in ways that are not possible for us to control because this basic human capacity operates at a tacit level. For example, it may be harmful to subject a very young child or baby to an interactive technology that impinges on their development of social interaction with others. The socio-ethical concerns within technoethics lie in the impacts on social / cultural cohesion, learning (social cognition), inclusivity.

3 Discussion and Future Developments

Workshop discussions between participants were aimed at ethical problems that give us cause for concern at the moment (e.g., the use of bionic implants for social/cognitive/control purposes, and the prospect of robot soldiers). They also covered ethical problems that may give us cause for concern in some distant future (e.g., machine consciousness and the ethics of our responsibilities to treat machines as we do humans). A more focused approach, as many participants emphasized, presupposes a careful triage of extant work in the fields of robotics, bionics and AI, conducted with the aim of identifying those technologies, projects, and systems that more urgently call for ethical reflection. Imminence, novelty, and expected social pervasiveness were identified as significant dimensions for an effective triage.

Notes

- 1) ETHICBOTS is the Acronym for “Emerging Technoethics of Human Interaction with Communication, Bionic, and RoBOTic Systems”, a EU Coordination Action within the programme “Science and Society” of FP6 with a duration of two years. For further information on the project and the project consortium see <http://ethicbots.na.infn.it>.
- 2) The interested reader can find an extended abstract of every presentation at the website <http://ethicbots.na.infn.it/meetings/firstworkshop/abstracts/abstracts.htm>. For a paperbound copy of the workshop “Book of abstracts”, please contact Guglielmo Tamburrini (tamburrini@na.infn.it).
- 3) The title of this project was “Robotik. Optionen der Ersetzbarkeit des Menschen”.

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For this conference report the author chose an unconventional format. Besides the reporting of the workshop he reflects central results in the context of his sociological perspective and discusses strengths and shortcomings. Comments on this report are welcome

(the Editor)

Learning of Talk?

Report and discussion on the closing workshop of the ELSA project “Let’s talk about GOLD!”

Vienna, Austria, September 21 - 23, 2006

by Christian Büscher, ITAS

The project „Let’s talk about GOLD!” is a research project of the Accompanying Research Programme ELSA¹ within the Austrian Genome Research Programme GEN-AU². The ELSA-programme addresses the issue of yet unknown consequences related to scientific knowledge production. For precautionary reasons the knowledge production should be accompanied by ethical reflections and a public engagement to include the social dimensions of techno-scientific development. In that sense the Austrian GEN-AU Initiative claims: “Every step towards the future has social implications. Some applications arising from genome research, and the way they are handled by society, are presently raising questions. For this reason, in the context of GEN-AU, issues such as (among others) genetic testing, data protection, patents, and prenatal diagnostics will be publicly discussed.”³ GEN-AU is therefore funding research projects in the genome field for future technological innovation and simultaneously research projects for technology assessment with a variety of disciplines and methods. The closing workshop of “Let’s talk about Gold” had the title “Engaging Science and Society in the Ethics of Genome Research”. It was organized by the Department of Social Studies of Science at the University of Vienna and the Interuniversity Research Centre for Technology, Work and Culture (Graz).

1 The Project and its Methodology

„Let’s talk about GOLD!” has literally initiated a dialog between scientific experts of the GEN-AU funded project “GOLD” (Genomics of

Lipid-Associated Disorders)⁴ and selected “lay-people”. The aim of that artificial interaction was to engage scientists and members of the public with the ethical dimensions of genome research. The experiment was set up for a period of one year, where the selected group of people met with genome researchers at seven Round Tables for discussions of a variety of ethical and social dimensions related to the concrete project and genome research in general. The interest of the accompanying research focused on the development of a “better understanding” of such an engagement and a possible “mutual learning process”. The focus of the discussion in this paper will be on the latter, the notion of “learning”.

Methodologically the project implemented Round Tables in order to accompany a large research venture over a longer period of time. The discussions itself have been the first data source. Additionally two series of qualitative interviews were conducted with the lay-people and the scientific experts. A final Round Table meeting was held at the end of the year to observe reflections and learning effects of all participants.

The closing workshop in Vienna had the purpose to open up the discussion to the scientific community and practitioners who are working on similar issues. The thematic foci were as self described:

1. Possibilities and limits of addressing ethics of genome research in a public engagement exercise
2. (Non-)Participating in which kind of governance?: Reflecting the Round Table as a participatory setting
3. Public engagement as mutual learning: Situated perspectives and learning processes
4. Talking science: Images, imaginations and conceptions of science / scientists as discursive elements.

