DISSERTATION

Titel der Dissertation

„Participating in which Kind of Governance? Tracing Bottom-Up Perspectives on the Governance of Science and the Possibilities and Limits of Public Engagement"

Verfasser

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„People are difficult to govern because they have too much knowledge.“
Laozi, 6th century BC

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1 Introduction

1.1 Public Engagement as a New Mode of Governing Science

The probably most noteworthy development in the relations between science, society and policy over the last decade has been the strong rise of public engagement as a means to mediate and govern the relation between the three mentioned fields. For a sociologist of science, this of course is a phenomenon, which begs to be explained (Irwin 2006), as much as it may be welcomed normatively. What might the reasons for this seemingly so strong and sudden rush towards a 'democratisation'[1] of science/society relations be? To offer some first glimpses into the backgrounds of this shift, let me start by discussing two quotes from actors which at first sight may rather not be suspected to be strong activists in radical democracy: the editors of Science and Nature.

In 2003, the editor of Science, Alan Leshner (2003), wrote on the "Public Engagement with Science":

> „Some people are not so happy about how central science and technology are to their lives. [...] One traditional response of the scientific community to what it views as a lack of appreciation or misinterpretations by the public has been to mount so-called public understanding or education campaigns designed to "enlighten" the populace, either about science in general or specific issues in particular. [...]
>
> But simply trying to educate the public about specific science-based issues is not working. Many science skeptics are already quite well educated, but they relate more to the risks of science and technology advances than to their benefits. Moreover, given the uncertainties in science, the best science-based strategy is not always as clear as we would like and as many in our community might claim. [...]
>
> The centrality of science to modern life bestows an obligation on the scientific community to develop different and closer links with the general population. That convergence will help evolve the compact between science and society so that it will better reflect society's current needs and values. We need to move beyond what too often has been seen as a paternalistic stance. We need to engage the public in a more open and honest bidirectional dialogue about science and technology and their products, including not only their benefits but also their limits, perils, and pitfalls. We

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[1] The use of inverted commas in academic writing can be confusing. In this thesis I will use single inverted commas to highlight terms which I intend to qualify or treat in a slightly distanced fashion. Double inverted commas will be used for quotes.

need to respect the public's perspective and concerns even when we do not fully share them, and we need to develop a partnership that can respond to them." (Leshner 2003: 977)

These are strong words from one of the most central figures in the science system – and they contain a number of more or less apparent justifications for the need of public engagement.

First and foremost, he is concerned with public trust in science, and whether citizens appreciate the role science and technology play in their lives. He goes on to argue that previous too paternalistic strategies to build trust have failed, and hence a more open stance and dialogue is needed. Of course this emphasis on the necessity to build public trust does not only arise from a deeply felt missionary conviction to carry science and its results into society. What resonates between the lines of his text is that in the decades surrounding the new millennium, science, though or precisely because it more and more pervades daily life, is again "under attack" (Nature 2006) and public criticism in a way it has seldomly been over the previous fifty years. Public scandals such as those around BSE, the wide rejection of GM foods in different parts of the world, as well as a rising number of recent fraud cases have shaken science's public integrity. In equally difficult times for science after the Second World War, the sociologist of science Robert Merton (1973 [1942]) wrote that the ivory tower may not be held if it is under constant attack. Very similarly but with the semantics of the new millennium, Leshner (2003) calls for transparency also concerning the downsides of science and for an open and bidirectional dialogue to build mutual respect and trust, and ultimately a "partnership".

But beyond the defence of the ivory tower, a second slightly less explicit line of argumentation runs through his text. It is critical of how science itself deals with its responsibility for how it changes the world. Relating to the inherent uncertainty of a science, which more and more extends its grasp and aims into ever more distant futures, he states that the best political decision as well as the very best trajectory of a scientific or technological innovation may not be based on scientific expertise alone. Societal values and interests come into play in deciding which uncertain path to choose. This implies a new kind of politics, a politics concerned with the co-production (Jasanoff 2004) of future scientific innovations and social structures. Again, Leshner's argument must not be read as a sudden case of techno-democratic enthusiasm. For both science and policy, the GM food case has been a hard way to learn that the public may not be ready to accept an

innovation if it does not share the basic value commitments it is based on. In this case science and policy have had to acknowledge that just talking about the low risks of the respective innovation does not suffice. A more radical approach to the governance of innovation is needed. In emerging promising fields such as nanotechnology "upstream engagement" is hence called for to prevent the "next GM controversy" (Mehta 2004, Macnagthen, Kearnes & Wynne 2005).

Commenting on the experience of these early-on debates, a recent Nature editorial (2007) states:

> *"There hasn't been anything quite like it in the history of science. Over the past three years, in Europe, the United States and Australasia, a plethora of groups of scientists and other citizens have discussed nanotechnology in extended exercises in 'public engagement'. These initiatives have arisen partly because of the acute awareness by many that all is not as it should be either in the degree of trust in science and technologies on the part of the public, or in confidence in nanotechnology in particular."*
> *(op.cit.: 1)*

Again, we find a deep concern with public trust. The impetus of the editorial however is different. It goes on to argue how enriching these dialogues are for both scientists and citizens, but harshly criticizes the failure of the respective governments to react on the basis of the results of these engagement initiatives.

This raises a central question this thesis will be concerned with: Even if, as the Nature article implicitly suggests, a group of scientists and citizens may happily agree on what is best for science and society, who will then take up their findings and make sure that both science and society will develop in the envisioned way? Or put differently: In which kind of governance are citizens actually participating?

1.2 Experts of Community

But let us take a step back and adopt a slightly more critical social-scientific stance towards the enthusiastic tone of Nature's editors. What do we actually know about what takes place inside these engagement settings, about how both scientists and citizens experience their participation, about how they see their role in this new form of governance? My preliminary answer, which remains to be defended in this thesis, is: very little. We do know much about the different kinds of participatory designs that have been

developed, we do know that the demand for these has spawned the rise of an entire business in conducting them as well as of a new kind of expertise which Nikolas Rose (1999) has termed "experts of community". These experts of community voice and represent public opinion by organizing and facilitating a range of different methods of public engagement. Some of them come from a similar disciplinary background as I do – from science and technology studies (STS) -, but many are communication and public relation experts who moderate these interactions 'by the book', along 'best practice' proven designs.

It is from a personal experience with the latter kind of expertise of community that my interest what those participating actually think about their own role in all of this springs. I remember sitting in a hall for a few hundred people with about fifteen other loosely scattered persons (ten journalists or social scientists and five relatives of the lay panel) and watching the public part of the first Austrian citizen conference on genetic data in 2003[2]. The laypeople read prepared questions and the experts answered … some other questions than those answered. It was a bit like a staging of an absurd theatre piece, with two groups of actors talking of completely different things and a moderator in between making funny gestures. But beyond the amusing aspects this was also a bit disconcerting. Quite obviously, the invited experts simply largely ignored the concrete questions posed to them and delivered what they believed was important, either because they considered the questions irrelevant or because of some other reason. In any case, this inability to establish a common ground of communication, a common field of reference for discussion, startled me. Beyond that, the facilitators and the lay panel also found it quite hard to delineate the specific problems of genetic data and thus lost themselves in a rather long debate about the details of their respective mobile phone contracts – and what this meant in terms of the general handling of private information in society. After the event, the fact that participation had happened was celebrated in a press conference (with little echo in the press), the final statement was handed over to the president of parliament and … nothing on the issue has ever since been heard in policy or public debate ever since. What would I think, having participated in this kind of governance?

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[2] For a less subjective evaluation see Bogner 2003.

1.3 Tracing Bottom-Up Perspectives: Research Questions & Methods

In this thesis I will aim to shed light on what those participating think about their role in taking part in experiments in public engagement. I aim to do so because I argue that these bottom-up perspectives have been widely neglected so far in the political and academic debate. Much more, how participation is to be done and which aims it is to fulfil, is defined top-down, by policy makers and social scientists alike (Irwin 2006, Felt et al. in press a). As such, this thesis may also be read as a modest attempt in the paradoxical effort to open and hence democratise the discourse around democratisation with regard to technoscientific issues.

The empirical part of this thesis will ask how participants experienced taking part in two different engagement settings. I am interested in understanding how they imagined the function, limits and possibilities of public engagement on the one hand, and which problems they identified and struggled with in making engagement happen on the other. To be able to fully comprehend their arguments on these issues, it will be crucial to understand how they perceived the governance of the respective technoscientific setting concerned, and how do they situated the role of public participation in this governance context.

Concretely, I will draw on data and experiences from two research projects I have been participating in. On the one hand, I will build on focus groups on the ethical challenges and the governance of two biomedical technologies, organ transplantation and genetic testing[3]. On the other hand I will relate to the reflections of the participants of an experiment in long-term upstream engagement: a Round Table on a basic research project in genomic research on the lipid metabolism[4].

Both settings were set up as experiments to shed light on the participants' views on the governance of science and technology and their own role in it – as well as, to different degrees, as exercises in actual public engagement. And in both cases, I was part of the "experts of community" which staged these experiments. As such, this thesis inevitably is an exercise in mastering the double hermeneutic, a term which Anthony Giddens (1984)

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[3] Project „Challenges of Biomedicine: Socio-Cultural Contexts, European Governance, and Bioethics", funded by EU-FP6, Coordinator and Austrian project leader: Ulrike Felt
[4] Project „Let's Talk about GOLD! Analysing the Interactions between Genome Research(ers) and the Public as a Learning Process", funded by GEN-AU, project leader: Ulrike Felt

has coined to stress that very often those living in society are concerned with the same issues and use similar terms as social science researchers, albeit (hopefully for the latter) in a less reflexive fashion. I am as concerned with wrestling with the question how public engagement might make sense in these contexts as our participants were. But hopefully, what sets me aside is that coming from a science and technology studies (STS) background I have more conceptual tools to think about and address these issues.

How will I trace and analyse participants' perceptions of governance and public participation in conceptual terms? In this, my starting hypothesis is that two other sets of background assumptions people may have are crucial for a qualitative understanding of their position towards public participation: their vision of how science works in its relation to society on the one hand, an their perception of the wider governance structures and processes participation is supposed to relate to on the other.

Concerning the former, how science is assumed to function as a social and epistemic enterprise, and how society relates to this functioning in my hypothesis is an important precondition to build a position on science's governance and the possible role of the public in it. For example, if the epistemic core and the corresponding social "core set" (Collins 1981) are seen as untouched by societal interests, the idea of a self-governance of science will have a very different meaning than in an account which assumes the epistemic core to be deeply invaded by e.g. economic considerations.

The latter means to investigate how participants perceive the actor constellations and processes in which science is governed in society. This assumes that laypeople have quite differentiated views on the governance of a respective technoscientific field, and that they situate their assessment of public participation in these fields against them. In previous work, Mike Michael (2002) has coined the term "lay political theories" to address this dimension of lay perceptions of the relation between technoscience and society.

1.4 Biomedicine: Three Case Studies from the Politics of Life Itself

Biomedicine is one of the most intriguing arenas to study the challenges of coming to terms with a politics of technoscience, and of posing questions on the governance of technoscientific developments and the participation of the public in these issues. In hardly any other area are people as directly affected by science and technology, and for hardly any other field have paradigmatic changes in the relation between technoscience and the

political been studied in so much detail.

A classic form to think the relationship between medicine and society and its political dimension is the concept of medicalisation. Medicalisation describes the expansion of medical jurisdiction, or the integration of more and more previously differently defined conditions into the realm of medicine (Conrad 1992). Hence, the processes and struggles associated with this transformation are mainly concerned with the expansion of control, of the jurisdiction of the medical profession into new terrains. Paradigmatic examples of these shifts are the re-definition of certain mental disorders "from badness to sickness", from phenomena that were previously defined in terms of deviance to medical conditions. While this framework may offer interesting perspectives for many important controversies around medicine in the 20th century, it may be argued to miss out important dimensions of the recent developments of biomedicine (Clarke et al. 2003). The central argument in this is that while in the age of medicalisation medicine sought to normalize and control human bodies and identities, in the phase of biomedicalisation, which we have now entered, the main issue becomes the biomedical transformation of bodies, identities and social collectives. These transformations are deeply linked to the ever increasing technoscientization of medicine. While the organisation and re-organisation of life is increasingly thought and practised at the molecular level, the expanding use of information technologies has on the one hand opened up completely new epistemic possibilities to read and transform the genome, and on the other fundamentally shifted the power relations in medical practice (Nettleton 2004). Along with these technological shifts, also the actors involved in biomedical practice and research have multiplied. Most of all, medicine has been capitalised and today is more strongly linked with economic visions and actors than ever, from the earliest stages of basic research on (Rose 2007).

Biomedicine does no longer only repair bodies, it is increasingly opening possibilities to optimise, shape and even customize them. Pharmaceutical improvements of human bodily functions, from cognitive to sexual, are only one cornerstone of an ever expanding field also including surgical enhancement, and at least dreams and visions of genetic modification. New identities are shaped by technologies such as genetic testing, creating new social collectives such as those 'genetically at risk' for a certain disease, and re-shaping social bonds such as the ways families think their hereditary relationships. As these new "biosocialities" (Rabinow 1996), for example patient groups advocating for research into rare diseases, become active proponents of health politics, even concepts such as citizenship need to be re-thought in biological terms (Rose 2007).

Thus it might be argued that what is reshaped in these "politics of life itself" (Rose 2007) is nothing less than how we understand ourselves as human beings, in relations to our bodies, our own identity, and our belonging to social collectives. Trying to understand how these changes are played out on the micro-political level of medical practice and in more macro-political arenas opens up a myriad of empirical questions linked to concrete sites, practices and technologies.

In this thesis, I follow my main question concerning the bottom-up perspectives of those taking part in the new participatory modes of governance in three arenas, in which the "politics of life" takes different shapes. Organ transplantation, genetic testing as well as the basic research on the lipid metabolism connected to obesity all are situated in the wider context of a biomedicalisation of society sketched above. However, the concrete social and ethical issues, and hence the challenges for governance, differ for each context. How this difference is played out in the discussions, and if and how it impinges on the perspectives of governance and participation I aim to trace, will be an important question to follow.

1.5 Outline of the Thesis

I will start my discussion by giving a more detailed account of the changes in science and society, which form the background to the recent rise in public engagement (chapter 2). Then, in two consecutive chapters I will follow up the two rationales for public engagement I have shortly sketched in my discussion of Alan Leshner's (2003) editorial. First, in chapter 3, I will address the role of public participation in handling the uncertainties and shaping the pathways of future technoscientific innovations and their relation to society. In this, following Sheila Jasanoff's (2004) argument I will assume that both the concrete form of the technoscientific innovation and the societal arrangements corresponding to it are co-produced. Secondly, in chapter 4, I will review science's and policy's attempts to build public trust and the ways of thinking about the trust relation between science and society that have been both developed in social science and experimented with in practical application.

After I have discussed the backgrounds of these two theoretical goals of public participation, in chapter 5, I will take a closer look at both the European and the Austrian policy debate on public engagement to see in which form and with which emphasis these aims are argued by policy makers. This is of direct relevance to my thesis, because most

public engagement exercises still are commissioned by the policy sphere.

