

SDN Meeting Report 2009

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Session 1: Democracy

Chair: Les Levidow (Open University)

Charles Thorpe (University of California, San Diego), *Participation as Post-Fordist Politics: Demos, New Labour, and STS*, presented a genealogy of the participatory impulse in UK science policy. He argued that the acceptance of public participation in science policy is one element in a broader set of initiatives that has opened British policymaking to participation. He traced this push to Third Way politics and the post-1997 New Labour program. Third Way thinking originated in part in the discussions of post-Fordism in *Marxism Today*. In this post-Fordist thinking, participation was linked with the dynamic, rapid feedback from market to production. and advanced as a model for effective policymaking. Thorpe argued that these ideas made their way into the Third Way through the efforts of the Demos think-tank.

Discussion: Some took issue with the UK government's approach to public participation. Thorpe noted that the rationale for increasing public trust and confidence in S&T is consistent with the ideas of *Marxism Today*. STS scholars' criticisms of UK participation mechanisms is similar those of critical scholars on other areas of UK policy.

Erik Aarden (Maastricht University), *'Socializing' European Research – A Direction for Democratization?* discussed results from an EU-based research project on the 'socialization' of science. The project was an effort to shift focus from the democratization of interest in science to broad public engagement with the benefits, opportunities and risks of S&T. The two-phase project consisted of phone interviews with scientists and policy makers to determine how they conceive of 'socialization', followed by an analysis of answerables and a set of social experiments to improve it. The primary deficit in 'socialization' identified in Phase one was researchers' inability to establish collaboration with industry. Phase two sought to remedy this. Aarden argued that, while these experiments do not speak directly to STS concerns with democratization, they do seek to give the public a sense of ownership and responsibility for science and technology. As such, they have some relevance to a shift in STS-focus from representation to agenda setting.

Discussion: The concept of 'socialization' and the relatively narrow scope of the experiments were challenged. Aarden explained that while the project was interested in revealing existing relations, socialization also had a normative valence: to help establish new links between science and society. Aarden explained that the industrial focus was in part a function of scientists' interests. Scientists identified the interface with commercial industry as an area of 'socialization' that could be improved.

Silke Beck (Helmholtz Centre for Environmental Research – UFZ), *A Democracy Paradox in Studies of Science and Technology?* linked scholarship on democratization of S&T to deliberative democratic theory (DDT) in order to open up interaction between the scholarly domains. Her analysis focused on a problem with the academic project of democratization of science which she called the ‘democracy paradox.’ Beck characterized the core difference between DDT and STS: the former is interested in deliberation as a means toward consensus formation while the latter sees deliberation as a forum for the expression of social heterogeneity and pluralism. At the same time, however, STS and DDT share concerns with democratic legitimacy; both challenge elite institutions to justify themselves in terms of accountability, publicity and reciprocity with dissenting positions. Thus while DDT can rest its arguments on a prescriptive, universally valid account of legitimacy, the constructivist orientation of STS must necessarily derive its account of legitimacy from the specificities of institutional and political context. Beck argued that in order to move from the theoretical to the practical, STS must bring its ethnographic resources to bear on notions of legitimacy itself.

Discussion: Questions were raised about the instrumental role of participation in constructing citizenship itself. It was suggested that deliberation might be a worthwhile site for examining and making more explicit the notions of citizenship. It was also noted that there is significant variation in satisfaction with public participation.

Tim Forsyth (London School of Economics), *The Boundary Politics of Adaptation Science*, discussed the creation of boundaries in ‘sustainability science’ and ‘adaptation science’. Adaptation science takes steps on the local level to reduce the damaging effects of climate change on local populations. Its focus is necessarily on local practices and as the problems it identifies are not generalizable. Sustainability science, on the other hand, examines phenomena on the global level. In identifying changes, it fails to recognize how changes are variably experienced and treats them immediately as problems, what Forsyth described as the ‘problem-process fallacy.’ This approach leads to premature ‘problem closure’ where the identification of a problem directly implies a solution. Furthermore, the characterization of global solutions ignores the coproductionist politics of identifying problems and solutions. The linear approach of sustainability science was contrasted with ‘syndrome science’ which takes into account the complex features of the local in addressing the effects of global change on the quality of lives. Forsyth described the tensions between development concerns and the possibilities for deliberation as shaped by policy makers under the IPCC. The global focus of climate policy is excluding consideration of local effects, adaptation possibilities and ‘syndrome science’ approaches.