In the following chapter I will mainly focus on item 3.

2 Main Results of the Workshop and Discussion

The workshop⁵ was held at the University of Vienna and started with an open for public session. The following days a variety of pres-

entations were addressed more to the scientific community.

As the project itself claimed to analyse the interaction between genome researchers and the public as a learning process, the workshop touched a variety of topics concerning the form of interactions between science and the public, forms of communicating about ethics and forms of learning.

At this stage of the project, different scientists of different disciplines offered mostly their experiences of the by now closed interaction exercises, observations of a more descriptive and structured nature, sometimes theoretical and hypothesis based assumptions and very often normative demands related to terms like “civil society”, “democracy”, “governance” and “responsibility”. The dominant distinctions used by the presenting scientists were science / public, science / society or scientist / lay-people and experts / lay-people.

Overall, there was a consensus between all members of the project, the members of the scientific advisory board and the invited guest speakers that science has to open up to the public because science is using society as a “laboratory”. Since science has to leave the artificial setting of a laboratory at one point to implement new technologies, the predictability and controllability of those technologies is undermined by the exposure to myriads of other known or unknown factors, once excluded through the laboratory boundaries. Consequently, the decision to expose technologies to flora, fauna and human bodies generates possibly unknown consequences and therefore concerns. Participatory exercises are seen as a rational consequence of bringing those concerns to the attention of scientists. Those concerned are offered the chance to exchange fears and what they might see as dangerous consequences related to the use of scientific knowledge.

2.1 Together We Talk, Divided We Act

On the first session of the workshop a couple of participants of the Round Tables organized within the one year project „Let’s talk about GOLD!” were invited to talk about their experiences, namely the lead scientist of the original GOLD project, a Swiss entrepreneur as a speaker for the lay-people (not by vote, but

by interest and engagement), a journalist and a representative of the genome research funding ministry. They all were on common ground by accepting the participatory exercise itself – the adverbs were “necessary”, “important”, “helpful” – but they were pretty much divided in their assumptions of the “performance” of such an exercise, when they reflected their professional roles and the expectations they face in their original organisations.

The *journalist* of course presented an insight to the selectivity in the reality of the mass media: The search for “sexy topics” – and most of the scientific projects are not sexy –, the unwillingness to dig deep inside the scientific work and the shortcoming of only brief presentations of the research results. The necessity of getting public attention and simultaneously the lack of attention prevent a presentation of not so exiting “news” and lengthy reports of all the work leading to results.

It started to get exciting with the statement of the *lead scientist* of the GOLD project Rudolf Zechner (University of Graz). He was clearly criticizing the selectivity of attention with which the public treats scientific work (which is in most cases, as explained beforehand by the journalist, due to the professional rules of the mass media). More importantly, he made it clear, there is a competition of expectations, which are brought forward to the science by the public, besides the anyway harsh international competition in science itself. He labelled modern science as “sports”. Besides the expectations of “trans- and interdisciplinary research” and “networking” for more and faster “innovation”, science is expected to be continuously evaluated and to be classified in rankings. Against that background time to conduct scientific research is highly precious and the bias to open up to the public marginal.

Leaving the pure conference report I will keep the statements about learning and about expectations in mind and discuss the questions of a person in the plenum of the first evening of the workshop: is the process self-sufficient? What are the consequences of a participatory setting? To answer the questions my essay follows the notion of *learning* and *expectations*. How is learning in those kinds of settings possible and how is science reacting to expectations of the environment?

2.2 Learning Achieved?

One of the primary goals of the project „Let’s talk about GOLD!” was to initiate learning processes, as the following statement from the project description explicates:

“The aim of this setting is to allow for mutual learning, for expressing expectations, hopes and fears with regard to the research topic. It is a process in which a relationship of trust can be fostered and a place where new kinds of thoughts about the possibilities and constraints of this type of research for the individual citizens, but also for the collective can be developed.”⁶

Also, the title of the last workshop session (“Beyond the Politics of Talk? Concluding Perspectives and Learning Perspectives on Public Engagement”) promised perspectives of participatory exercises beyond the politics of “talk”. Because of the explicit exclusion of “action” as a consequence of the experiment, the perspective lies in “learning”. It was part of the setting that no goal in form of a consensus or a concrete and immediate decision had to be reached. But still it was not perfectly clear who is actually learning how. In my perspective the setting in this case is that of sociological research (the project itself) which addresses the interaction between science and the public/ society. We can identify three references of who is (supposedly) learning: (1) the social sciences, (2) science / scientific organisations / scientists and (3) public / society.