In chapter 6, I will then discuss how public engagement is enacted in concrete designs, and how the "expertise of community" is usually played out in these settings. To do so, I will give a brief overview over the history and scope of available designs, and then propose that most of the current practice in this field is committed to a "mechanical objectivity" (Galison 1998) model of representing public opinion. Employing standardized models this form of representation rather obscures the contingent choices and implicit assumptions inherent in participatory designs (Irwin 2001) than making them transparent.

This discussion of the practice of participatory designs concludes the chapters which are meant to lay out the context to my argument in this thesis. In the following chapters, I will develop the central concepts which will guide my empirical analysis. To grasp how scientists and citizens conceptualise the governance of technoscience and their own role in it, I will analyse their statements along two central concepts: their 'lay models of science in relation to society' on the one hand, and their 'lay political theories' on the other. As already touched on above, the former term is crucial for understanding the meaning of public participation in my empirical work, because it defines the territory on which any governance of science and any public participation is played out. The latter term comprises the shape of the governance system they perceive for the respective area of technoscience they are discussing, the actors involved in it, their relations as well as their assumption on the role of public participation in this context.

I will discuss both concepts and their background in science and technology studies in separate chapters. I will first describe the repertoire of models which STS and its related disciplines have developed to describe science as a social activity in its relation to society (chapter 7). In chapter 8, I will relate the rather short conceptual history of the concept of 'lay political theories', on which not much prior work exists, and clarify my own use of it.

Building on these two terms, chapter 9 will lay out the precise research questions I aim to follow in my empirical material. Chapter 10 will describe the empirical settings I relate to and the methods, which have been employed in these projects. In this, I will pay particular attention to reflecting how my colleagues and I as the "experts of community" for these respective settings handled our own expertise and its relation to these designs. In the last section of this chapter, I will sketch how the two empirical settings relate to my research questions. In short, while I will identify and analyse lay political theories for both settings, the evidence for the lay models of the science in society and how they are used is much more dense in the long-term setting of "Let's talk about GOLD!". Hence I will limit my

discussion of these models to this material.

The first main part of my empirical chapters will be devoted to identifying the lay political theories of the discussants in the focus groups on organ transplantation and genetic testing (chapter 11). I will analyse which political issues they identified, how they describe their perception of the respective systems of governance and how they make sense of public participation under these circumstances. My discussion will reveal important differences between the two technological settings.

The second part will address the long-term data from the Round Tables of the "Let's talk about GOLD!" project (chapter 12). For this project, I will analyse in detail which questions the participants developed as relevant to be discussed in an upstream context, how they struggled to find models of the relation between science and society, which might allow them to tackle these questions, and finally I will interrogate how they built their lay political theories in a similar fashion as I did for the focus group settings.

Building on the results of my empirical analysis, I will offer four conclusions on the relation between technoscience, governance and public participation in my case studies (chapter 13). Each of these conclusions aims at identifying a current deficit and outlining a demand to be met in order to render public engagement exercises more fruitful. Building on these, in a reflexive conclusion on my/our own expertise of community beyond the two empirical settings (chapter 14), I will sketch which kind of expertise would be needed to meet these demands.

1.6 Technoscience: A Definitional Remark

In this thesis I will use the term "technoscience" (e.g. Latour 1987) to stress that the a priori assumption of a difference in kind between science and technology is analytically rather unproductive because it artificially separates two densely interweaved arenas. It is hard to argue that modern science is in an activity independent from technological reason, given that science always was (Zilsel 2003 [1946]) and is ever more so driven by technological possibilities which open up and thus also shape new epistemic options (Keating & Cambrosio 2003). There is no genome research without a DNA-sequencer and PCR, and even the seemingly most arcane areas of physics can hardly do without artefacts such as particle accelerators and detectors. Hence science as a practice may not be understood without considering its technological artefacts on the one hand. On the other hand ever more strongly also very basic scientific knowledge production is oriented

towards applicable and economically exploitable technological outputs (Nowotny, Scott & Gibbons 2001).

Further, for the thesis at hand, deconstructing another implicit assumption made in the distinction between science and technology is important: that science is about the discovery of truth in nature and technology is about the application of the principles discovered for societal means. If we follow this line of argumentation, which is one of the most dominant cultural ways of thinking the science/technology or basic/applied science distinction, virtually all basic science (Wilsdon & Willis 2004) and also large parts of technological development (Pinch & Bijker 1987) are removed from the possibility of political discussion. Societal influence only sets in in the context of application, and thus political issues only arise there, but not at any time before.

Hence such distinctions can themselves be argued to be political actions. In his concept of "boundary work" Thomas Gieryn (1995, 1999) has described how scientists defend their epistemic authority and the power to define their own rules of conduct by distinguishing between what is science and what is not. In these processes of boundary work, some attributes and properties of science are accentuated, while others are denied, in order to exclude other actors from exerting influence on the institutions and values of science, as well as from gaining "the credibility, prestige, power and material resources that attend such a privileged position" (Gieryn 1995: 405). Historically as well as in present debates, separating ‚science' from ‚technology' or ‚basic' from ‚applied' science may be read as precisely such a boundary work strategy. Conceptually separating science from technology a priori thus would mean to be analytically blind to an important political mechanism at work in the debates around the political dimensions of technoscience.

2 Shifting Boundaries: Changes in Science and Society as Challenges to a Governance of Science

At the beginning of the 21st century, many categories which before had been strong pillars in the foundation of both society as well as of the disciplines which reflect on it seem in constant flux. As the seemingly ordered structures of modernity erode, technoscience becomes ever more central to both everyday life and the development of society, while its effects seem both more risky and uncertain than ever before. This process is intrinsically connected to and amplified by changes in the structures of governance, as the state as central institution of traditional government is transformed by a number of complex and interrelated processes. In this chapter, I will give an outline of these changes in science and governance. First, I will address the shifting role of the state and the rise of governance. In a second step, I will then turn to the changes science itself is undergoing and discuss the implications of these changes in terms of governance.

2.1 Beyond Government – the Transformation of the State and the Rise of Governance

It is hard to describe the crisis of the classical concept of the state and of state-exercised government in more concise words than Nikolas Rose:

> "As we enter the twenty-first century, many of the conventional ways of analysing politics and power seem obsolescent. They were forged in the period when the boundaries of the nation state seemed to set the natural frame for political systems, and when geo-politics seemed inevitably to be conducted in terms of alliances and conflicts among states. They took their model of political power from an idea of the state formed in nineteenth century philosophical and constitutional discourse. This imagined a centralised body within any nation, a collective actor with a monopoly of the legitimate use of force in a demarcated territory. This apparent monopoly of force was presumed to underpin the unique capacity of the state to make general and binding laws and rules across its territory. It also seemed to imply that all other legitimate authority was implicitly or explicitly authorised by the power of the state." (Rose 1999: 1).

Government, the 'traditional' mode of ordering society in which power, steering and regulatory competences are seen in the hands of formal public institutions and the state, is thus seen as a concept with ever less explanatory power for the political realities of

today. Societal processes no longer seem to be as accessible to a steering implemented in the traditional means of a more or less centralized exercise of power, such as by national laws and regulations. How might this shift, this transformation of the state be explained? Benedict Anderson (1983) has argued that nations are to be understood as "imagined communities", whose collective identities are not least constructed by technological means. Technologies of communication and control (Law 1986), technologies of representation such as the map or the census (Anderson 1983), as well as large socio-technical networks (Hughes 1983) such as newspapers, electricity or transport networks, created a sense of territorial unity and governability of the nation state. Globalisation or de-nationalisation (Zürn 1998) as a term and process implies that the nation state is no longer the main point of reference for many of these technologically constructed identities. Especially the new information and communication technologies have facilitated the creation of identities beyond national borders, and economic and technological zones (Barry 2001) are no longer even remotely congruent with the territorial limits of nation states. However, it seems important to note that neither identities nor technological and economic zones are hence necessarily global – they are trans-national. New boundaries are erected as the old ones are transgressed, the seemingly global space of the internet and its many digital divides being a prime example. However, the new technological boundary conditions also allow instant shifts of scale – from the local to the global – and thus seemingly paradoxically strengthen localised and regional identities as well as more global ones. The state seems to be 'lost in the middle', as it is "too large to relate to local communities which are also globally constituted and connected and [...] no longer require mediation between the local and the global; and too small to cope with the emergence of world-economies and world-cultures." (Nowotny, Scott & Gibbons 2001: 22).

But what comes after the state, which other modes of ordering may replace classical ways of governing? In political science, as well in much political discourse, "governance" has become a popular notion to address this issue. As with many highly popular analytical concepts, the use of the term varies widely between authors and disciplines. Studies of current publications on this topic have shown that a large number of competing definitions for the concept of governance may be identified solely in the academic segment of the debate, the estimates ranging from five to six or even nine quite different conceptualisations of the term (Jordan, Wurzel & Zito 2005: 278). It is not my aim to take a stand in this discussion or even to add another 'definition' to this already quite complex

boundary object. Rather, it will be sufficient for my purposes to identify the elements of the governance concept which constitute a kind of "baseline agreement" (Stoker 1998). One of these baselines is that governance describes a change in the meaning of government (Rhodes 1996). While the terms "governance" and "government" have for a long time been used synonymously in everyday as well as scientific usage, the recent discourse about governance situates both terms at opposing extremes, as two "heuristic poles on a continuum of different governing types" (Jordan, Wurzel & Zito 2005: 492). "Government" is used to denote a traditional mode of ordering society, where power rests in the hands of formal public institutions and the state. In this mode, steering is accomplished through centralized means of exercising power, such as laws and regulations.

On the other hand, "governance" refers to new constellations of power that go beyond the structures, rules and processes of classical government. 'Governance' often involves non-governmental actors in policy-relevant decision-making, which means that the boundaries between public and private sectors are increasingly blurred. With the involvement of these new actors in policy-making, decision-making constellations shift from the top-down model that is characteristic of government to network-shaped structures that exemplify governance (Stoker 1998). The framing of policy issues and the processes of regulation and implementation are increasingly de-centralized in this model of ordering society. Thus, governance may be seen as a new mode of distributing power and regulatory competences.

The emergence of governance is often argumentatively linked to the failure of traditional decision-making structures and to a decline in the ability of central governments to effectively steer society. The reasons for this failure range from challenges posed by processes of globalisation, to a displacement of power from the nation state to supranational organizations such as the European Union. However, the empirical basis for the shift from government to governance is often criticized as being rather weak (Jordan, Wurzel & Zito 2005). Key empirical questions about the relationship between governance and government, the identity of new actors and their role in these processes remain open. In his analysis of the governance of genomics in the 21st century, Herbert Gottweis (2005) stresses that governmental actors remain important in this field, while at the same time bottom-up forms of governance such as the increasing role of companies and also of public opinion seem to emerge. Different forms of government and governance may thus co-exist in one field, their precise configuration being a matter of empirical investigation.

The shift from government to governance will be an important point of reference for my empirical analysis, because as I will show considerations about the weakness of government and the new forms of governing replacing it are not limited to the academic sphere.

Beyond the shift from government to governance, 'governmentality studies' offer important insights into a further crucial aspect of the current transformations of the political. Authors in this tradition (Rose 1999, Foucault 1991 [1979]) stress that the rise of novel forms of self-governance are an important element of the transformations of governing. In this line of work, understanding any form of governance also crucially entails grasping the relations between those governing and those to be governed. This opens the vast field of literature on the disciplining of citizens and bodies, but the aspect which is of relevance to my argument here is much more strongly linked to the productive aspects of power. The most effective forms of governmentality might not be those which repress the actions of those governed, but which re-imagine them in a form which fits a new mode of governing. In such an argument, even a concept such as freedom may become a tool of governance (Rose 1999).

For example, in the biomedical domain, the past years have witnessed the rise of a discourse around an informed and empowered patient capable of making his or her own choices. But freedom always has a price, which in this case may be the systematic delegation of responsibility from medical authorities and institutions to 'the medical consumer' (Lupton 1997). The imperative to remain healthy is only one issue around which a whole array of techniques of self-governance has developed. Instead of relying on the provision of medical care by governmental institutions, the contemporary medical consumer is itself active in maintaining his or her health (Bunton, Nettleton & Burrows 1995).

In a broader perspective, it might be argued that in many fields techniques of government have been individualised, requesting the citizen to be active and reflexive (Giddens 1991, Beck 1997). This is important for the argument of this thesis, because an analogy to the issue of public participation might be drawn. Also in this context the individual is asked to be reflexive and to decide, on matters of technoscience. However, as in every form of self-governance, this reflexivity takes place within limits, and it depends on models of thought, which allow the reflexive citizens to grasp and consider the topics at hand. If the responsibility to consider and decide on an issue is handed down without empowering the

citizens to grasp, debate and deal with these issues, participation may quickly become a new form of "tyranny" (Cooke & Kothari 2002), as a recent contribution has argued for the field of participatory involvement in the field of development aid.

A further crucial issue in this is in how far citizens are aware of their own role in the wider dynamics of governance. In most engagement designs and initiatives, citizens are asked to consider their positions towards technoscience, but they are not expected to be too reflexive about their own position in the dynamics of its governance (Irwin 2006, Michael & Brown 2005). However, they might still do so nonetheless, and this reflection might influence their conduct, even if it is not officially considered. The aim of this thesis also is to offer a glimpse at these othered reflexivities, by discussing bottom-up perspectives on governance and public participation in technoscience.

2.2 The Co-Evolution of Science and Society and its Challenges for the Self-Governance of Science

In the last section I have referred to an important body of work in political science arguing that the state as an institution as well as the ways by which society is governed are undergoing quite radical transformations. But what about other areas of society? Referring to the work of sociological theorists, Helga Nowotny, Peter Scott and Michael Gibbons (2001) have argued that the diagnosis made for the state may also be seen in a broader context. They characterise the growing importance of non-governmental actors and rationales in governing as but one indicator for a growing transgressiveness between the seemingly so clear-cut categories into which society was divided in classical modernity.

> "The great categorizations of the human enterprise produced by the successive revolutions of modernity [...] and around which the contemporary world is organized now appear to be either in flux, eroded, or socially contested. It is increasingly difficult to distinguish between the domains of the state and the market, between culture and mass media, between public and private arenas." (op.cit.: 22).

The classical account of the modernity which is now claimed to be dissolved is Niklas Luhmann's (1998) theory of functional differentiation. He argues that modern society is divided into functional subsystems, such as science, politics or the economy. Each of these operates independently according to its own rationale, which Luhmann calls "code". Every subsystem is further characterised by its own system of norms, its own ethos, and hence its very own system of self-governance.

For science, the most influential analysis of this system of norms and of the "scientific ethos" has been provided by Robert Merton (1973 [1942]). Written in the historical context of the severe attacks against the authority and legitimacy of science after the Second World War with its 'downfalls' of science on all sides of the front, Merton's account is both an analysis of the normative structure of science and a normative plea for science to remember and return to the basic values and norms he describes. It is a defence of a "science under attack" and thus itself both an important scholarly contribution and a prime example of a boundary work delineating the professional space and authority of science (Gieryn 1995, 1999). His key term is the scientific ethos as an affectively toned complex of values and norms, which is held to be binding by the single scientist. This complex is not codified, it is legitimised by values institutionalised and reproduced by the central institutions of science itself. Merton describes four key values: universalism, which implies that the truth of results produced in science is not to be influenced by the race or social status of the producer. Communism, which entails that scientific results are not the property of the single scientist but of the scientific community as a whole. Disinterestedness stresses that a scientist should be interested in the general advancement of science, rather than merely in his or her own career. And finally, organized scepticism means that scientific results must be exposed to critical scrutiny by institutions such as peer-review. These norms support a strong line drawn between society and the epistemic core of scientific knowledge production. The much contested norm of universalism may be taken as a prime example for this, which strongly states that 'real' scientific knowledge production should be free of social influences.