Discussion: It was noted that sustainability science is a ‘big tent’ and includes attention to vulnerability, poverty, inequality, etc, but that all are positioned under the rubric of a scientizing systems orientation, rather than a locally focused syndrome diagnostic approach. The difference resides in part in approaches to risk. In identifying risks in terms of global climate change, mitigation is limited to emissions management rather than the adaptation of local practices (e.g. livelihoods) to changing environments.

Session 2: Scientists at Work

Chair: Ulrike Felt (University of Vienna)

Alex Wellerstein (Harvard University), *What can nuclear weapons tell us about the regulation of emergent technologies?* The paper reintroduced contingency and agency in the history of the atomic bomb and used that material to illuminate the potential future challenges associated with the weaponization of biotechnology, nanotechnology, and other emerging technologies. Nuclear technologies are already emergent analogies in public discourses about these issues, in large because they represent the apocalyptic potential of science and technology out-of-control. A key question emerges around technological determination, particularly in the assumption that the public availability of scientific knowledge will inevitably give rise (or at least open the possibility) to use that knowledge for weapons. This model is too simple, however, if we account for tacit knowledge, industrial capacity, and raw materials required for weapons production. The Acheson Report, for example, puts a strong emphasis on securing materials, while arguing that control over knowledge itself is very difficult to achieve. On the other hand, other examples from nuclear history, from Klaus Fuchs to A. Q. Khan suggest that knowledge transfer is not irrelevant to the history of nuclear proliferation.

Discussion: Intelligence systems make it extremely difficult to manage people with know-how; consider the example of the weaponization of anthrax. The larger question is: who are the imagined perpetrators and what are the consequences of training people who are capable of making weapons? We must also pay attention to the decentralization of, e.g. the biotechnology industry, as it affects the differentiation of capabilities and capacities, as well as, to some degree, their unknowability.

Regula Valerie Burri (ETH and University of Zurich), *Visions of public engagement: nanoscientists' understandings of science-society interactions*, drew on interviews with nano-scientists in Europe about the question of participation and especially how these scientists imagine science-society relations. Shared views include: no awareness of different institutionalized forms or informal vs. formal events, and an awareness of the importance of public engagement for nanotechnology. Scientists acknowledged the need for dialogue and upstream engagement, but implicitly made dialogue into dissemination and generally focused on downstream modalities of engagement. The interviews gave rise to four models: (1) Educational – unilinear science-society relations; explain the facts to lay persons; hierarchical deficit model (Wynne). (2) Paternalistic –citizens imagined as active performers who express emotions, hopes, and fears and ask questions; scientists' role is to include taking care of citizens' fears and concerns. (3) Elitist – complex science-society relationships; public includes two type of citizens: passive citizens and actively engaged, well-informed lay person who is engaged in science (lay experts); real dialogue only possible with lay experts. (4) Economist – market mediates science-society relationships; participation of citizens as consumers. These were compared to an STS model: (5) Emancipatory – intertwined science-society relationships; dialogue as dominant paradigm; citizens are interested and engaged; symmetrical.

Discussion: Is there a difference between engagement and markets? Nanoscientists saw a clear difference, seeing products as beyond their control but also did not view engagement as important for research ‘products’. Why did scientists differ in their models of citizens? Is it disciplinary? What legitimizes these models in scientists’ views?