The first case “social sciences” is fairly easy. One project member stated in the last session, it was a learning process for them, i.e. providing know-how. If the project is capable of providing new knowledge about participatory settings, ethical debates and cultural biases related to the observed participants, then it is a case of the usual process of knowledge production in science, namely developing new theories or methods or complementing existing theories or methods of “participation” (the project refers more to the development of methods). Therefore the “learning process” cannot be attributed here. If so, it would be highly disappointing and it would not fit to the highly normative notion of “democracy”, “responsibility” or “need for governance”, which

were emphasized throughout the workshop. So learning must refer to another subject.

As for the reference point of learning, the second case “science / scientific organisations / scientists” is a bit more complicated. First it makes sense to differentiate between science as an output-system⁷ (with a symbolically generalized medium of communication – true knowledge – and a communicative restriction to true / false operations), scientific organisations (centres, institutes) and individuals (persons) as members of these scientific organisations.

2.3 “Reflexive Learning”

Brian Wynne, as a member of the scientific advisory board, stated in the last session of the workshop: the role of the social sciences is to identify the cultural bias in science and bring it to attention and to initiate “reflexive” learning. What does this mean? Learning itself is a reaction related to disappointed expectations. The other reaction is the insistence of the disappointed expectation, which confirms normative orientations. Reflexive learning is distinguished from single loop learning (more efficiency, correction of failure, modified sets of rules or routines) and complex double loop learning (evaluation of the consequences of existing rules and routines and consequently modified programmes and strategies) and addresses learning about learning (Wiesenthal 1995). In my opinion that is not what was meant by Wynne’s statement. I suppose he meant a change in the mindset of the scientist how to conduct the knowledge production. Science is in general confronted with the expectation to add ethical standards to the “Mertonian Paradise”-like set of rules and routines.

Annina Müller and Maximilian Fochler, two scientific project members, presented their observations of shifting images of science and also about ideas about governance of science and public participation in the course of the one year experiment. As expected, the learning subjects have been at first the participants: “...especially our lay people changed their views on participation..., they did offer starting points for developing different visions of participation.”⁸ Also Annina Müller stated: “the lay people were able to see more of the backstage of science – the working practises and scientific

cultures –, and thus their images both of science and scientists became more fine-grained...”; and the participating scientists “expressed an ambivalence of performing and switching between multiple roles.”⁹ As a result of intense discussions within the participatory process of the project „Let’s talk about GOLD!” there were indications, that the participating individuals questioned their initially rock solid assumptions and distinctions. They learned.

I presume the different set of assumptions and distinctions adopted by the “lay-people” and by the scientists will be presented to a broader public in upcoming publications of the project. But, is individual learning a condition of the possibility that higher aggregated social organisations learn? It is completely unrealistic, and it was never addressed at the workshop, that the public is learning from the learning experience of fourteen participants. Presumably they talk about their experience with family members and friends, a smaller public. Consequently, we can exclude the third reference for learning “the public” or “society” respectively.

Back to the only realistic reference – the complex of science, scientific organisation, scientists – the question is: Do participatory exercises offer the right conditions for the possibility that a scientific organisation learns via the learning experiences of (some) of its members? That would be the true and only intriguing perspective for any kind of “performance” of those settings. Is there a possibility of different decision-making after an inclusion of the public?

With participating in a public engagement scientists leave native ground without knowing the consequences (positive and / or negative, which they will not find out unless they participate): they take a risk (variation). While participating or afterwards there must be a process of drawing conclusions about the experiences, a process which is clearly affected by the still valid cultural bias and those conclusions must lead to different programmes of decision-making (selection). The resulting routines and rules of action are then given to those without the initial experience (retention). Those mechanisms of organisational learning (March, Olsen 1995, p. 199 ff.) provide the possibility for a self-restriction, in the sense of drawing a line when a probable cause of future problems comes into the view of science itself. Who else

has the methodological and cognitive ability to formulate a probable cause? Politics, law, public do not have it.