My aim here is not to comment on whether Merton's norms are adequate descriptions of reality in the sciences. It is not hard to argue that often they are not. However, the violation of a norm does not necessarily cancel its normative power, as long as it is perceived as a violation, and sanctioned. As I will show in the empirical parts, much of Merton's basic concepts may still be found in the rhetoric strategies and in the self-understanding of scientists today. For the purpose of the argument of this chapter however, it is important to note that Merton's scientific ethos is a perfect exemplification of an ethos developed by a functional subsystem as described by Luhmann (1998). As such, it depends on the exclusion of other societal rationales, which both normatively and conceptually also is the basic thrust of Merton's argument. Science is to be governed, and may best be governed, by science itself, and other societal values are to be handed in by

the scientist as he or she enters the laboratory.

Helga Nowotny and her co-authors (2001) argue that this diagnosis is becoming less and less valid, as the mutual influences between sub-systems increase. To grasp this mutual influence between science and society, they use the term "co-evolution" to stress that the mutual influence between society and science is largely driven by self-organising processes which ever more strongly intertwine the development of these two areas. In their argument, one of the most important dimensions of this co-evolution is the reflexive change of institutionalised roles and norms such as the scientific ethos. They claim that scientists have become more reflexive about the social impacts and implications of their research, and that publics, in the words of Sheila Jasanoff, "have become more conscious of the ways in which science and technology affect their interests and values" (Jasanoff 2003: 234). Hence, the epistemic core of science is increasingly influenced by societal actors and rationales. Science becomes more problem-oriented and more and more often enters trans-disciplinary co-operations in which knowledge production is consciously contextualised by the expectations and needs of social actors. Thus, they argue, besides reliability, "social robustness" becomes a second important criterion in judging the quality of scientific knowledge.

This implies that the science system itself is seen as progressively changing from a "segregated" model of internal organisation to an "integrated" model. New forms of co-operations emerge, such as those between patient organisations and medical researchers (Epstein 1996, Fochler 2003, Rabeharisoa & Callon 1999), which are but one example in which it becomes hard if not impossible to distinguish between 'science' and 'society' (Latour 1998). But science does not only co-operate with new partners, also more traditional bonds such as those with economy intensify, with probably structurally even more important consequences than the new co-operations mentioned above. Visions of economic applicability enter the epistemic core of knowledge production at ever earlier stages, and there is a „noticeable convergence between the paths of basic research and the potential of future technological innovations" (Nowotny, Scott & Gibbons 2001: 38).

Thus science itself changes, societal values enter more and more strongly, and this raises obvious challenges to the model of governance described in the Mertonian ethos. But to fully grasp the extent of these challenges it is first important to note that it is not only science which is changed by society. To the same extent, the reverse might be argued to

be true. As captured by terms such as the "knowledge society" (Stehr 2003) scientific knowledge has become a central structuring criterion of contemporary societies. It is seen as providing innovation as the basis of economic welfare, as providing orientation from the conduct of familial life to global problems such as climate change, and as prime approach in solving societal problems in general. Ever more strongly, science is seen as the means to shape societal futures, which are more and more seen as manipulable extensions of the present (Nowotny, Scott & Gibbons 2001; Brown, Rappert & Webster 2000). At the same time however, the societal relation to new scientific knowledge and the pace of innovation must be described as deeply ambivalent. In Europe, large parts of the population share the notion that science and technology is changing their life too fast (European Commission 2005a). Emerging technosciences such as green biotechnology are vividly contested, as are biomedical technologies such as genetic testing which establish new risk identities without providing any treatment (Novas & Rose 2000). It can no longer be assumed that innovations are tested within the clearly-defined boundaries of science itself, but rather – to use the term coined by Krohn & Weyer (1994) - society itself has become the laboratory due to the incessant intensification and growing scale of technologies and technosciences. As society becomes the laboratory in which new technosciences are tested, uncertainties proliferate. New technoscientific developments may have unanticipated consequences or be in conflict with fundamental societal values (Jasanoff 2003). In short, technoscience has become a central issue, a driving force of societal change, but one about which society is deeply ambivalent (Beck 1997). This has strong consequences, both for the governance of technoscience itself, as well as for its role in other contexts of governance. If technoscientific developments are seen as the main cause of the problems to be addressed, then science itself can hardly become the neutral arbiter on which decisions may be based. The traditional expert authority of science is challenged, as may be exemplified by the manifold smaller and larger controversies around the status of scientific expertise (Phillips, Bridgeman & Ferguson-Smith 2001), as well as in the institutional efforts to "democratise expertise" (Gerold & Liberatore 2001) and to establish transparent criteria for the consultation of scientific experts.

Hence, under the conditions of co-evolution, a self-governance of science which externalises the mutual influences between science and society such as the Mertonian ethos seems out of time and out of place. The challenges to a governance of science

multiply. It can no longer be only about the 'correct' production of scientific knowledge the Mertonian norms were thought to guarantee, but it needs to consider the impacts the knowledge produced will have on society, if not even reflexively the influence society has on the production of knowledge. New modes of governance have to be found, in which scientists may become more attentive to their societal context, to the societal influence on and their own responsibility for the societal consequences of their work. And the scientific ethos seems in need to adapt to these new conditions.

3 Debating Technosocial Futures: From Risk to Innovation Governance

It seems that many both in academia and in the policy sphere believe that public engagement may be a step towards a very different way to deal with the politics of technoscience. But how precisely could it be different, and what obstacles are to be overcome in making this difference? In the preceding chapter, I have sketched a central dilemma for the current governance of technoscience and the innovations it produces. On the one hand, as science is ever more strongly interwoven with societal interest and rationales, and as scientific experimentation increasingly takes place in society, the impacts of technoscientific knowledge production on society become a central issue for governance, albeit one which has to deal with high levels of uncertainty. On the other hand, science itself has lost its traditional expert authority to be the neutral arbiter offering the 'best' solutions to these problems, because it is seen as responsible for their very existence. Hence, new ways to address these issues and to legitimise political decisions taken on them need to be found.

Sheila Jasanoff (2003) has argued that the 'participatory turn', the strong rise of public engagement mechanisms, must be seen against this background. The involvement of the public in political decision-making may be another way to establish public accountability. However, as she claims, it is the way this accountability is established, which is of crucial importance, if one wants to judge the democratic quality of these processes.

> "Participation alone, then, does not answer the problem of how to democratize technological societies. Opening the doors to previously closed expert forums is a necessary step – indeed, it should by now be seen as a standard operating procedure. But the formal mechanisms adopted by national governments are not enough to engage the public in the management of global science and technology. What has to change is the culture of governance, within nations as well as internationally; and for this we need to address not only the mechanics, but also the substance of participatory politics. The issue, in other words, is no longer whether the public should have a say in technical decisions, but how to promote more meaningful interaction among policy-makers, scientific experts, corporate producers, and the public."
> (op.cit.: 238, emphasis in original)

"More meaningful" is a key term in this argument. Following Alan Irwin (2006) as well a recent Nature editorial (2007) it may be criticized that much actual public engagement

may be seen as mere "talk about talk" (Irwin 2006), provocatively put as empty exercises whose end is 'to let the public have their say', but without much effort to meaningfully translate the results into political action. Under these circumstances consulting the public becomes a mere vehicle of legitimating policies which are still decided top-down, not much differently than in prior modes of governing.

To become meaningful, Jasanoff (2003) argues, participatory exercises must be seen as an attempt to deal with the inherent social uncertainties created by technoscientific progress. The term uncertainty is crucial in this respect, as it differentiates participatory methods from traditional approaches to risk assessment, which rely on expert knowledge to assess the 'risks' of certain technological developments. To 'assess' risk however both requires and presupposes a framework in which the dangers and possible future negative effects of a technoscience may be identified. Only if it is known what the adverse effects might be, then their risk that can be numbered. However, the definition of these adverse affects is inherently a social issue, which is not reducible to technical considerations (Wynne 2005, Limoges 1993).

For Jasanoff, "the ways in which we know and represent the world (both nature and society) are inseparable from the ways in which we choose to live in it. Knowledge and its material embodiments are at once products of social work and constitutive of forms of social life" (Jasanoff 2004: 2). Hence, in her approach, knowledge and social order, or knowledge and the social structures this very knowledge corresponds to, are co-produced. Public engagement, then, may be a way to actively engage in a politics, which might democratically discuss and influence both the future shape of technoscientifc innovations as well as the social constellations in which these innovations will be applied. To do so, in her argument and that of other colleagues (Wynne 2005) it needs to go well beyond discussing risk in categories which have been pre-defined by scientific expertise.

Timing is a crucial issue in all of this, as a changing societal relation to the future is one of the most important contexts to the process of co-evolution. Ever more strongly, the future is seen as "open and responsive to human action" (Nowotny, Scott & Gibbons 2001: 39), as to be shaped and influenced by technoscientific means. This shift significantly extends the time span lying between the start of the governance process and the constellations which are to be shaped and influenced. In risk governance, the imminent possible consequences of an existing application, framed in the terms of technoscientific expertise, were steered and debated. The new forms of "innovation governance" emerging in current public

engagement (Felt & Wynne 2007) start at a much earlier point in the innovation process, as considerations of the applicability and hence social use of the knowledge produced enter basic research. On the other hand, by not only considering narrowly defined risks but also the wider social changes an innovation may trigger, it extends the period of time considered well beyond only the initial application of a technoscience in society, the current public debates around nanotechnology and the science fiction like visions of the future they are connected to being a prime example.

Much of the current debate on these issues crystallises around the term '"upstream engagement'" (Wilsdon & Willis 2002, Wilsdon, Wynne & Stilgoe 2004). The movement to shift engagement designs up the 'stream' in the innovation process has been advocated most strongly in the United Kingdom, both in policy documents and in academic contributions. In the British context, the rise of the upstream approach is very strongly linked to the apparent problems of public engagement on GM issues. The huge British public debate on GM food strongly showed the public's large basic uneasiness about the introduction of genetically modified food and crops onto their fields and into their supermarket shelves. But what to do with this diagnosis at a point in time when significant public resources had already been invested in developing these future applications, and when products are at the verge of entering, or already on, the market? At this point in time, institutional commitments are already firmly in place, and leave very little room for a general change of trajectory, such as for example a societal decision not to use a certain technology[5].

Hence critical social scientists have stressed that new ways of public engagement have to be found in order to produce more socially robust innovations. Brian Wynne has argued that much of current public engagement "has an exclusive focus on downstream risk or impact issues as distinct from upstream research and innovation, reflecting the false assumption that public concerns are only about the instrumental consequences, and not crucially about what human purposes are driving science and innovation in the first place" (Wynne 2005: 67). In his argument and that of his co-advocators the question "Is it safe?", implying a framing of calculable and predictable risks, all too often replaces more basic considerations on the role of technological innovation in society and its long term social consequences. However, as they go on to argue, public concerns tend to go deeper than

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[5] One of the few examples of such a „downstream rejection" of technological progress is genuinely Austrian: In a public vote in 1978 the Austrian citizens decided against the use of a ready-built nuclear power plant, and against the use of nuclear power in the country in general.

just the instrumental effects of technoscientific developments. Hence, basic public questions remain unanswered in 'downstream' public engagement, which renders this type of citizen participation genuinely ineffective in establishing any meaningful relation between science, politics and the public. Moving engagement 'upstream', from the phase of application into research and development, may allow to ask more basic questions, such as:

> „Why this technology? Why not another? Who needs it? Who is controlling it? Who benefits from it? Can they be trusted? What will it mean for me and my family? Will it improve the environment? What will it mean for people in the developing world?" (Wilsdon & Willis 2004: 28)

Being able to address and answer the questions posed in the quote above in an engagement setting undoubtedly would be an important step for a more democratic governance of technoscientific innovation. However, it needs to be remembered that they come from a pamphlet, a document which in the end must also be read as piece of utopian political writing, as much as it may be based in the results of empirical work in science and technology studies. And as with every utopian political idea, the most important question seems to be whether it may be put in practice, and at what costs. Will the methodology that has been developed for downstream engagement also be applicable upstream? Will the members of the public indeed cherishingly embrace this approach, which pays so much more attention to 'their deeper meanings'? Does it indeed fit their own models of the relation between technoscience and society, or are there cultural assumptions, which stand against the success of upstream engagement? These questions remain open in the theoretical discussion, but they are crucial to be able to see if at all upstream engagement may become an effective way of mediating the relation between the public, science and policy - and if so, which methods and forms of expertise it may require to become fruitful.

4 Understandings and Misunderstandings – The Quest to (Re)Build Public Trust in Science

Why should public engagement build trust in science, and how may it do so? Answering these questions requires developing a deeper understanding of the social relations between science and the public.

Efforts to understand how public trust or distrust in science emerges, and to influence these processes building on this very knowledge have a quite long history (Felt 2003a). However, it might be argued that since the mid-eighties the concern with the public's uptake and understanding of science has become more important both in the academic but especially in the political debate than ever before.

Interestingly, the first strong impetus to address the public's understanding of science came from science itself[6]. In 1985, one of the most prestigious scientific societies, the British Royal Society, published a report titled "The Public Understanding of Science". Of course, the interest of the British scientific elites in the public uptake of their work did not come from pure curiosity. It was a measure of defence, albeit not against the public, but against politics. Science, especially basic science, was seen as under attack by the budget cuts of the Thatcher government. And as their scientific excellence was obviously not enough as an argument in itself to counter these budgetary cuts, science was looking for new allies, and it discovered the public[7]. Public support and appreciation for science was seen as too low, an issue, which was to be addressed in defending science against the "Iron Lady". The basic rationale implicit in the Royal Society Report of how the public relates to science and how its support may thus be won has since often been termed as the "deficit model" (Wynne 1995). It assumes that the public's distrust is mainly rooted in the fact that it is too less informed and thus ignorant about science. This ignorance is to be met by informing the public, which in this rather simple linear and unidirectional communication model will quasi automatically lead to building trust. In science communication, the complicated language and approach of science merely has to be simplified and related to the public, which hardly can await this information to solve their fear and mistrust. The roles attributed to science and the public alike in this approach

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[6] For a historical perspective, see Felt 2003a, Wynne 1995

[7] It is ironic to note that this situation is nearly the reverse of what we may witness today. Today, science often seems to be allied with politics in their common quest for innovation, and the public is seen as the ‚danger' to this rational alliance.

clearly follow an enlightenment model. The public is portrayed as caught up in a state of superstition and false beliefs, and as only waiting for the rational knowledge of science to enlighten it (Felt 2003a). Science on the other hand is portrayed as intrinsically benevolent, and the knowledge it produces may only be to the advantage of society. Risks or adverse effects are not an issue in this model. Because 'science' is good for 'the people', it only needs to be adequately explained to create trust. It might be argued that this model still very much follows the idea of a strong segregation between science and society, coupled with a sound belief in the authority of scientific expertise. Hence there is also little room for public participation in this concept. Since any form of controversy about science can only be based on a public misunderstanding of scientific facts, as well as of the true benevolent intentions of science, the public needs only to be educated to end the controversy in the interest of all. There is no need for any contribution by the public beyond that.