Annalisa Saloni (Cornell University), *Delegate or perish: competitive federal grants and the current organization of research and training in academic labs in the biomedical sciences*, explored how funding practices have limited the autonomy of researchers in Canada. Dependence of professors on competitive federal research grants has reshaped the organization of research and publications in laboratories. The Canadian shift in scale of laboratory research groups is a response to the rise of competitive federal research grants and the dependence of labs on this funding. In the 1960s, all professors had one grant which was renewed so long as the faculty members remained productive. Shifts in the economy of funding in the 1980s gave rise to pursuit of multiple grants, support of graduate students, and (if successful) the construction of larger grants. Now, faculty are required to maximize productivity in terms of publication: delegation of experimental work on faculty projects to trainees; sharing authorship credit with people doing technical work. Competitive grant funding can be seen as an instrument of research governance. This is an example of principal-agent theory. Shows the importance of political economy of research within universities.

Discussion: How do lab profiles shift over time? How and why did the competitive grant model emerge? Is the university requiring it? Is it because the new science is more equipment intensive? Is it technology rather than the grant that’s the instrument? Is it economies of scale? Medical Research Council made renewals more competitive.

Brian Wynne (Lancaster University), *Scientists and social scientists at play on democracy, again*, told about a ‘failed experiment’ of mass participation in science. Experiments were launched by the Hadley Centre and the Natural History Museum, two major players in global environmental science. This was an exercise in mass environmental monitoring, organized by major scientific organizations, some local environmental groups, some artists, and some STS scholars. It began with a 2-day workshop to do a planning exercise to take place at a cultural festival in Manchester. Focus was on what kind of practical participatory experiments would be meaningful to scientists and also exciting enough to engage Manchester citizens. Climate scientists wanted to do bubble experiments to measure thermal gradients. The biodiversity exercises focused on biotagging, where citizens would pick up and record anything that they saw as significant. The purpose was to develop and document local classification systems of meaning. The workshop was to conclude with a reflective exercise. As it turned out, there were very few participants who were not involved in the exercise in another capacity. The climate scientists clearly saw the exercise as providing no meaningful data, treating it instead as public relations. Politicians explain this sort of failure as a function of the public being uninterested in meaningful policies. Toward a better explanation: is there a connection between the narrowness of scientific framing of these problems and the lack of effective engagement of public communities? The nature

of the deliberations around science serve to maintain the narrowness of the public meaning of issues as given by science.

General Discussion: How are meanings attached to science when science enters the public realm? All four papers are interested in boundaries between who's inside science and who's outside, who controls that decision, and what relationship is imagined between scientists, citizens, and the state. The role of scientists in relation to the core orders of the techno-political-economy is ambiguous. From nuclear power and nuclear weapons to the knowledge economy, scientists sit well within the core techno-political-economy, but on climate change and biodiversity, they stand in opposition to deeply embedded large-scale technological-economic-political orders. Does the political economy of research funding look different across disciplines and countries? This raises the further question of where scientific research begins, and why.

Session 3: Life, Property, and the Public Interest

Pierre-Benoit Joly (INRA/SenS and IFRIS, Université Paris Est), *Performing Life through patents – The Case of small RNAs*, discussed recent shifts in the production of biological knowledge, driven in large part by new work on small RNAs. The analysis centered on the interaction of new shifts in knowledge, transnational intellectual property rights, and patent practices at the USPTO and the EPO. By highlighting the inability of patent systems to deal with the complexity, multifunctionality and contingency exemplified by the mechanism of action of small RNAs, the authors draw our attention to the ordering effects of the patent system. As patent rights presuppose specificity and replicability, small RNA patent applications tend to utilize a reductionist frame focused on actions on specific genes, contrary to the evolving scientific understanding that seek to “de-center” the gene. Thus the authors argue that the “stability of the legal form of patenting” affects the structure of small RNA patent applications. In essence, the legal requirements for granting a patent affect not just the patent applications, but also the conduct and trajectory of research even when contraindicated by contemporary scientific understanding of small RNA action.