The only possibility of learning is a change of research programmes in scientific organisations, in the sense of complex learning. Science as a functional system does not limit scientific communication itself; that is empirically impossible. Also is the possibility of enforcing a change in programmes of scientific organisations by an individual mind dependent of several social factors like status, reputation, authority or trustworthiness, which come through and structure organisation. But among several unanswered questions, one question presumably is in the public's view the most pressing: are organisations learning in a desired way?

3 Talk and Action

In recent years it was often argued that organisations adopt to the expectations of their environment by either generating *formal structures* or *talk*. Both are only loosely coupled to the action set of organisations. The first observation is called institutional isomorphism: "Coercive Isomorphism results from both formal and informal pressure exerted on organizations by other organizations upon which they are dependent on by cultural expectations in the society within which organizations function. Such pressure may be felt as force, as persuasion, or as invitations to join in collusion (DiMaggio, Powell 1983, p. 150)."

It is well known that scientific organisations like universities adapt to environmental demands in a questionable way. That is valid when expectations are connected with decisions, which affect the basic conditions of existence of the targeted system; for example in the case of *evaluation*. If the quality of science is measured by the sheer number of publications, than a new scale of publication appears: the "smallest publishable unit". Evaluation as a rational way of guaranteeing scientific quality and solution for the allocation of scarce funding resources has had its undesired and unintended consequences (Laudel 2006; Orr 2005).

Another case is *networking*. Science is more and more involved in networks with formal structures (formal membership, institutionalized exchange of personnel and information)

which include companies, scientific organisations and intermediary institutions to speed up the process of innovation. Scientific knowledge is supposed to lead to applications more quickly through networking. Therefore, initiating networks is highly ranked on the political agenda and, as for Germany, funded by federal and regional ministries.¹⁰ Krücken and Meier (2005) argue with reference to Di Maggio and Powell, that the generated competence cluster or technology transfer offices are formal structures to signal compliancy to societal expectations. The actual networking is considered as highly personal between individuals who trust each other. Furthermore they describe formal networks less as a rational structure to allow innovation to happen, but more as a taken-for-granted myth, without indication of an increase in efficiency of information exchange or absorption of uncertainty. Networking is – in this interpretation – a symbol for flexibility, openness and willingness to learn.

Nils Brunsson found out that foremost political organisations generate *talk* to protect and therefore enable *action*. The distinction of an action system and organisational talk is functional in the sense of coping with inconsistent norms from outside the organisation: "Organisational ideas are often expressed in talk aimed at other organizational members or external listeners. In the action system members coordinate their individual actions in order to act together" (Brunsson 1989, p. 168). He calls it the organisation of hypocrisy: "the action is protected, in that management satisfies by talk the demands which the action does not meet. It then becomes easier to act since the action does not have to satisfy inconsistent norms" (Brunsson 1989, p. 172).

The suspicion is that the social sciences provide both a formal structure (participatory exercises) and a possibility for talk for the other scientific disciplines in question. The latter do not have to do it themselves. Therefore, scientists thankfully participate because they manage to meet the expectations without having to fear any consequences; unless there is evidence of changing scientific decision-making after a participatory exercise. As a consequence, participation faces the pitfall to generate structural effects which hinder learning and produce counter effects in form of a

protected action set (science does research solely on scientific criteria) and of a delivered legitimacy (scientists just participate).

4 The Role of Accompanying Science

Brian Wynne's argument is truly valid for the social sciences as well. From my perspective scientists have to reflect their role and control, if possible, the taken for granted assumptions: what is the role of the social sciences in the conflict-laden field of modern science and technology? Is it the role of analysing possible consequences of scientific and technological progress, of a moderator in science/ public conflicts or of an agent of the public by formulating demands and normative expectations? Are the social sciences advocates of the public? With what kind of legitimacy are the social sciences doing that? Is it with the legitimacy of theories and empirical data? Robin Williams likewise expresses some concerns: "If it takes up this challenge and seeks a closer engagement with science and technology policy and practice, STS (Science and Technology Studies; ed.) will need to consider very carefully its (often tacit) commitments, rooted for example in our historical links to popular and critical movements, and develop a wider repertoire of roles, narratives and analytical frames more adequate to the complexity of the decision-making processes we face today and the ways in which we are engaged" (Williams 2006, p. 342).

The workshop and foremost the statements at the opening session have shown once more, that it is necessary to evaluate the "rationality" of participatory settings. Is there a gain of democracy? How does a participatory exercise influence the action set of scientific organisations? Science is often suspected to act like "*Science acts outside of society*", in the sense of a superior position.¹¹ The social sciences have to be careful not to generate the impression that they act outside of society and of science.