The basic assumptions of the deficit model were largely backed by a line of research mostly building on quantitative surveys such as the Eurobarometer or the surveys of the National Science Foundation in the United States (Durant, Evans & Thomas 1989). In these surveys, the self-reported attentiveness to and interest in science is measured, as is the level of 'scientific literacy' of the public. Scientific literacy in this case may more or less be equalled to the level of knowledge about science, which is measured by asking a series of seemingly straightforward[8] factual questions about different areas of science. This literacy then of course may be correlated to the self-reported interest in and support for science.

By more critical scholars, these studies have been argued to

> "[...] inevitably build in certain normative assumptions about the public, about what is meant by science and scientific knowledge, and about understanding. [...] Such surveys take the respondent out of the social context and are intrinsically unable to control or examine analytically for the potentially variable, socially rooted meanings that key terms have for social actors." (Wynne 1995: 370).

Thus these surveys may measure the individual reactions to 'science', but they do so without knowing what this highly variable and abstract term actually means to the

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[8] Unfortunately for the creators of these surveys even the seemingly most basic „facts" tend to run away if one looks at them for too long (Knorr-Cetina 1981). For example, it seems like basic literacy to know whether the sun moves around the earth or vice versa. Of course, the assumption is, the latter is true. On the other hand, strictly speaking in terms of physics and a situation involving two bodies, we may only talk of the two moving around each other. Anything else is a matter of perspective.

respondents. Following the logic of the deficit model, they are only interested in levels of support and levels of factual knowledge, not in the reasons for actual trust or mistrust, and they exclusively problematize the public in its relation to science, completely missing out on any possible contribution of the sciences to problems in the mutual relationship with the public. Further, they juxtapose a seemingly homogeneous science to an unequally undifferentiated public (Levy-Leblond 1992). But what relevance might basic knowledge about medieval European history have for developing a position towards plant genomics?

In a qualitative approach, Mike Michael (1992) has studied how laypeople differentiate between science in general and different sciences in particular. Drawing on a number of in-depth interviews, his main finding is that people may have quite differentiated knowledge and opinions of one particular scientific discipline, but at the same time claim to know very little to nothing about science in general. Thus the high levels of ignorance seemingly found by survey research may also be an effect of the cultural meaning of the term science in its general form. People seem to believe that in order to know something about "science in general", it is necessary to know about everything, from cosmology to molecular genetics – which in fact of course completely impossible, even for any scientist (Wynne 1995). Thus paradoxically the results of the survey might be read much more as indicative of the cultural authority of science and of the self-perceived distance of the public from science than of public knowledge about science.

Other studies have even shown that more knowledge might even lead to less trust instead of more. Helen Lambert and Hillary Rose (1996) argued this to be true for people affected by a genetic metabolic disorder. The more informed these patients were, the more they were aware of the fact that the scientific information their doctors had given them was in itself controversial. Further, Lambert and Rose have described that the patients were very active in the way in which they integrate scientific knowledge into their daily lives, developing "situated knowledges". The fact that they do not follow medical advice to the last extent may thus not be due to a lack of understanding of the information given to them, but rather a conscious choice between the level of therapeutic effects and their own quality of life.

In the probably most central contribution to this debate, Brian Wynne (1992, 1996) has forcefully argued how strongly the emergence and loss of trust is connected to the actual interaction between scientists and laypeople. In a much referred study he analysed the

interactions between Cumbrian hill farmers and radiation scientists after the Chernobyl accident, and shows how the farmers' reactions were influenced by prior experiences with scientists due to their vicinity to Sellafield[9] and most of all the scientists' ignorance of their local knowledge about soil and weather conditions as well as animal behaviour, which in the end jeopardized the validity of their 'scientific' measurements.

Drawing on this and other case studies, Wynne argues that laypeople's trust in science is a far more complex issue than the simple dichotomy of trust and distrust suggests. Trust must be seen as a complex and contextualised process in which a number of locally contingent factors play important roles. In the sheep farmer case, previous experiences with the Sellafield authorities were as important as the actions of the scientists or the economic dependence of the farmers to sell their lambs as fast as possible. Trust can thus not be seen as a dichotomous variable, but rather as an equilibrium of different locally contingent factors. This in turn means that a seemingly small shift in one of these factors can cause a quite dramatic change.

The qualitative studies referred to above may be summarized under the label of "critical public understanding of science" (Michael 2002). They share the assumption that laypeople's uptake of science is an inherently social and situated process, which may not be reduced to as simple mechanisms as those assumed by the deficit model. Further, they argue that the reasons for conflicts in the relation between science and the public must not only be sought on the side of the public. Much more, it often is the "body language" (Wynne 1996) of scientific institutions and the values they seek to impose on laypeople, which are at the roots of public resistance. Hence, any meaningful science communication must not only concentrate on the public, but should aim at facilitating and mediating a dialogue between science and society.

It is on the results of this line of work that often the call for more interaction and engagement in order to build trust between science and society is based. A whole range of methods, from science weeks to open labs and to 'discourse days' seek to facilitate more dialogue between science and the public, hoping that trust will emerge as a result of this interaction. However, while the studies cited above tell us much about how laypeople trust or distrust science in their own life-worlds and everyday contexts, there are only very few contributions which address how trust as a social relation is constructed in settings such

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[9] Also known as Windscale.

as engagement designs, where laypeople may engage with a techno-scientific issue they have never before heard of or thought about.

In a recent contribution, Nik Brown and Mike Michael (2002) point to the importance of the display of authenticity and emotion in these contexts. In the light of the crisis of scientific expertise, which I have sketched in the previous chapter, they argue that traditional expert authority is often not enough to establish trust in a public setting. The function previously fulfilled by scientific authority is now fulfilled by authenticity based on the display of painful and emotional decisions, which implies that "*all possible perspectives have been accommodated, all that can be borne has been borne.* In sum, the combination of the *factivity of emotions* and the *spectacle of their display* produces a particularly potent rhetoric."(op.cit.: 265; emphasis in original). It is the pain of the scientist which signifies that sufficiently disparate positions have been considered in developing his or her stance towards a particular issue. Typically, a certain experiment may be legitimated by mentioning all the different ethical problems that have been considered related to the issue, as well as the potential benefit of the experiment such as for example in contributing to find a cure for a certain disease. Hence, the expert authority of the scientist is no longer constructed by his superior knowledge or his proud incorporation of the scientific ethos, but by his display of the pain caused by the disparity of the different societal rationales, which affect his or her decision to do or not to do an experiment. Hence, authenticity as Brown and Michael describe it does not only comprise showing emotionality, it also comprises conveying that the scientist in question is socially and ethically responsible. However, this still does not answer the question in which cases and on which grounds laypeople will judge this display of emotion and responsibility to be trustworthy.

5 The New Scientific Governance: Deficit to Dialogue?

It has been resonating through much of what I have written so far that public engagement is becoming a more and more important keyword both in the academic as well as in the policy realm in conceptualising the relation between science, society and politics. To describe these changes, Alan Irwin (2006) has coined the term "new scientific governance", to highlight that what is at stake in these developments is not just another approach to doing better science communication, but much more a potential re-ordering of how science is governed *in* society. Studying recent developments in the UK policy sphere, he argues that to talk of a "participatory turn" may also be slightly misleading in conceptual terms, for it implies a "paradigm shift", a rupture in which the "old" scientific governance gives way to new modes of governing. As I will argue in this chapter, this is hardly the case. Much rather, the rise of the "new" scientific governance is to be seen as an ongoing process in which new elements such as new modes of public participation stand beside, interact and possibly even blend with more traditional ideas of ordering the relation between science, politics and society.

Hence, the precise form of the "new scientific governance" merits detailed empirical investigation, which, as Alan Irwin (2006) has forcefully argued, needs to go beyond a normative cherishing of the democratic new participatory rhetoric or a bashing of the re-invention of older hierarchical forms in new guises. In this chapter[10], I will attempt to give an outline of the way these issues are conceptualised in the European and Austrian policy discussion. I will start by outlining the broader policy backgrounds against which the rise of the "new scientific governance" is to be situated, and discuss how the relations between science, society and politics are envisioned in recent key European policy papers. The European Union is to be seen as one of the key actors in the area of science and society policy in Europe, and hence the discussion in these documents may be seen as having a significant impact also in the different national contexts. In a next step, I will address the uptake of the "participatory turn" in the Austrian policy context. My aim in this is to give some empirical details for theoretical arguments made in the previous chapter, and to sketch the policy context for what will be discussed in the remaining thesis. Though my analysis covers the key policy contributions, I do by no means claim it to be a complete

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[10] The arguments in this chapter are based on Fochler & Müller (2006).

in depth policy analysis. Especially on the European level, the space I can give to this analysis as a piece of context in this thesis is not meant to address the complexity of the negotiations and actor constellations behind single documents, let alone the relation of the various documents to each other. It can and should however provide an impression of the fragmented and contradictory nature of the wish for new forms of governance, as an important background against which the debates described in this thesis take place.

5.1 Governing the European Knowledge Society

Technoscience and technoscientific knowledge and innovations have become ever more central issues in the EU policy debate. Two streams of policy discussion may be seen as of importance for understanding the broader contextualisation of the relations between science, the public and policy makers: the Lisbon process on the one hand, as the central policy process for setting medium-term policy goals for the European Union; and the White Paper on Governance on the other hand, expressing the Union's attempt to redefine its modes of governing in the face of an apparent crisis of its perceived democratic legitimation. I will discuss both discourses in turn.

In the Lisbon agenda, establishing a European "knowledge society" is seen as the key prerequisite for sustaining economic growth and international competitiveness. The following quote illustrates the central role attributed to technoscience in this process:

> "Research and technology account for between 25 and 50% of economic growth and is a principal driving force for competitiveness and employment. In the knowledge based society, they will, more than ever, be an engine of economic and social progress. In the global economy, technology and research represents tomorrow's jobs. Research in Europe remains fragmented and compartmentalised. This is worrying. The Union is again lagging behind its major competitors in key areas – and the gap is widening.
> (EC 2000a: 18)"

In this quote, as in the general tone of the agenda, the future of the European Union is inseparably linked to technoscientific progress. Economic growth as well as societal progress is connected if not even at times equalled to the capacity for scientific and technological innovation. The Lisbon process has resulted in the ambitious goal to raise European spending for research and development to three percent of the GDP by 2010.

Hence, one of the strongest a priori assumptions in the Lisbon process is that technoscientific progress and innovation are to be considered as both positive and an aim in themselves. However, there are a number of obstacles perceived in the European policy

discourse to realising the goals of the Lisbon agenda. The public plays a key role in at least two of these obstacles. First, serious public controversies around economically promising new technologies, such as GM food, as well as the very heterogeneous reactions to stem cell research across Europe have hinted at the fact that the public does not necessarily share their policy makers' unconditional enthusiasm for technoscientific innovation.

A second obstacle, strongly linked to the first, is the current and expected future lack of 'knowledge workers', i.e. persons with technoscientific training. These human resources are perceived to be of key importance to realise the Lisbon goals (EC 2004a). However, in most European countries the graduates in science and technology are declining, if not in absolute numbers, then at least in relative proportion to the total number of university graduates (EC 2004a: 7-75). Further, Europe is seen as "exporting brainpower" especially to the United States, where promising young European scientists seem to find better working conditions than within the Union. The general public attitude towards technoscience is often seen as part and parcel of these better conditions, and better science communication is also seen as a key means to motivate young people and especially women to choose scientific careers.

Hence, there is an obvious tension to be noted between the long-term aims of the European Union as expressed in the Lisbon agenda, and the European publics who are expected to play an important role in their realisation, and be it just by not contesting them. Addressing this tension is often seen as the key aim of science communication on the European level, as the Science and Society action plan amply puts it:

> "At the dawn of the 21st century, as the economic integration of an enlarging European Union becomes a tangible reality with the introduction of the Euro, our society is faced with the challenge of finding its proper place in a world shaken by economic and political turbulence. Examples abound to show that knowledge, in particular science, technology and innovation, are indispensable to meet this challenge. Every day, scientific and technological progress contributes new innovations essential to our quality of life and international competitiveness. [...] However, there are indications that the immense potential of our achievements is out of step with European citizens' current needs and aspirations, such as peace, jobs, security and sustainable development of the planet. [...] Europe would therefore gain by assembling in a Community framework the efforts deployed in the Member States to improve the European public's ability to assess the scientific and technological

issues of the day, and to motivate them to become more involved in science."
(EC 2002: 7)

A second relevant stream of wider policy discourse is the discussion around the White Paper on Governance of the European Commission (2001). In this document, new methods of ordering the relations between political and societal actors in the policy making process are called for, as a reaction to a perceived crisis. Two dimensions of this crisis are mentioned. The less dominant line of argumentation is a "perceived inability of the Union to act effectively" (EC 2001: 7) on problems such as unemployment or food safety. Traditional political means of steering and regulation are thus evaluated as ineffective, asking for new mechanisms such as 'co-regulation' which involve the actors concerned earlier and more 'upstream' in the policy process. Most importantly, however, the described crisis of European politics is linked to an irritation in the relation between the European Union, as a political actor, and its citizens. Increasing distrust and disinterest in the traditional political institutions are seen as the main obstacles to be overcome in re-organizing processes of European governance. A "reinforced culture of consultation and dialogue" (op.cit.: 16) is invoked as an answer to this dilemma. In this variation of the political conceptualisation of governance, 'citizens' and 'civil society' are the new actors to be more actively included in the policy making process, even though it remains largely unclear who exactly is to be involved and to speak in the name of society. However the White Paper (op.cit.: 10) outlines the need for more "participation throughout the policy chain – from conception to implementation", and goes on to argue that "improved participation is likely to create more confidence in the end result and in the institutions which deliver policies". It makes a clear plea that "legitimacy today depends on involvement and participation", and calls for new forms of governance to replace "the linear model of dispensing policies from above" (op.cit.: 11).

All of this seems at least discursively to point to a move away from the top-down towards the bottom-up. However, it needs to be taken into account that this effort to make European policy making more inclusive also necessarily takes place within the framework of the Lisbon process. Thus, in how far those to be involved and those expected to participate may question the basic assumptions on technoscientific progress it is based on remains an open question.

5.2 Two Voices Struggling to be Heard[11]: Paradigms of Science/Society Relations in the European Policy Discourse

In analysing the document "Science, Society and the Citizen in Europe" (EC 2000b), Rob Hagendijk has made an observation which neatly describes nearly all European documents which have been issued since. He observes that the paper "reads as if two voices are struggling to be heard" (Hagendijk 2004: 46). While one of these voices stresses the importance of dialogue and participation, another seems to still rely on the traditional deficit model and pleads for informing the public.