Jonathan Kahn (Hamline University), *The Persistence of Race in Biotech Patenting and Drug Development*, described the utilization and capitalization of race in biotechnology. Kahn observed a rapid fivefold increase in racial and ethnic categories in biomedical gene-related patents over the past decade. Examining patent applications, medical trials and genomics advertising, the paper demonstrated the persistence of race as a social and biological category, belying the essential promise of pharmacogenomics: truly individualized medicine. The central thesis is that the persistence of race is driven by both the economic rationale of profit maximization and the deployment of race as a residual category. Race is employed in two ways - defensive patenting and market/patent differentiation. Defensive patenting occurs when racial applications are employed to strengthen patent applications by increasing their specificity and narrowing their claims. Race is also used to differentiate patents by delimiting the scope of the application to particular communities, and in niche marketing of biotech. The paper argued that race

persists as a category in biomedicine because it provides a useful explanation for unknowns in biomedical research.

Martin Rémondet (IFRIS - Unité INRA/SENS), *Regimes of knowledge production in tension – Patenting animal cloning between assisted reproduction and biotechnology*, investigated three examples of French biotechnological patents, with the aim of understanding how biotechnology innovations exist within, and/or may be generative of particular normative frames and conversely, how these frames shape research strategies. In the first case, INRA researchers filed for and received wide-ranging patents from the EPO, covering the technique of producing clone mammals. The second case examines the patent for the nuclear cloning of a rabbit. This patent, the result of the INRA licensing their cloning technology to biotech firms, covers the creation of a new class of objects – cloned rabbits. It also extends ownership rights over the rabbit to the holders of the patent. The paper argued for an expanded view of patents, not only as tools for the protection of invention, but also as “the codified stabilization of networks” of actors which “articulate their interests within the frame of intellectual property rules.

Shobita Parthasarathy (University of Michigan), *Postmodern Bureaucracy? Science and the Public Interest at the European Patent Office*, examined how the European Patent Office (EPO) has responded to increased public criticism and attention, especially over the granting of biotechnology patents. The EPO’s process of dealing with challenges to patents allows any third party to “oppose” the patent on reasonable grounds, and various stakeholders have used this mechanism, along with the morality clause in the 1973 European Patent Convention, in opposing particular biotech patents. Surprised by the vigor of public resistance, EPO created a new category of sensitive, possibly problematic cases, and an alternative knowledge system within the bureaucracy to handle these cases in a process Parthasarathy labels the “routinization of morality.”

General Discussion: IP regimes seem to be generating a set of competing logics, including divergences between the thing that is being studied and the thing that is being capitalized, between visions of the public good, between the bureaucratic logic of patent evaluation and economic accounts of efficient generation of innovation, and between whether they are enhancing or inhibiting scientific practice. As a result, IP and PTOs have become sites of democratic debate, with efforts to use patenting practices as a shoe-horn for addressing other, larger, problems. But they are an inadequate forum because there are no clear rules of deliberation. Behind all of this are differences between the EU and US, derived partly from legal differences, and partly from differences in how the EPO and USPTO conceive of their roles vis-a-vis other democratic institutions.

Session 4: Science, State, Co-production

Chair: Andrew S. Mathews (University of California, Santa Cruz)

Grischa Metlay (Harvard University), *Instrumental Solutions for Complex Problems: Alcohol and Drug Problems in the United States, 1970-2000*, reported preliminary findings from his dissertation work on the history of scientific efforts to conceptualize and remediate alcohol and drug abuse in the US. In particular, he traced the role of

federal expert institutions—the National Institute on Alcohol Abuse and Alcoholism and the National Institute on Drug Abuse—in developing and implementing a “problem-centric approach” to tackle the issues. Metlay showed that instrumental strategies resulting from this approach, rather than disciplinary divisions, structured multi-disciplinary alcohol and drug-related expertise, and these strategies were coproduced with historically specific conceptions of alcohol and drug abuse as complex problems. He concluded that the organization of expertise and accompanying instrumental strategies played a significant role in how the government understood and addressed complex problems. In the Q&A, workshop participants stressed the importance of power dynamics between and within different disciplinary groups involved in defining and framing alcohol and drug problems.