Nonetheless, the discussions offer at least two questions for further research. First, what kinds of formal structures emerge from the constellation of including public expectations into the scientific rationale? Secondly, what kinds of affects do participatory exercises have on the decision-making process in scientific organisations? May be the results will expose a

further differentiation of professional roles in science: on the one hand scientists doing research and on the other hand scientific managers explaining science to the public, raising money and participating for legitimation.

Notes

- 1) ELSI and ELSA are the acronyms that were coined by the Human Genome Project. They refer to the ethical, legal and social implications (ELSI) or aspects (ELSA) of genomic knowledge and technology. ELSI or ELSA programmes have developed since the 1990s across Europe and the Western world. The ELSI program of the U.S. Human Genome Project is the biggest bioethical research project to date. On the European level, the European Research Area on Societal Aspects of Genomics (ERASAGE; <http://www.erasage.org>) has been created and funded by the European Commission in 2005. It includes eight national funding agencies with specific funding allocated to the field of ELSA of genomics (Netherlands, United Kingdom, Austria, Norway, Finland, Germany, Israel and Canada).
- 2) GEN-AU means "Genome Research in Austria"; see <http://www.gen-au.at>
- 3) <http://www.gen-au.at/english/faq.jsp?id=35>
- 4) The research addresses obesity and lipid-associated disorders and explores the molecular basis of lipid metabolism in order to develop strategies for intervention; see: http://www.gold.uni-graz.at/project_description.html
- 5) For more information on the workshop, please visit: <http://www.univie.ac.at/virusss/workshops/4718>
- 6) <http://www.gen-au.at/projekt.jsp?projektId=37&lang=en>, download vom 19.03.2007
- 7) Output refers to a performance for other parts of society, which the other parts cannot contribute: here *true knowledge*.
- 8) Maximilian Fochler: "Lost in the mist in unknown waters? Perspectives on the relation of public participation to a governance of science"; workshop presentation abstract (handout during the conference).
- 9) Annina Müller: „Colliding cultures? On the multiplicity of images of science in a public engagement exercise“; workshop presentation abstract (handout during the conference).
- 10) See for a comparison of different concepts of technology transfer Krücken, Meier, Müller (forthcoming).
- 11) See the science / society distinction used throughout the workshop.

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Nano Visions – Implications for Technology Assessment, Communication and Regulation

Lausanne, Schweiz, 23. - 26. August 2006

Bericht aus einer Session der Internationalen Konferenz der European Association for the Study of Science and Technology

von Mario Kaiser und Monika Kurath (Universität Basel) sowie Andreas Lösch (TU Darmstadt)

1 Hintergrund

Nanowissenschaften und Nanotechnologien werden derzeit als emergierende und äußerst viel versprechende Felder in Forschung und Entwicklung gesehen. Sie gelten als führende Innovationsgebiete der Zukunft. Weltweit werden jährlich Milliarden-Beträge in die Forschung und Entwicklung investiert. Neben Revolutionierungen der Pharmakologie, Medizin, Ernährung und Informationstechnik soll Forschung im Nanogrößenbereich auch zur Einsparung von Ressourcen und dem Schutz der Umwelt beitragen. An der nanotechnologischen Forschung und Entwicklung sind unterschiedlichste natur- und ingenieurwissenschaftliche Disziplinen beteiligt. Viele Innovationen der Zukunft werden aufgrund von neuen Konvergenzen zwischen diesen Disziplinen erwartet (z. B. Nano-Bio-Info-Cogno Convergence).

Begleitend zur nanotechnologischen Forschung und Entwicklung formierte sich in den letzten Jahren ein breites Feld an geistes- und sozialwissenschaftlichen Forschungen, welche die ethischen, rechtlichen, sozialen, kulturellen und ökologischen Implikationen dieser Zukunftstechnologie analysieren und reflektieren. Dieser frühe Einstieg von „Reflexion“ in das Thema Nanotechnologie stellt ein Novum in der Geschichte neuer Wissenschaften und Technologien dar, insofern die sozial- und geisteswissenschaftliche Begleitung beinahe den Eindruck erweckt, sie vermöge gegenüber der technologischen Entwicklung Schritt zu halten. Nur konsequent also, wenn solche Begleitforschung nicht erst bei den Folgen einer bereits realisierten Technologie und auch nicht bei der Suche nach geeigneten Regularien im Stadium der