The latter voice strongly bases on the assumption characteristic of the deficit model that scientific progress is a priori to be judged as positive and that public mistrust needs thus to be based on misinformation. The science and society action plan quote I have referred to in the last section amply exemplifies this point. Science is described as "essential to our quality of life" (EC 2002: 7), and the actions to be taken are "to improve the European public's ability to assess the scientific and technological issues of the day, and to motivate them to become more involved in science" (op.cit.: 7). Thus it is the knowledgeability of the citizens, which has to be improved, and this higher knowledgeability is implicitly assumed to contribute to a higher public acceptance of technoscience.

This emphasis on informing the public is often separated only by a page or even a headline from assertions which stress that the relation between science and the public needs to be much more strongly characterised by dialogue than by mere one-way communication.

> "The dialogue between science and society needs to be a two-way street where each listens as much as he talks." (EC2000b: 16)

> "The acquisition of a basic grounding in science and technology by the European public and a regular flow of information to the public from experts are not in themselves enough to enable people to form an opinion. A true dialogue must therefore be instituted between science and society." (EC2002: 14)

These quotes seem to stress that the reasons for the lack of public support must not only be sought with the public, but lie in a disturbance of the relation between science and society, equally concerning both sides. Mutual learning between science and society thus becomes a prime indicator for successful communication.

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[11] Hagendijk 2004

While put in their pure form both 'voices' seem to be contradictory - or at least as in a quite tense relation - they at times also blend to hybrid ideas, which uneasily encompass both ideas reminding of the deficit model as well as a discursive emphasis on engagement and participation.

A first such hybrid category is the rise of the "educated scientific citizen" as the dialogue-partner of science and policy. Consider the following quote:

> "The dialogue between the public and researchers and experts will be all the more rewarding, however, and the capacity of the public to discuss "science/society" issues in full knowledge of the stakes heightened, when it has a thorough knowledge and understanding of science and technology [...]. The aim cannot and must not be to nurture an unfailingly favourable attitude on the part of the public. It must be to create the conditions for an informed democratic debate." (EC 2000b: 16)

It is instructive to see how the deficit model is both de-constructed and re-constructed in this quote. On the one hand, the basic approach is one that favours mutual dialogue, and stresses that the aim of science communication must not be to simply convince the public of a superior rationality of science. On the other hand, being informed is re-introduced as a pre-requisite for taking part in a good democratic debate, and hence as a central quality of the 'European scientific citizen'. The hope that citizens with a 'thorough understanding' might be much more 'understanding' and permissive towards new scientific developments might be read between the lines.

A second relevant hybrid category is the idea of science as culture and the aim to enculturate the European citizen in this fascinating but distant endeavour. A heading in a European report on the Governance of the European Research Area reads: "Giving society the key to the laboratory" (EC 2004b), and the Science and Society Action Plan stresses:

> „If scientific and technological progress is to meet the needs of Europe's citizens and regain their support, they will need to have information that is understandable and of a high quality, as well as ready access to this specific culture." (EC 2002: 9)

In this line of discourse, taking people „into science" becomes the central metaphor. In a way, science is portrayed like a distant country against which one might have prejudices because one has not been there and hence does not understand its culture, and the lives and motivations of those inside this culture. Engaging people with science in this line of discourse implies giving them "a key to the lab" (EC 2004b). But again, it does construct

the deficit on the side of the public – with the only difference that the information deficit assumed in the deficit model becomes a deficit in cultural understanding.

The purpose of this excursion into the European policy sphere has been to show that the fact that "participation" and "engagement" are on the rise as buzzwords in the political discourse must not be taken as an unconditional commitment to a democratisation of science policy at face value. New boundaries and entry limits constraining who may have voice in these processes are re-erected, and the concrete form of the dialogue to be had remains fundamentally unclear.

5.3 Prosperity by Consensus: The Science/Society-Relation in the Austrian Policy Discourse

In the European context, Austria is to be described as a latecomer concerning policy initiatives addressing the interface between science and society (Felt 2003b). It was not before the end of the 1990s that first positioning papers on research policy were formulated. In general, science and technology policy has gained in importance as a policy field in Austria over the recent years. An institutional indicator for this is the establishment of the Austrian Council for Research and Technology Development (ACRTD)[12], which is supposed to serve as an independent advisory body to government. One of the explicit mission goals of this council is to "raise public awareness" of science and technology, and it quickly has become one of the largest funders of initiatives in this area.

The discursive "discovery" of this policy field in general, and of relation between science and society, is strongly influenced by the European discourse on these issues. Concepts and catchwords from the European level are taken up, though as I will argue at times in a quite peculiar Austrian translation. Some other terms seem to be very characteristic of the Austrian way of thinking, such as, almost inevitably, the idea of societal consensus. The 1999 "Grünbuch zur Österreichischen Forschungspolitik" (bm:wv 1999) puts it like this:

> "In a democratically-constituted country, research policy must be based on the broadest possible political consensus. An essential part of this process is better relations between those engaged in research and the public in general. "13

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[12] www.rat-fte.at

[13] This translation of bm:wv 1999:19 is taken from the English executive summary of the document, http://archiv.bmbwk.gv.at/fremdsprachig/en/science/green.xml, accessed 02.08.2007; All other Austrian

This is perceived as especially important as the Austrian policy papers tend to assume a certain adverseness of the public against science and technology. The public is seen as

> „[...] affected at the same time by a high level of scepticism and fears to the point of a total rejection of scientific development as well as by a low level of knowledge concerning single – especially controversial – issues." (Q1; bm:wv 1999: 81-82)

This sweeping assertion of a public in fear of technological innovation is often linked to the marginal role of Austrian science after the Second World War due to the brain drain caused by the extinction of considerable parts of the intellectual elite by the Nazis (op.cit.). Beyond this, it carries strong characteristics of the deficit model. In the ACRTD's mission goals[14] one may find a section "prosperity by consensus" under which the council aims to "make clear"[15] the benefits of science and technology to the public. It has done so by launching several large awareness campaigns called "Innovative Austria". The first of these campaigns is worth mentioning because it is internationally unprecedented in its direct operationalisation of the goals of the Lisbon agenda in science communication. In a series of posters and TV-ads, the sentence "innovation is" was completed by economic goals such as "when the budget is right", or (amply summarizing the stereotypical Austrian's goals in life) "a fast car, a house and a good pension"[16]. After a negative evaluation this campaign was re-launched in a slightly more subtle format. Still, many Austrian initiatives and policy documents on the issue may be characterised as strongly influenced by the deficit model. Interestingly this also applies to the Austrian enculturation of the term "dialogue". Consider the following quote:

> „To accept scientific and technological progress, to understand the main matters at a very basic level presupposes a readiness for change on the side of the population. A precondition of this readiness however is an open dialogue between the scientific community and society, which establishes an understanding for the utility of research in and for society in the first place." (Q2, bm:wv 1999: 8)

Here, the aims of an interaction between science and society are clearly predefined. Society is expected to accept technoscientific progress. It is only the public which is expected to change, under the pre-condition of a dialogue with science. In essence,

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policy quotes are translated by the author, the respective original quotes may be found in Annex 1 labelled as Qx.

[14] http://www.rat-fte.at/view.mc?docid=80, accessed 05.09.2006

[15] The German term „verdeutlichen" carries a distinctly hierarchical, if not even slightly patronizing undertone.

[16] See Fochler & Müller 2006 for an illustration;

dialogue hence becomes just another strategy of communication within the well-entrenched assumptions of the deficit model. Dialogue as a communication strategy is best suited to establish the public's understanding of the benefits of technoscience. Strangely though, dialogue seems to be a rather unidirectional process, in which science talks to society, but does not really seem expected to listen to and learn from the results. This is well illustrated by the description of the to date last Austrian consensus conference on the issue of genetic data in 2003 given by the president of the ACRTD. In a press conference, he introduced this participatory method as suited for "all issues, on which consensus must be established, in order to get something done. Those issues, where ignorance prevails, because this causes fear." (APA[17], 23.06.2003)

If the European discourse was described as two voices struggling to be heard, then the Austrian counterpart rather resembles one voice speaking in two different pitches. Dialogue seems to be only one more way of realising aims framed by the assumptions of the deficit model.

5.4 A True Dialogue? Some Summarizing Remarks on the Participatory Turn in European and Austrian Science Policy

To sum up my discussion of the conceptualisation of the science/society-relation in the European and Austrian policy arena I would like to make five points, which are crucial to consider for understanding how the policy discourse frames participatory interactions between science and the public. The common bottom line these points share is that while participation and engagement are becoming more and more important catchwords, this process takes place within very closely defined boundaries and is strongly framed by other, especially economic considerations.

Firstly, any participatory interaction needs to take place within the predefined goals and boundary conditions of the Lisbon agenda, which nearly categorically assumes the beneficial nature of technoscientific progress. Hence, participation may often only be aimed at "taking societal concerns on board" (EC 2005b), at making progress more "socially robust". Questioning the basic assumptions behind Lisbon however does not seem to be on the envisioned agenda. This however does implicitly exclude an important set of questions for upstream engagement, such as, most bluntly: "Do we want this technology at all?" (Wilsdon & Willis 2004).

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[17] Austrian Press Agency

Secondly, though mutual learning is often stressed, the way this learning is to take place and the expected results are specified only for the side of the public. Hence dialogue may, such as in the Austrian case, turn out to be a quite unidirectional affair.

Further, as Alan Irwin (2006) has observed for the British case, also the European and particularly the Austrian policy discourse seem to assume that consensus is the ultimate goal of democratic politics. The mutual acknowledgement of dissent and differing positions is not considered.

Fourthly, all policy documents share a vagueness on who precisely the public to be involved might be (Felt & Wynne 2007). Whether it is stakeholder groups or any representation of the 'average citizen' who should take part in this dialogue and speak 'in the name of the public' remains open.

This leads to the last point, which is the general lack of any detailed idea on how these processes of dialogue are to take place. It can hardly be put better than in the words of a brochure of the European Commission: "Although public engagement and accountability are crucial aspects of democratic societies, as always, the devil is in the detail." (EC 2005c, 16)

The details listed tend to be questions such as: Who should be the public meant to participate? At what point in time should it do so? And which form should this engagement process take? Indeed, these seem to be big questions rather than details. In the next chapter, I will discuss how they are put into practice in the existing participatory methods in the European context.

6 Representing Community – Enacting Engagement

A recurrent argument throughout the last chapters has been that the recent turn towards public engagement and participation needs to be analysed as a political phenomenon in its own right, as a new mode of governing (Irwin 2006). Whether this new mode is in any way genuinely new or whether it represents the re-enactment of older hierarchical models in a new guise is a question, which may only be answered by close empirical scrutiny - unbiased by any a priori normative commitment on the issue.

One way to do so is to take a closer look at the means and methods by which engagement is enacted. It would seem that to do so for a scholar in science and technology studies requires leaving his territory in conceptual terms, because treating a discussion group on genomics or a consensus conference as a technology would seem quite counter-intuitive. However, my argument here is that it is not. Engagement designs are for the most part a product of applied social scientific knowledge, and they play their specific part in enacting the machinery of governing, as do voting systems (Miller 2004) or parliaments (Heurtin 2005). In this sense, my argument is that participatory designs may be seen and analyzed as political technologies. For analysts such as Nikolas Rose, these "technologies of community" belong to

> "[...] a whole array of little devices and techniques [...] invented to make communities real. [...] New 'experts of community' have been born, who not only invent, operate and market these techniques to advertising agencies, producers, political parties and pressure groups, but who also have formalized their findings into theories and concepts." (Rose 1999: 189)

In this thesis, I am particularly interested in the role and expertise of these "experts of community" in producing public opinion in the contexts of engagement designs. Following Law and Urry (2004) my argument is that as every other form of expertise, also this social science expertise and its methods plays a crucial part in producing the 'realities' it represents. How these experts of community live and conduct their expertise will have a crucial effect on how public engagement is played out, and whether it might contribute to a more democratic dealing with technoscientific innovation or whether it remains a purely legitimatory effort which leaves more questions open than it solves. In this chapter, I will aim to both provide an overview of the scope of participatory designs, and to develop an argument on which different types of expertise of community exist and how they shape

public engagement differently. Building on Peter Galison's (1998) historical studies of representation in the sciences, I will propose a distinction between different approaches to representing public opinion in these "technologies of community".

6.1 A Brief Chronology and Categorisation of Engagement Designs in Europe

The emphasis in the title of this section is on the "brief". My aim in the following is neither to offer a comprehensive description on when exactly which participatory events took place where in Europe and at which point in time, nor is it to describe each and every variant of participatory methodology available. This has been amply done elsewhere, and I refer the reader interested in more detailed historic accounts or in the precise differences between "citizens' juries", "consensus conferences" and "Planungszellen" to the number of studies available on these issues (e.g. Joss & Bellucci 2002, Steyaert, Lisoir & Nentwich 2006). For the argument of this thesis, I will restrict myself to reconstructing broad trends and to identify features of these methods which are relevant to my argument. In doing so I will largely refer to a study on participatory politics in Europe conducted with my colleagues Ulrike Felt and Annina Müller (Felt, Fochler & Müller 2003, 2006). In an expertise for the Technology Assessment Office (TAB) of the German Bundestag we have mapped participatory efforts in the politics of technoscience in eight European countries.

Still, even when - or maybe especially when - painting with a broad brush an operative definition of what precisely I mean by a "participatory design" or an "engagement design" is needed. Especially in the political, but also partly in the academic discourse the use of these terms tends to be rather vague. Both terms are for the most part used quite synonymously and very often without a clear definition on what precisely they may mean. Meanings of public participation (or engagement respectively) may range from participating in political decision-making processes, to the participation of patients in the production of scientific knowledge, or to "participating" in debates about technoscience by visiting a public lecture. Especially in policy documents the term "engagement" is also used to denote Public Understanding of Science activities such as science weeks or information campaigns. While these events do of course constitute fascinating objects for empirical analysis in terms of a micro-politics of science-society interactions, I will not include them in my operational definition of participatory designs. I will only include those designs, which explicitly aim at making a contribution to either the formal political process in narrow terms, to other political processes in a wider sense such as processes

of scientific or other self-regulation, or to a wider societal political discourse on technoscience. Since most public understanding of science activities do not share this aim, they are excluded by this criterion.

After these preliminary remarks, I will start my argument on the use of participatory methodologies in Europe by pointing to the fact that actually the experimentation with these methods chronologically precedes the recent policy preoccupations with public engagement. These methods were first developed mainly in the context of technology assessment, and more particularly the so called "participatory technology assessment" tradition (Joss & Bellucci 2002). Though it of course is difficult to pinpoint an exact point of departure for the history of public participation in science and technology in Europe, the first consensus conference held in 1987 in Denmark is a reasonable starting point. The Danish model of the consensus conference (Andersen & Jaeger 1999) is considered a paradigmatic example of public participation in technoscience. The process involves giving a group of lay citizens a broad topic. These citizens in turn define an exact question to be dealt with in the conference, and select and question experts on the chosen topic. The lay panel drafts a statement documenting the opinion of the group, and this statement is often directed towards policy makers. The consensus conference model developed by the Danish Board of Technology was taken up by other countries in the mid 1990s, such as by Great Britain and the Netherlands. Since then, a large number of European countries have imported the model of the consensus conference. New methods of public participation have also been experimented with, and the scope of methods available has been broadened significantly. In Austria, which may be described as a latecomer concerning public participation in science and technology in Europe (Grabner, Peissl & Torgersen 2002), a number of experiments have taken place, including one national and a regional citizen conference. Most of the recent Austrian events focused on issues of genomics and society, especially concerning the medical domain, but their impact on the Austrian public discussion has been limited due to a lack of media coverage (Seifert 2006).