Frank N. Laird (University of Denver), *State-Society Relations, Socio-technical Imaginaries, and Path Dependence: Comparing Renewable Energy Policies in Germany and the United States*, compared US and German imaginaries of renewable energy in the last several decades. Faced with the energy crisis of the 1970s, the two countries started out with similar approaches to renewable energy. By 2000, Germany was well ahead of the US, in terms of installed capacity and export competitiveness. Laird contended that such a notable divergence could, in part, be attributed to different styles of state-society relations: pluralist in the U.S. and corporatist in Germany. In addition, behind this institutional and structural dimension, the two nations attached different ideological valences to renewable energy: in Germany renewable energy was imagined as a green but economically viable industry, whereas in the US it was often seen as part of a critique of modern industrial society. In the discussion, questions were raised, on one hand, about whether there was really no serious contest over the imagination of renewable energy, and on the other, why a particular imaginary came to dominate over others. It was suggested that the concept of imaginaries should be used with caution.

Robert Doubleday (University of Cambridge) and **Matthew Kearnes** (Durham University), *Science and the State: UK Science Policy and the Enactment of British Liberalism*, attempted to historicize recent developments in UK science policy, which they saw as attempting to resolve long-standing tensions between institutional support for academic inquiry, state coordination of technological innovation, and the logic of market-driven commercialization. The authors maintained that similar tensions were already evident in postwar UK science policy, and argued that these could serve as useful sites for examining science policy as an integral element of modern statecraft. Their case study was the policy debate over the so-called “Haldane Principle,” the idea that research funding should not be subject to direct political control but should instead be allocated by councils of researchers. An interesting question that came up during discussion was how changes in the postwar history of UK science policy were intertwined with processes of decolonization. It was pointed out that the ways in which the institutions of science and the state imagined domestic publics resembled the ways in which colonial subjects were imagined earlier.

Huib Dijkstra (Rathenau Institute), *Governing the Technological Borders of Europe*, discussed the role of technology in the politics of border control. As European

states increasingly seek to control not just physical borders but also the movements of people, a range of new technologies of the body—such as biometrics and speech recognition—are being introduced to distinguish “citizens” from “aliens.” In other words, the borders of Europe and its member states are changing into “technological borders.” Dijstelbloem suggested that this technologization does not simply support the existing political and administrative aims of states. Rather, it mediates the construction of citizenship by objectifying and turning the bodies of immigrants into a “password.” Despite their profound implications, however, the new technological borders of Europe are as yet not accountable to political processes—either at the level of the European parliament or member states—running the risk of becoming a new no-man’s-land. Several participants inquired into whether these technological borders have been challenged and transgressed, and if so, what tactics and strategies of resistance have been employed. The need to use and link to existing STS methodological and conceptual principles—such as symmetry and reflexivity—was also emphasized.

Session 5: Science and Decisions

Chair: Ângela Pereira (European Commission, Joint Research Centre)

Tsuyoshi Hondou (Tohoku University) and Tamiko Nakamura (Graduate School of Law, Kyoto University), *Toward Effective Treatment of Scientific Evidence in Cross-examination, a Case Study*, discussed how methods of cross-examination in law courts in Japan achieve the appearance of truth and finality because of how questions are asked. The key technique is to ask a witness to confirm a statement in yes-no terms, and then to ask a further statement (also in yes-no) terms about another theme that apparently contradicts this. Once the apparent contradiction is established, the cross examiner has achieved the objective of making the witness (especially “expert” witness) appear unreliable. In principle, this process is adopts the common assumption that natural science is based on proof without doubt when – in most cases – discussions of scientific uncertainty are based on the precautionary principle, which can be informed by normative values. A background theme here was the underlying legal philosophies of truth and justice, which might come from when Japan was opened to Western science and law in the 16th and 17th centuries.

Pia M. Kohler (University of Alaska, Fairbanks), *When Does a Chemical Warrant a Global Ban? Negotiating the threshold for risks from persistent organic pollutants (POPs)*. The paper argued that the scientific advisory body of the Stockholm Convention (the multilateral environmental agreement regulating POPs) was unusual and progressive for various reasons. These include the committee’s ability to recommend bans on chemicals following their own assessment of complaints as they come in (there is no parallel Framework Convention, nor differentiated timeline for developed and developing countries as in climate change). In May 2009, there was a controversy concerning the chemical endosulphin which forced the committee to take a vote, rather than base a decision on consensus. Some concerns were raised then that the scientific representatives of countries might come from government ministries, and hence be less shielded from political concerns.

