public understanding of science" model—by producing opportunities for engagement and deliberation. However, it differed from the French and EU case in that engagement was meant to produce sensible citizens who would have the proper conception of their relation to technology as a consumer, tax-payer, etc. Thus science museums are an important site for examining how democracy, citizenship, and public issues are produced.

Questions focused on whether "democracy" is the right frame for this sort of analysis. Why not talk about civic epistemologies instead and examine museums as sites not for producing democracy, but for (re)producing civic epistemologies? This might give greater analytic refinement. Answer: the paper used democracy because in these cases it is an actors' category. In all three contexts, actors talk about democracy.

Bron Szerszynski (Lancaster) and **Linda Soneryd** (Score-Sweden), *New Topologies of the Public: Science, Technology and Political Subjectivity*
This paper explored the ways publics are constructed in relation to S&T policy within public engagement exercises. The authors contended that these exercises should be seen as technologies for generating different kinds of publics. They criticized some of the normative underpinnings of dominant approaches to deliberative exercises. Deliberative Democratic Theory, for instance, assumes a purity of public reason that can be ideally unconstrained. But, the authors argued, notions of publics and politics are always produced by established machineries. These should be recognized as producing particular kinds of public reason, not as allowing some pure form to emerge unconstrained. On the other hand, STS critiques of public engagement exercises have pointed out how these are not places where politics happens so much as expressions of pre-political associations that produce particular forms of politics. The authors agreed with this critique, but suggested that these exercises are worthy of study nevertheless because they are in increasingly common use. To what they described as an essentialist notion of political subjectivity, operative, for instance, in deliberative democratic theory, they propose a theoretical approach that emphasizes relations, transformations, and scale and focuses on the "topology" of the political subject. In acts of engagement different identities, interests and capacities are put in specific topological relations of inclusion and exclusion. These mechanisms control the conditions that determine what forms of politics emerge. Thus to properly analyze deliberation, one must attend to the way particular deliberative mechanisms like the citizen's jury, the focus group, and the scenario workshop draw topological relations between approaches/competencies that participants explicitly employ and those that they do not. It is not merely a matter of doing these exercises well, but of attending to the sorts of politics they are likely to elicit.

Questions: It was suggested that some essentializing happens in the characterization of "topological" differences between types of engagement exercises, as if giving "types" of topologies. What difference does focus on technical issues make, especially given that in a Sciencewise exercise, participants are not supposed to have specific technical

knowledge, whereas in everyday politics, people are entitled to knowledge, interests, etc. Given that topologies may vary depending on the focus of the exercise, can one draw any general conclusions about typologies of engagement rather than examine them case-by-case, especially since public talk employs inside-outside topologies. Answers: the authors were concerned to avoid any essentializing tendencies in their topological analytic because they want to shift attention from the static and structural to the dynamic (Deleuzian) relations that shape possible forms of political subjectivity.

General Discussion
The general discussion focused on how models of public engagement assume certain types of publics. Is a public brought into being by an issue (Latour/Dewey)? Or is it better understood as "submerged network," present already, but brought to life (or into a new configuration) around controversy. One example was given (by B. Wynne): the public which appeared to be created by nuclear power is seen as coming into existence in the 1970s. But prior to that there were local public inquiries in UK on local nuclear power stations. In each of those public inquires, there was a somewhat disparate, but articulate, public. This contradicts the need for a mechanistic way of seeing how publics get made—as if there is a vacuum there until issues affect them. An alternative reading of Dewey was proposed wherein the emergence of a public is more like emergence of an imagined community. It is a hermeneutical moment: a prior collection of people is brought into a mode of communicative exchange that produces a changed set of relations and a changed imagination, and thereby a public.