In former work I have referred to above (Felt, Fochler & Müller 2003, 2006) my colleagues and I have developed a typology to categorise various forms of public engagement

methods. Using it in a slightly modified form[18], I will distinguish between four types of participatory designs, which differ along two sets of variables. On the one hand we have categorised participatory methods along the intensity of lay involvement in the specific design. While some methods involve their participants very strongly and even leave much of the process and the content of the output to their discretion, in others lay opinions are much more openly mediated by (social science and TA) experts. This leads on to the second set of variables we have been using to distinguish between designs. Some methods mainly aim at producing a concrete output in terms of a statement or a report which may for example be directed towards policy makers. Others are less strongly inclined to produce one formal output, but rather aim to stimulate discussion- and learning processes. Of course both categories are not mutually exclusive, but they map out a continuum along which different participatory designs may be situated.

The first category of participatory designs we have distinguished comprises methods which aim to produce a genuine lay positioning. This implies creating a setting in which a group of lay citizens may develop a position towards a technoscientific issue. Usually the citizens are provided means to inform themselves about the topic at hand, be it by questioning experts or in any other fashion. The crucial element of this group of methods is that the lay panel is then expected to also voice their opinion in their own words in a concluding statement, which is very often directed towards policy makers. Hence these designs combine a high level of lay involvement with a very strong product orientation. A further aim often mentioned in the literature is the stimulation of public debate on the issue discussed (Andersen & Jaeger 1999). Thus these methods often feature a concluding public event, which allows for broader media coverage and may thus facilitate the publicity of both the topic and the output of the conference. As the Austrian example amply shows, there is of course no guarantee that this will really take place (Seifert 2006). The paradigmatic example of such a design is the consensus conference, which I have sketched above. Other examples of this group of methods include the 'citizens' conference', which in most cases differs only very little from the consensus conference design but for the name, and the Swiss Publiforum.

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[18] In our initial work, we had included a separate category of „online designs" which I now subsume under those designs which aim to develop knowledge on lay attitudes without giving the participants themselves formal means of voicing. The reason for this mainly is that this type of design has proven to be less important and less frequently used than it seemed at the time of our writing.

The second category shares its emphasis on producing a concrete output product with the first. However, its focus on efficiently producing output in terms of a picture of lay attitudes towards a technoscientific development is even stronger than for the designs mentioned above, which results in a lower intensity of lay involvement. These methods also aim at creating an environment in which laypeople may be informed and develop a position, however the settings tend to be much more short term-oriented and leave less agency to the participants in choosing their sources of information and voicing their opinion. Very strongly informed by methods of qualitative social science and market research, such designs may for example resemble extended focus groups which combine an information input with a discussion on the issue, from which public positionings may be derived in later analysis (Irwin 2001). The reporting on these attitudes is not done by the citizens themselves, but by the technology assessment or social science experts conducting the method. This framing implies a number of crucial differences from the first category of designs of active lay positioning. Firstly, and this very probably is their main advantage, these designs are much cheaper and may be conducted much faster than for example a consensus conference. Hence they may be used in a much more dynamic fashion, to quickly respond to upcoming topics or to answer very clearly delineated and specific questions. Secondly, participants tend to be less 'informed' as the information input is limited and as they may not themselves choose the means and sources of their information. This has advantages and disadvantages. Even though they may know less on the issue, it may be argued that precisely because they know less their opinion is more representative of a general public. The interaction with experts for example in the consensus conference may also result in the laypeople taking over a 'more scientific' worldview along with the facts they are provided, which may affect their final positioning. Thirdly, as they have no public component, these designs hardly aim at stimulating public debate at all. Their aim mainly is to inform technology assessment and policy making. Examples for this group of methodologies would be the Swiss Publifocus (Rey 2002) or the Public Consultation on the Biosciences in the UK (Irwin 2001).

"Discourse-oriented" designs are the third group of methods in our categorisation. Other than the two first categories they are less oriented towards a product (such as a concluding consensus statement), but rather towards generating a discussion and learning process between science and the different societal actors involved. As the positions of these actors may be very different especially for more controversial issues,

aiming at producing a "common" output very probably may turn out to be rather counterproductive. Hence these methods mostly aim at making visible different positions and at facilitating their interaction to allow for a common learning process. They thus, given adequate media coverage, may be very effective in stimulating public discourse. However the lack of a concrete output positions this group of designs in a weak position to inform the policy process. In terms of concrete design these methodologies often use panel discussion or workshop designs. Examples of this type of method would be the "Diskurstage" (discourse days) on genomics of the Austrian genome research initiative GEN-AU (Felt, Fochler & Strassnig 2003) or the National Forum of Science in the United Kingdom.

The fourth category of public engagement designs differs quite strongly from the first three, both in the size of the design as well as in the methods used. While the designs described so far aim at directly involving only a quite limited group of people and possibly facilitating public debate by media coverage, the so called "Public Debates" extend the scope of the design virtually to entire nation states. This design was first developed in the Netherlands, where public debates on xenotransplantation (2000) and GM food (2001) took place. The most recent and widely discussed example of such a debate is the British public debate on GM food in 2003 (Irwin 2006).

Between June and July 2003 the GM issue was discussed in around 600 public local, regional and national meetings all over Great Britain. The meetings were held in a similar structure, and common information material including a video had been produced for the participants. In sum around 20.000 people are estimated to have visited these meetings, discussed and given their opinion on GM food[19].

Public debates may be described as hybrids between public engagement designs and public understanding of science activities in the sense that they often combine a number of methods from both. In the Dutch public debate on xenotransplantation (Dutch Consumer and Biotechnology Foundation 2001) for example, citizen panels were carried out along with a nationwide information campaign as well as special theatre performances for school children. Hence these designs aim at both mapping public opinion and inducing a learning process on the side of the public on the issue of the debate. The former is often done by combining engagement methods with both qualitative

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[19] GM Nation (2003) 'The Findings of the Public Debate',
www.defra.gov.uk/environment/gm/debate/index.htm, accessed 01.08.2006

and quantitative social science research. The result of the public debate is mostly documented in a report of the organising committee, which combines the various methods used in the debate.

As such Public Debates are both output and learning-process oriented, and they involve laypeople to very different degrees in the different elements of each single debate – from survey research to citizen conferences.

6.2 One Method Fits All? The Machinery of Representing Community Between Experiment and Standardisation

In the previous section of this chapter I have dealt with sketching the variety of public engagement methods. I have however not answered the question how widely single methods are used, or if some methods are better for certain purposes rather than others. In terms of a methodology of these designs, these are however crucial questions, which also lie at the heart of much academic and political debate on these issues (e.g. Abelson et al. 2003). Taking up my brief characterisation of the typology of participatory methods and analysing the way they have been used in different national contexts, it may be argued that it is very difficult to pinpoint any repertoire of similar methods, which are more broadly used in different countries. Much more, there actually is only one method, which seems to travel well and which has been used in a variety of European and Non-European countries (Einsiedel, Jelsoe & Breck 2001): the consensus conference. The import of this model has been largely successful in some countries such as Great Britain and it rather has failed in others such as in France. Through its widespread use, the consensus conference has become a kind of 'standardised package' for enacting participation, which is often, as in the case of the most recent Austrian consensus conference (Seifert 2006) taken over without much adaptation to the local context. Beyond this import and possibly adaptation however, there is very little methodological discourse on other methods, their advantages and disadvantages.

However, the growing attention given to public participation in the policy realm has created an attendant increase in discussions about 'best practices', and transferring and evaluating models. Considerable time has been devoted in science studies writing on participatory designs to develop common definitions and standards for evaluating participatory events. Some authors have argued forcefully that a common paradigm is necessary judging the effectiveness of participatory methods (Rowe & Frewer 2004). In light of the fact that several exports of the standardized package of the consensus

conference to other European national contexts have failed, the call for a framework for evaluation seems understandable. The key question to be answered in defining it however is how to theorise and capture the relation of the respective design to its techno-cultural context. Rowe & Frewer's attempts strongly aim at the establishment of "general criteria" and largely omit the question of the cultural situatedness of participatory mechanisms.

There are a number of empirical indicators though, that the success and failure of participatory designs is strongly linked to their fit or lack of fit with basic cultural assumptions on both governance and the role of technoscience in society. Klüver (2002) notes that the model of the consensus conference has strong roots in the Danish national culture with its participatory tradition, and its history in involving laypeople with issues of science and technology. The 'first wave' of countries taking up the Danish model may either be described as having a strongly participatory political culture, such as the Netherlands or Switzerland, or as having a long-standing tradition in science communication and communicating about science, such as the United Kingdom. But experiences in transferring the consensus conference model to other national contexts such as Austria or France have shown that the assumptions concerning the relation between science, the public and the policy sphere implicit in the standardized package may not apply in all European contexts (Felt, Fochler & Müller 2003). Approaches to governing technoscience in Europe vary widely, and participatory methods are by far not part and parcel of all of them (Hagendijk & Irwin 2006). For example, in France, where there is a general lack of citizen participation in any area and especially in technoscience, the consensus conference is seen as an "unknown political object" (Felt, Fochler & Müller 2003) that is alien to the existing political structures and traditions.

The importance of cultural context has been amply demonstrated in the case of public understanding of science activities (Felt 2003b), and in recent work my colleagues and I have aimed to show that the basic cultural assumptions on the role of technology in society and its relation to regulatory frameworks may be very different even between otherwise closely related Western European countries (Felt/Fochler/Winkler, manuscript). Hence my argument here would be that different (national) cultural contexts matter and need to be taken into account in designing, transferring and in evaluating participatory mechanisms. Or, to rephrase this in terms of governance: the models and conceptualisations of governance built into the design of the participatory exercise must be compatible with the existing models of governance in the national (or local) context. This suggests that efforts to determine best practices and benchmarking criteria for

public participation at the European level (European Commission 2002) may not be successful. And it raises some very fundamental questions about the methodological issues at stake in staging participatory events at a European level, such as the recent European consensus conference on brain research[20].

Hence, my argument is that culture matters in this discussion. But what about technology? While there are at least traces of discussions why participatory methods may work better in some cultural contexts than in others, there is virtually no debate whether the technology to deliberate on makes any difference. This implicitly assumes that the governance processes and the challenges posed to governance are very similar for technologies as different as medical nanotechnology, information technologies and GM food. Studies of the public perception of technologies however indicate that the political issues may be assessed quite differently depending on the technology (Grove-White, Macnaghten & Wynne 2000). Thus it seems to be a very relevant question for empirical investigation whether technology does or does not make a difference for public engagement.

Beyond the literature on public engagement, more general STS contributions on the topic of representation are helpful in understanding the expertise of community at work in the processes described above. In its essence, the expertise of community is about the art of representation, about creating contingent representations of the public in the policy process. However, representation is far from being an innocent issue, both in the social and the natural sciences. In a recent reflexive contribution to social science methodology, science studies scholar John Law (2004) has applied some central tenets of science and technology studies to the social sciences. The core of his argument is that as in natural science, social science methods must also be understood as actively producing social realities. He does not imply that the results of most social science are purely 'socially constructed', but argues that specific methods tend to privilege some variants of representing social reality over others. Hence, Law concludes, the choice and enactment of method always also is a political issue. In my argument, this especially applies to the expertise of community.

In order to be able to discuss different forms in which this experience may be deployed, a short excursus into the history of natural science is instructive. In a historical article on

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[20] www.meetingmindseurope.org, accessed October 30th 2007

the changing notions on how a scientific representation should look and which criteria it should fulfil, Peter Galison (1998) distinguishes between two main ideals in modern science.

On the one hand he describes a paradigm of representation he calls "objectivity", in which the ultimate goal of representing is the quasi-mechanic depiction of nature. In this vision, nature is thought to "speak for itself", as long as it is adequately and objectively represented by the scientist. Objective representation is often assumed to be best guaranteed by mechanical means and by minimizing human intervention, as for example by photography under standardised conditions. In this approach, there is a strong belief that an adequate representation 'truly' depicts the object in question, and ideally may almost be equalled to the object itself. In the "objectivity" approach the scientist is a neutral medium of nature, he or she merely assists nature in 'revealing herself'. Much more important than the person operating it though is the machinery which generates the representation. In order to produce 'true' images, this machinery needs to be reliable, and if the results are to be compared between geographically different points of measurement, it needs to be standardized. This notion of representation is deeply committed to a vision of a reality, which is "*independent* and *prior* to an observer; *definite* in shape and form; and also *singular* (there is only one reality)" (Law 2004: 145, emphasis in original)

This is very different from the second approach to representation which Galison (1998) terms "judgement". In this approach the scientist assumes a far more active role as an expert capable of seeing patterns in nature. Hence the representation may not be seen as independent from the observer, and his or her skills and implicit knowledge. As in medical practice, the assumption in this approach to scientific representation is that seeing is not a straightforward activity, but that the "scientific gaze" needs to be learnt and incorporated. Hence the gazing scientist has a much more important role in representing. The machinery of representation still plays an important role, but in this case the machines such as an ultrasound device need to be situatively configured by the expert. Without his or her expertise in manipulating the representation process and reading its results, no good representation is possible. The reality observed may not be seen as independent, but as at least co-produced by the observing expert. Of course this approach also makes performative aspect of representation much more strongly visible and amenable to contestation than the 'objective' route to representation. Galison thus also links the prevalence of the respective approaches in different historic periods to the

degree of institutionalisation and self-confidence of the scientific profession.

What does this mean if we relate it to the issues discussed above? My argument is that the standardized way of employing especially the consensus conference design without hardly any consideration of the concrete national or technoscientific context strongly resembles Galison's (1998) "mechanical objectivity" approach. One standardised machinery is used to represent a phenomenon, without much intervention by the representing experts to adapt it to the specific features of the object to be represented. The conducting experts of community create as standardized boundary conditions as possible, and then wait for 'society' to speak for itself. This negates any active role of the conducting experts in shaping the results of the respective method, and it presupposes, that the object to be represented is relatively constant across different national and technological contexts, an argument which might be disputed empirically (Felt et al. in press a, Felt/Fochler/Winkler, manuscript).

6.3 Who Speaks in the Name of Society? Forms of Representation

The 'representativeness' of public engagement designs is a key issue, as it is very often seen as a precondition for their political legitimacy, and its lack is a popular argument against particular methods. My aim in this chapter is not to discuss whether some designs may represent the public better than others, but to interrogate the different basic assumptions behind different techniques of choosing participants for a design and their implications.

Broadly speaking, two ideal-typical models for choosing the citizens to participate in an engagement design may be distinguished, which make very different basic assumption on the 'public' to be represented.