Discussion: Does voting represent a problem in itself, implying that committee members might avoid this method of democratic procedure in the future? It was also pointed out that – despite claims to be scientifically representative – the chief purpose of each committee member’s existence was political representation, and this does not indicate a clear connection to scientific neutrality. As with other scientific bodies, drawing on the image of pure science offers a greater chance of consensus.

Arienne Naber (Delft University of Technology), *Crowdsourcing in Water Management Decision Making*. Crowdsourcing was defined as assessing the digital networking of individuals and the knowledge and experience contained within networks of people connected by internet. The public influence of sites such as YouTube or Wikipedia need to be acknowledged. So far, four mechanisms ensure the reliability, transparency and legitimacy of these knowledge sources: peer review, technical solutions, norms-based social organization, and the connectivity (or hierarchy) of digital networks themselves (e.g. ways of avoiding repetition). New webservicing sites such as Slashdot offer information about peer reviewed IT reports and advice with some 400 moderators.

Discussion: This paper was about the construction of publics. Some asked how representative the images of the crowdsources were – for example, how far the ‘crowd’ was dissected according to classic social divides such as race, gender, ethnicity, and how far people accessing the crowds might or might not acknowledge these divides.

Roopali Phadke (Macalester College), *Defending Place in the Google Earth Age*, built on the speaker’s previous work on public debate about wind farms off Nantucket Island in order to assess more general trends in how rural communities defend places against technological devices (especially when trends for wind energy are increasing). The speaker demonstrated that common views that rural communities support wind energy development are wrong. Main concerns are about visual impacts and possible damage to wildlife. The paper outlined how grassroots campaigns use defensive visualizations to depict the undesirable effects of wind development, often using technical devices such as Google Earth. Yet, the public response to these tactics was not always as campaigners intended; some experienced a loss of public trust in the images created.

Discussion: Wider debates dating to Lewis Mumford have suggested that technologies such as nuclear power and renewable energy can be related to authoritarian versus democratic politics. These assumptions have been questioned because it is clear that local opposition can be informed by discourses of national interest. It was also noted that there has been recent opposition to the cost and time of public inquiries into renewable energy development, and a push to treat technologies as having a “green pass” because they are assumed to be progressive. This trend was observed in the UK, USA, and Canada.

General Discussion: All the papers concerned boundaries, about what counts as evidence and about the norms of democratic procedures. All illustrated somewhat naïve, if commonly accepted, notions of democracy. It is important to realize, for example, that “seeing” and transparency are not causes, but effects. Accordingly, some representations of democracy (such as a website of Burmese protesters; a virtual image of wind turbines;

a cross examiner's trick) are neither "proof" nor "democratic," but are seen to be such depending on how far norms of proof and democracy allow them to be seen this way. An important question, therefore, is about how contexts give rise to particular attempts at proof and representation, and how they can be addressed together.

Session 6: Legitimacy, Ethics, and Trust

Chair: Kjetil Rommetveit (University of Bergen)

Alison Mohr & Sujatha Raman (University of Nottingham), *Capturing the Public or Evoking the Moral Codes of Science? Reflections on the politics of public engagement*. The paper analyzed the recent public dialogue on stem cell research in the UK. The dialogue revealed high levels of public support, in stark contrast to the earlier public engagement exercise on GM crops held in the UK. Comparing these two cases helps us understand how differences in the way that public engagement is structured can shape the outcome. For example, in the stem cell dialogue, stakeholders and "lay" publics were quarantined from one another, which meant that there was little opportunity for open disagreement or debate. In the GM dialogues, by contrast, oppositional groups participated and were able to challenge the divisions between laypersons and experts. This suggests that when STS scholars are asked to play mediating roles in these dialogues they must be sensitive to the ways in which the structures of public engagement can influence its substance.