The first is based on the classical quantitative social science approach to representativity. It assumes that society is made up of distinct individuals who may be categorized along axes such as sex, age and formal education. Any representative citizen group must hence have roughly the same distribution of these variables as the general population. Or, put in another way, at least the experts conducting the design may not be criticized as imputing any bias, because they have followed the standard procedures for creating representation. Resembling Galison's (1998) "objectivity" approach the point here is not to stress that gender, age and education are relevant variables with respect to opinions to

the topic at hand. They may or may not be. Rather, their function here is to serve as as clear and transparent categories as possible, as categories which seemingly afford hardly any interpretation by those experts conducting the design. The selection is 'objectively representative', it is uninfluenced by the experts who only 'assist' the public in voicing its opinion. It is from this nimbus of mechanical objectivity that the political power of these representations springs, in the same way as Bruno Latour (1993, 2004) has described the hidden political power of those who speak 'in the name of nature'. But this mode of representation does not only put the representing experts in a specific role, it also shapes the role of the represented scientific citizens. As they are chosen as single individuals without considering any but the formal specificities of their social embedding, the assumption often is that these citizens are to be unprejudiced, to have no prior position on the issue. The requirement of objectivity thus does not only extend to the method of representation, it also stretches to the role of the citizens in a slightly more indirect form. As in science, objectivity may be read here as a method of purification, as an attempt to other the influence of the social. The representation of the public is created as if no prior public positions on the issue to be discussed would exist. Of course, very often this is not the case and hence controversies may arise in which the 'activists' excluded from the table on the grounds of their lacking objectivity criticize the legitimacy of the citizen group to speak in the name of society. The distinction between 'activists' and 'neutral citizens' is a recurrent theme in the discussions around public engagement. For example, 'representative' focus groups were included in the design of the GM Nation public debate[21] in the United Kingdom as a counterpart to public meetings, which were seen as in danger to be 'hijacked by activists'. Hence, put provocatively the 'objectivity' approach to representation in public engagement seems to rest on the necessity that none of those involved have a prior subjective opinion – neither the experts conducting the design, nor the participating citizens, nor the scientists providing their expertise. Truth is revealed in the experimental design.

The second approach to representing the public much more resembles 'judgement'. It assumes that society is not necessarily composed of individuals but of social groups which may be affected by technoscientific innovations in very different ways and hence may develop very different positions towards an issue. Some authors have even taken this argument a step further and suggested that the affectedness by technoscience may very

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[21] GM Nation (2003) 'The Findings of the Public Debate"
www.defra.gov.uk/environment/gm/debate/index.htm, accessed 01.08.2006

well be the point around which a social collective crystallises (Rabinow 1996, Irwin & Michael 2003). Hence to adequately represent the public may not mean to randomly choose individuals which fit a certain demographic categorisation, but to capture the multiplicity of situated positions which exist in society. Of course, there is no standardised approach to doing this, and as implied above, this will be very different for varying issues. Further it implies a very different role for those conducting the designs, which in this approach indeed need to be experts who should be able to discern which positions may exist in society and should seek to most adequately represent them. Again, as in the 'judgement approach' this is a much more openly performative way of doing representation, and one which is by far more open to the 'activists!'-criticism. Finally, it also puts the citizens themselves again in a different role. They are not seen as 'unprejudiced', but they have been chosen because they 'represent' some position in a much more direct sense. Of course, to 'speak for' a certain collective, such as 'those affected by diabetes' may be an as problematic task as being the unprejudiced scientific citizen. In the latter position the room to develop one's own positions and the repertoire of argumentation seems less constrained than in the former.

7 (Lay) Models of Technoscience in its Relation to Society, and their Strategic Use

While the previous chapters have been concerned with sketching the context of the argument I wish to make in this thesis, this and the following chapter lay out the conceptual background of how I will approach my main research question: to identify and analyse bottom-up perceptions of governance and public participation.

This chapter is concerned with models of technoscience in its relation to society. As I have already shortly sketched in the introduction, how science is assumed to function as a social and epistemic enterprise, and how society relates to this functioning in my hypothesis is an important precondition to build a position on science's governance and the possible role of the public in it. As in other parts of this thesis, the "double hermeneutic" (Giddens 1984) also plays a role here. Inevitably, my analysis of the models of science in its relation to society participants may draw on will be guided and structured by the enormous range of prior work on these issues. After all, the relation between science and society is one of the most central questions both the philosophy and the social studies of science are concerned with. For the purpose of this thesis, I will understand the breadth of these available models as a repertoire of ways of thinking about the science/society interface, which is available to me as a researcher, but which also may be seen as a tool to categorise the implicit models our participants may draw on. With the reductionism necessary to fit this wide range of studies into this small theory chapter, I will identify and discuss three basic concepts of understanding science as a social system and its relation to society.

In a second step, I will discuss the concept of "boundary work" coined by Thomas Gieryn (1995, 1999). His term captures the strategic use of these models in the interaction between science and society, an issue, which is of high relevance to my empirical argument because I will study the use of these models to support or contest certain visions of governance.

7.1 The Untouched Epistemic Core – Technoscience as an Activity Free of Societal Influence

In both the classical philosophy of science, as well as in the early days of sociological inquiry into science and technology, the basic assumption was that science is foremost about the discovery of truth in nature, and technology about the realisation of

technological possibilities based on these truths. The success and recognition of these discoveries was not an issue to be explained by social factors, but by their correspondence to nature, which is conceptualised as existing independent from its social and historical context. Hence, society hardly has any place in the hard epistemic core of science.

In the classical philosophy of science, as for example in Karl Popper's theory (1959 [1934], Chalmers 1999), the success of scientific theories in competition to others lies in their superior ability to reflect, explain and predict nature. The production of knowledge constitutes a realm autonomous from the social, which is neither open to sociological enquiry, let alone political discussion. Scientific truth is independent from social or historical conditions. If a theory is true, it will survive, and if not, it will be falsified.

As has been noted by his critics, this position may hardly explain the success of any historical scientific theory. As Thomas Kuhn (1962) has argued, there has been hardly any important theory in the history of science, which has not been falsified by known 'facts' at the time of its initial formulation. Much rather, facts are re-interpreted as a theory succeeds. To address these issues, Kuhn has described the historical development of science as a sequence of paradigms guiding research. Change happens as one paradigm is replaced by another in a process of revolution, which he deliberately describes in analogy to political revolutions. For Kuhn, the choice between one paradigm and another, between two scientific world-views, is a purely social process dependent on which paradigm is able to gather more and more powerful supporters within the scientific community. Thus, in Kuhn's theory, political processes have a place in the development of scientific knowledge, but only in the revolutionary phases between paradigms. The standard production of knowledge in 'normal science' however largely remains free of any societal influence. The social is thus given a space in his theory, but at the same time excluded from any influence on the actual knowledge production in the epistemic core of science.

The same argument may be made for the classic sociology of science, such as for the work of Robert Merton. His "normative structure of science" (1973 [1942]) theorises the norms and values on which conduct in science is based. The four central values, universalism, communalism, disinterestedness and organised scepticism however are also only described to govern the conduct of scientists in science as a social system, leaving the knowledge production itself untouched by social influences. Some of these

values, such as universalism may even be argued to be based on the assertion that there is a hard epistemic core to science, which ideally should not be touched by, but may only be distorted by political influences. This may best be seen in his argumentation that the scientific content of a discovery may be isolated from the social and political conditions of its production. Alluding to the biography of the war criminal and Nobel laureate Fritz Haber, Merton argued that the synthesis for ammoniac he developed is not rendered 'false' by the Nuremberg trials. This rigid focus on the truth vs. falsity of scientific knowledge black-boxes the wider societal and political context of the production of this knowledge. Under these conditions, the achievements of the scientist Haber may remain untouched from their application by Haber, the leader of the German chemical warfare program. In essence, the argument here, which we will meet again in the empirical parts of this thesis, is that political responsibility may exist only for the application of technological knowledge, not for the discovery of the basic principles this application is based on, because the latter are given in nature. Thus, Haber-the-military may have been a criminal, but Haber-the-technologist may simultaneously be a hero of science. However, while the basic principles for many discoveries made by Haber could of course also have been discovered under very different circumstances, it is still hardly without relevance or social contextualisation that so many important 'natural facts' with a direct relevance to mass destruction were discovered in the wake of the World War period. For Merton however, these political issues remain external to the epistemic core of science.

7.2 Context Matters! – Society Creeps into the Epistemic Core

To show how the social and the political indeed do enter the epistemic core of science may be described as one of the central issues of the more recent programme of science and technology studies. A major issue in breaking down the dichotomy between the pure production of technoscientific knowledge and the political issues in its application has been to both theorise and show the permeability of science's seemingly so rigid epistemic borders to societal ideas.

For this issue, the classic author to refer to is Ludwik Fleck. In his theory (Fleck 1981 [1935]), any kind of epistemic process a priori is both historical and social, as any new discovery has to both build on and at the same time fit with the existing knowledge in a certain historical period. Most of all though, taking the historical development of the medical concept of syphilis as an example, Fleck shows how knowledge and ideas already

existing in folk knowledge, which he terms pre-ideas, are taken up by and strongly shape scientific knowledge production. This in turn of course again influences other forms of cognition present in society. Instead of a rigid separation between scientific knowledge production and societal interests, Fleck conceptualises a constant shifting between and a perpetual mutual influence of scientific and societal thought styles.

In empirical social science research, the aim to address the social constitution and thus the political dimension of the epistemic core of scientific knowledge was first taken up in programmatic form by the "strong programme" (Bloor 1976). A central tenet of this approach is that 'truth' may not be taken as explanatory for the success of a scientific theory. Much more, that a fact is taken to be true is to be explained equally as is the failure to establish 'truth'. This call for symmetry in the investigation of scientific knowledge lead to a series of studies which sought to understand the content of scientific theories such as phrenology (Shapin 1978) or statistics (MacKenzie 1981) through taking into account the social boundary conditions of the respective time period. Thus, the emergence of statistic knowledge was seen as linked to the eugenics movement in 19th century Britain, which had an obvious interest in means to classify population groups and to produce knowledge on their distribution in British society.

Some of the most convincing case studies on the social contextuality of scientific knowledge production come from feminist scholars. Londa Schiebinger (1989, 1993) has shown how gender and most of all gender stereotypes are inscribed into the scientific image of the human body, but also in seemingly neutral botanical and zoological classification systems in the 18th century. She traces how sex as a category for classification becomes relevant in areas where it has not been used as a distinction in prior classificatory schemata – as for example in the classification of plants. And as she shows this to be true for scientific fields such as zoology, anatomy or botanics, she makes a forceful argument that this epistemic shift is intrinsically linked to the urge for a deeper understanding and thus also accentuation of the differences between the sexes. In the political context of the 18th century, in the end this means to forge deeply political arguments on the role of women in the dawning new social order following the French revolution. For example, the female skeleton was depicted as related to the ostrich, its head being too small in proportion, and the size of the pelvis being exaggerated – while the male skeleton was likened to the horse. Hence, the female body was 'naturally' designed to inhabit the sphere of domestic reproduction, and not the public sphere in which political debate takes place.

In the study of technology, a corresponding approach may be seen in Langdon Winner's argument that technologies may be seen as inherently political (1980). For Winner, technological artefacts "embody specific forms of power and authority" (op.cit.: 19), and thus have political qualities. Concretely, he conceptualises them to do so in two ways:

First, it may be the case that technological arrangements affect social order, that they are used as a means to settle a political conflict in a certain community. He gives some examples for such technological arrangements, the most popular one being the bridges of Robert Moses in New York, which were built by the architect Moses in a height which allows cars, but not busses to pass under them. If we consider that blacks and generally lower social classes were much more likely to use public transport, then the technological arrangement of the overpass becomes a means of exclusion. However, Winner does not give any account on how precisely artefacts acquire their political qualities, other that they are not purely socially determined and not necessarily shaped by individual actions.

This also applies to the second form in which technologies may be political in his concept. Winner argues that there may be "inherently political" (op.cit.) technologies. By this, he means technologies, which not only have political effects, but demand a certain form of social order to become operational. He argues that for example nuclear technology may be only run in strongly hierarchical structures, due to the safety risks associated with the technology. Solar power on the other hand may be organized more de-centrally and 'democratically'. Again, this argument links the shape of a technological arrangement to its social and political context, albeit without giving any hint on how the correspondence between the former and the latter comes into being.

7.3 Shaping Technoscience, Building Society. The Co-Production of Technoscience and the Social Order

Most recent contributions in science and technology studies do not see science as insulated from society, or as contextualised by societal influence. Much rather, science and society are thought as interwoven in a "seamless web" (Hughes 1983).

The theory which has most strongly made this argument is actor-network theory (ANT) (Latour 2005). In the argumentation of most contributions from this tradition, societal structures and technoscientific artefacts are co-constructed. Technologies such as the seat belt or the computer system, which does not allow starting the car unless the

driver's seatbelt is fastened, may be read as scripts (Akrich 1992). They prescribe the behaviour of users, and at the same time carry an implicit assumption on how users would behave otherwise (Latour 1992). They hence are both material enactments of social norms and in turn play an important role in enforcing these norms in society. As the assertion that people should behave rationally and fasten their seatbelts is clearly normative, it may be argued that in fact social norms or "moralities" are built into these technological systems (Latour 1991).

An important part of the argument on these moralities is that as a technology stabilizes in society, the social values and norms inscribed in and prescribed by a technological arrangement are more and more collectivized and come to be seen as self evident, not as contingent choices made in a process of technological development. After this stabilisation has taken place, the script of a technology does no longer seem like a social vision of a designer, but as the natural consequence of the technical properties of the technological artefact. Thus, social norms are 'cast into stone', because they take the form of technological arrangements, or as Bruno Latour has put it: "Technology is society made durable" (Latour 1991).

> "That is why it makes sense to say that technical objects have political strength. They may change social relations, but they also stabilize, naturalize, depoliticize, and translate these into other media. After the event, the processes involved in building up technical objects are concealed. The causal links they established are naturalized. There was, or so it seems, never any possibility that it could have been otherwise" (Akrich 1992: 222).

As a technology 'matures' and is more and more inscribed into society, the contingent choices made and the identities ascribed in its implementation are gradually moved from the realm of the 'social' to the 'nature of the technology' and thus depoliticized.

Beyond actor-network theory, co-production has become a general keyword for the intertwinedness of science and society. Sheila Jasanoff defines co-production by stressing that

> "[k]nowledge and its material embodiments are at once products of social work and constitutive of forms of social life; society cannot function without knowledge any more than knowledge can exist without appropriate social supports. Scientific knowledge, in particular, is not a transcendent mirror of reality. It both embeds and is embedded in social practices, identities, norms, conventions, discourses, instruments

and institutions – in short, in all the building blocks of what we term the social. *The same can be even said more forcefully of technology."*
(Jasanoff 2004: 2-3, emphasis in original)

In this concept, assuming that the epistemic core of science is untouched by societal interests seems fundamentally naïve. This coincides with the work of Nowotny and co-authors (2001) on the co-evolution of science and society[22]. They stress that the degree to which science and other societal subsystems and rationales are interwoven is strongly increasing, to a degree that it might be at times hard to analytically distinguish science from its societal context (Latour 1998). As I have argued in chapter 2, these changes, in which the co-production of technoscientific knowledge and social order becomes ever more obvious, also pose quite strong challenges to both established ways of self-perception of the scientific profession, as well as to traditional approaches to governing science.