Discussion: A comparison between the UK dialogues and consultation exercises conducted by the World Bank point to the formal and informal ways of limiting what should/not be said. What would have constituted a "failure" in the UK stem cell exercise? Raman thought it was unfortunate that there wasn't more diversity of opinion. It was noted that in such exercises so-called "lay" persons often do not express ethical issues as such because "ethics" is seen as expert. It was also noted that governments might use such dialogues to maintain certain kinds of imaginaries. In S. Korea, for example, the important questions were: How could Korea create/maintain technological self-reliance and how could science/tech/publics be engineered to achieve that goal? It was reiterated that the idea of public engagement is radically different across history, nations, and political cultures. In getting directly involved in these public dialogues, STS scholars' critical capacities could get captured by the processes we are studying.

Gregory Hill (University of Portland & Institute for Culture and Ecology), *Uncertainty, Precaution and Resilience: a case study in the Columbia river basin*, explored the computer modeling and decision support techniques used to enhance public participation in discussions about the recovery of salmon and steelhead (listed as endangered under the Endangered Species Act) in the Columbia River Basin. He argued that the current models favor the status quo, and provide little or no room for precautionary planning. He offered a different approach, iterative in nature, and including resilience management, backcasting, and extended peer review as components for planning. This will allow for the inclusion of various viewpoints, develop an "aspirational vision," and address the challenges of an unpredictable future.

Discussion: One participant inquired what things are known in that system, by whom and how. E.g., does this consultation process exclude politics and property? It was noted that the images create a strong normative agenda about what landscapes should look like that is very culturally embedded. How with a global understanding of post-normal science do you deal with the local in that model? What uncertainties are embedded in these models/tools? It was noted that the post-normal science conception of uncertainty (uncertainty is given) is different from MacKenzie's understanding of uncertainty (interpretive flexibility). Placing uncertainty on a single scale/one dimension immediately introduces the idea that there is uncertainty today, but tomorrow we can reduce it with science.

Hannot Rodriguez (Arizona State University), *Public Trust in Regulatory Institutions: Three Models of Trust for Three Challenges of Risk Analysis*, argued that social analysts of risk have developed three models that depart from the traditional deficit (or expert) approach. These are the *competence* model (Giddens), in which there is expert dissent on real risks (uncertainty); the *cultural* model (Douglas/Wildavsky), which focuses on incompatibility of cultural values and the idea that prior ideological commitments determine risks; and the *relational* model (Wynne) which suggests that scientific models are imposed, irreflexively, on the public. If we take these models seriously, then we see that experts in regulatory institutions must deal with epistemological, axiological, and reflexive challenges. The case of regulating GMOs in the European Union is an example. The epistemological question raised is, what is the evidence of risk? The axiological question is, what rights does one have to choose (or not choose) to consume GMOs? The reflexive challenge is, how should GMOs be monitored post-commercially?

Discussion: Why have Douglas and Wildavsky been used in risk studies: because culture *masks* risk, rather than *makes* risk? This would leave room for a "real" risk out there, somewhere. Among the three models, the third is different from the other two. The first is cognitive, the second is normative, and the third is interactive and requires a more transformative attitude among the public. With GMOs there was a great deal of public ambivalence over a sense of being dependent upon institutions. It may be more productive to focus on who gets to define public meaning and issues, and how this changes historically. Factual controversies may appear most important, but they are just surface conflicts.

General Discussion: What kinds of publics are being created through these public engagement efforts? Public fora for gene bank projects are focused on finding out what scientists need to tell you in order for you to participate. A question was raised about how consultation can be evaluated when the purpose is to assess moral intuitions about a technological project. An account of moral subjectivity and citizenship has to be given. It was noted that the concept of the "public" seems to be where the rubber meets the road. What is the relationship between "culture" and "public"? Finally, it was noted that we must attend to where people come from. Moral sensibilities are part of peoples' everyday understandings of agency, trust, etc. So, people often turn to histories and patterns to establish trust. We must attempt to find language that is grounded in possibility as well as actuality and that invites exploration of agency.