7.4 Boundary Work: The Strategic Use of Models of Science/Society Relations

Whether science and society are seen as closely intertwined or strongly separated has important political consequences. In his book "We have never been modern" Bruno Latour (1993) argues that the division between '*one*' nature, which exists before and untouched by societal interests, and '*many*' cultures, which are shaped by human action and are thus open to political discussion, is in fact the defining criterion of modernity. He shows how this distinction historically came into being in the 17th century with the formation of modern experimental science, and argues that it is exclusive to modern Western culture and may not be found among traditional societies. According to Latour the separation of truth from politics has had an intrinsically political function from the very beginning: to remove at least some issues from human conflict, and to lay foundations for a social order based on a rational consensus on facts instead of on the raging war of human passions (see also Shapin & Schaffer 1985). In today's political landscape maybe more than ever there is a tendency to believe that conflicts are best to be solved by delegating them to experts, by seeking for a safe basis of facts which quasi forecloses any political discussion. However, as Latour argues, this distinction between nature and culture is mainly a discursive mechanism to displace issues from the political sphere and thus to

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[22] See also chapter 2.

close controversy. At the same time, these seemingly so rigid boundaries are constantly breached, and hybrids of natural and political issues and actors play increasingly important roles. The recent scientific and political negotiations around climate issues may be taken as a prime example here. In Latour's argument, it would be naïve to see the disputes around this issue as a question of pure science, which keeps being distorted by political interests. Much more, as studies have shown (Miller 2001), the political and the natural are co-produced in these activities. Thus, it might be said in his argument that the social is constantly reconstructed in a mutual process of co-evolution with and discursive boundary work against the natural.

Hence, erecting and de-constructing the boundary of science as a realm untouched by societal conduct is a fundamental mechanism of modern politics. Arguments on whether some issue is part of 'the social' or 'the natural' may be used to close or open controversies in political debate, but also in the context of a concrete engagement design. This implies for example that to address an issue, as for example obesity, which will be one of the topics in the empirical chapters, in the terms of 'facts' established in basic research may mean to remove it from the realm of political contestation, to depoliticize it and to transform a social and political issue into a seemingly apolitical one. This equally applies to claiming that one's own research is not concerned with finding a medication against obesity, but only with "studying metabolism" pathways.

To study this for my own material, I will use Thomas Gieryn's (1995, 1999) concept of "boundary work". He has described how scientists defend their epistemic authority and the power to define their own rules of conduct by distinguishing between what is science and what is not. In these processes of boundary work, some attributes and properties of science are accentuated, while others are denied, in order to exclude other actors from exerting influence on the institutions and values of science, as well as from gaining "the credibility, prestige, power and material resources that attend such a privileged position" (Gieryn 1995: 405). Historically as well as in present debates, separating ‚science' from ‚technology' or ‚basic' from ‚applied' science may be read as precisely such a boundary work strategy. In this concept, there is no essential way of defining science, or technology, respectively. Science is "nothing but a space, one that acquires its authority precisely from and through episodic negotiations of its flexible and contextually contingent borders

and territories" (op.cit.).[23]

Gieryn stresses that to draw boundaries always means to both define what is inside the boundary and what is not. Hence, distinguishing between science and non-science also implies employing a model of the relations between science and society. These models of the relation between science and society in turn strongly correspond with visions of governance. As I have argued, the ideal of scientific self-governance is strongly challenged in a model assuming a co-evolution of science and society. If the epistemic core of science is however taken to be free of societal influences, the very same approach to governance becomes nearly self-evident.

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[23] The largely futile attempts in the philosophy of science to find any essential criterion to distinguish science from non-science may be seen as an important support for this argument (Stengers 1998).

8 Lay Political Theories: Grasping Citizens' Imaginations of Governance

As a second element of my conceptual approach I will use a concept coined by Mike Michael (2002), who introduces the notion of "lay political theories" as an effort to engage with a blind spot so far very little addressed in qualitative research on the relations between science and society. In the following, I will first relate his rationale in developing the concept and then describe my concrete use of the term.

In the Public Understanding of Science tradition, most of the studies which addressed the relation between science and society from a qualitative perspective have aimed to 'show' that laypeople's understanding of science is complex and situated, and that they must be conceptualised as holding knowledge and experience in their own right. What follows from this is that they are thus first capable to engage with science and politics in deliberative processes about technoscience, and secondly should be treated as and empowered to act as knowledgeable actors in these processes. In that sense it might be argued that the relation of interpretationist critical Public Understanding of Science to traditional positivist approaches mirrors a classical relation between quantitative and interpretationist approaches to sociology (Wynne 1995). While the former often seeks to conceal its normative implications by resorting to notions of objective and reliable measurement, the latter tends to openly embrace its emancipatory and empowering mission in 'giving voice' to its interlocutors. Mike Michael's (2002) main critical argument against this emancipatory approach, which is part of his own academic history, is that its hidden normative assumptions may lead to analytical blind spots.

First, he identifies a tendency inherent in the vocabulary and approach of many studies in the critical tradition to simultaneously "romanticize" and "localize" lay knowledge, or as he puts it: "In reading some of these studies of local communities, one is often left with the impression that the lay local is the site of happy common and coherent consent." (op.cit.: 369). All too often the picture is one of a culturally insensitive science invading lay life worlds, as if those lay communities were hermetically closed and untouched by techno-science or other cultural currents otherwise. The term 'romanticize' implies that there is quite a danger to implicitly buy in the normative commitment that lay knowledge may in some ways be morally superior to those of the scientific 'invaders' on a general level, as legitimate as this assertion may be in the single case. The story then would be

one of the colonisation of lay life worlds by technoscience, resting on the faulty assumption that social communities untouched by modern science and technology are the rule, not the extreme exception. The lay local is "localized" and insulated as if it was "a domain separated from wider cultural dynamics" (op. cit.). Lay locality is pitched against de-contextualised and global science, an assumption deeply out of tune with the formation of simultaneously local and global knowledge communities, such as those of patients on the internet (Novas & Rose 2000, Fochler 2003).

For the matter of considering the impact of this criticism on studying lay participation in the governance of science, the charge of "romanticization" is more important. Michael (2002) argues that both the classical quantitative and the critical qualitative approach to the Public Understanding of Science are not only based on very different understandings of both science and politics. They are also actively engaged in doing politics. Both the proponents of the classical and the critical tradition may for example be shown to be highly active in policy advice on both the national and the European level. In their advice, they enact different versions of the relation between science, the public and politics. While the main thrust of the classical approach is to raise scientific literacy, that of the critical tradition is to empower lay participation and foster the involvement of laypeople in the discussion, in order to bring their local knowledge and value systems to the table. The former may be accused of a sociological deficit by not recognizing the inherently social conditions of the uptake of scientific knowledge. The latter however "can be said to be tacitly informed by a Rousseauesque democracy" (Michael 2002: 363), resting on a naïve vision of the process of empowerment and of the political process in general. Assuming that lay participation is quasi per se a good thing, it is blind of laypeople's own understandings of the political embedding of technoscience and their relation to it. It implicitly assumes that laypeople would welcome empowerment as well as participation in the governance processes around technoscience unconditionally, because it does not consider that they may have their own understandings of processes of governance which might not have fit with the implicit normative commitments of critical Public Understanding of Science research.

Put differently, critical PUS allows laypeople to be reflexive on some issues, but not on others. They are seen as holding complex views on how science affects their lives and on how scientific knowledge relates to their own situated forms of knowing. However, no attention is paid to the possibility that they might have equally complex assertions on how science relates to the political process and on what their own role in this context may be.

While what I have written so far gives an account on the conceptual background of the notion "lay political theories" and a broad definition of the issues it is meant to address, it is not sufficiently concrete to serve as an operationalisation in an empirical setting. There is not much empirical work to relate to, which develops the concept beyond Michael's (2002) programmatic contribution. Together with Nik Brown Mike Michael himself (2005) has recently focussed on the public's representation of the public and its political implications in the area of xenotransplantation. Based on focus group data, they show a wide range of representations of science and the public in laypeople's accounts that "do not necessarily follow common notions of the divide between science and society" (Michael & Brown 2005: 55). Their work suggests that the public's perception of central categories relevant to the concept of governance may be quite nuanced and context-sensitive.

In this thesis, I will approach the concept of lay political theories slightly differently, based on an approach my colleagues and I have recently developed (Felt et al. in press a). Relating to my discussion of the political science concepts of government and governance in the first chapter, I will aim to identify and analyse evidence of our participants' imaginations of government, of governance and of public participation. To do so I will trace which actors they perceive as relevant in the governance of technoscience and which roles they ascribe to them. How they relate these actors to each other and in which processes and via which media they perceive processes of governance to be conducted will be further important issues to consider in this thesis.

9 Research Questions

In this thesis, my general aim is to shed light on the bottom-up perspectives of those taking part in public engagement experiments. In my argument, this is of strong relevance because very little prior work exists on these perspectives, even though they may be of crucial relevance to understand the democratic potential of public participation in the current governance of science. Further, dealing with participants' problems and struggles in coming to terms with their own role in public participation might be helpful in developing recommendations on how participation might be organised in a different, maybe more democratic way.

Hence, the general questions I will pose to my empirical material are:
- How do citizens experience taking part in a public engagement setting?
- How do they perceive the governance of the respective technoscientific setting?
- How do they situate the role of public participation in this governance context?
- How do they imagine the limits and possibilities of the social and political shaping of technoscience in general?
- Which problems do they identify and struggle with in making engagement happen, and why?
- In settings where both laypeople and scientists are involved, how do the social relations between scientists and laypeople impinge on their respective perception of the questions above?

To be able to grasp these experiences and perceptions on a conceptual basis I will use the two main concepts I have introduced in the preceding chapters: I will study the participants' *lay models of science in its relation to society* on the one hand, and I will follow their *lay political theories* on the other. Both terms lead me to a separate set of sub-questions.

Lay models of science in its relation to society allow to better understand which obstacles participants face as they struggle to define their own role in public engagement in general, and in upstream engagement in particular. The general aim here is to identify how the participants imagine the limits and possibilities of societal influence on technoscience in general. My hypothesis is that these models form an important

background for building one's position on science's governance, and the possible role of the public in it. This implies to ask:

- How do participants understand science as a social and epistemic enterprise in its relation to society?
- How do participants conceptualise the limits and possibilities of social and political influence on technoscience?
- How are these lay models of the science/society relation used in the discussion and to what ends?

The main aim of following *lay political theories* is to grasp how participants perceive the governance of the respective technoscientific setting, and the possible role of public participation in it. The assumption driving this approach is that laypeople have quite differentiated views on the governance of a respective technoscientific field, and that they situate their assessment of public participation in these fields against them. Hence, I will investigate how participants perceive the actor constellations and processes in which science is governed in society. This leads to the following questions:

- Which actors do they perceive as relevant?
- How do they conceptualise the relations between these actors?
- How do they imagine interventions might take place in this governance system?
- How do they relate the idea of public participation and the role of the public to this perception of governance?

Taken together, the participants' own experiences, their visions of governance and participation, and their perceptions of science in its relation to society, will hopefully adequately describe the complexity of lay positionings on technoscience and its governance. By analysing the multi-layered picture resulting from this conceptual matrix and the different empirical settings described in the next chapter, I will develop conclusions on the governance of and public participation in technoscience.

10 Material and Method: Two Contexts of Engagement

To answer my research questions I will build on material from two very different experiments in public engagement with technoscience and its governance. These two settings were situated in two different research projects, which my colleagues and I have been conducting over the past three years. In terms of their basic approach to enacting public engagement, both settings were quite different. The project "Challenges of Biomedicine – Socio-Cultural Contexts, European Governance and Bioethics"[24] built on focus group discussions with lay and affected people on two biomedical technologies, genetic testing and organ transplantation. The focus group is a method which allows only for a very short but focussed time of interaction, and did in our case also not involve any input by scientists, be it as experts or participants. „Let's Talk about GOLD! An Analysis of the Interaction between Genome-Research(ers) and the Public as a Learning Process"[25] on the other hand was an experiment with a quite new method of long-term engagement, which equally involves laypeople and scientists: the Round Table.

Hence, though both settings are crucial to answering my research questions, their contribution is quite different. In the following I will therefore describe both approaches in detail, and then comment on how I will use them in the following empirical sections.

10.1 A Comparative Approach to Biomedical Technoscience and its Governance: The 'Challenges of Biomedicine' Project

The project "Challenges of Biomedicine: Socio-cultural Contexts, European Governance and Bioethics (CoB)", funded by the European Union, involved 10 partner institutions in eight European countries. The main aim of this project was to better understand how biomedical technologies are perceived in the public sphere, what role cultural values and backgrounds play, and in how far previous experiences matter when people position themselves towards such technologies. On the basis of this analysis, the project aimed at developing the implications this has in terms of governance and participation with regard to biomedical technologies, as well as the consequences this brings along in terms of

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[24] Funded by the European Commission under the 6th research framework programme, „Science and Society", Contract No. SAS6-CT-2003-510238, project leader and coordinator: Ulrike Felt
[25] Funded by the Austrian GEN-AU research programme, project leader: Ulrike Felt

bioethical framings both on the European as well as on national levels. The project hence is innovative on very different levels: firstly it is an approach to bridge the disciplinary gap between social science and ethics in a common research endeavour. Secondly it is a systematic approach to comparative qualitative empirical fieldwork in the field of science and society, which has been rare so far[26]. This rareness especially applies in combination to the third innovative feature of the project, which is its focus on citizens' perceptions of governance and public participation.

As an empirical approach, focus group discussions on two biomedical technologies, organ transplantation and post-natal genetic testing, were carried out. In the categorisation of engagement designs I have proposed in a prior chapter, focus groups may be characterised as a method which is short term oriented, allows for very little lay interaction with the topic in comparison to other methods, and is quite focussed on output. However the output is not produced by the participants themselves, but by the organizing experts of community – in this case ourselves.

Focus groups are a method of engaging the public with a topic with relatively little cost in conducting and organising the design on the one hand, and which requires only very little commitment in terms of time from the participants. Hence they may be expected to be a quite inclusive method with a low threshold for participation. The method of the focus group is especially apt for identifying shared systems of norms and values (Bloor et al. 2001), as well as divergences on these. It is thus very well suited for tracing common models of governance and of public participation. Compared to interviews for example, it allows to study how opinions form, are contested and defended and thus also to analyse social interaction on the topics discussed. Further, the positions taken in the discussion may be seen as relatively unbiased by the researchers compared to other settings, as hardly any information on the topic to be discussed has been given beforehand. This at the same time also is linked to a disadvantage: even though they render quite rich material, their comparatively short duration and the fact that they took place only once allows a 'snapshot' of citizens' opinions on the respective topics. Any changes which might take place as especially those who have not been in touch with the technology before start to think about it and to come to terms with it are out of the scope of analysis.

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[26] For an exception see Marris et al. 2001.

Organ transplantation and post-natal genetic testing were chosen for our project because each of these technologies raises different potential ethical and social problems and hence challenges for governance. Further, organ transplantation as a technology which has been established as a socio-technical system for quite some time may be considered as a technology more "downstream" than genetic testing, which is currently still very much in the phase of being implemented in society.

In this thesis, I will only use the five focus groups carried out in Austria. Of these focus groups, two were carried out on organ transplantation and three on genetic testing. As affectedness was expected to be a key factor in the personal approach towards the technology, each biotechnology was discussed in separate groups of affected and non-affected participants with a group size ranging from seven to ten people. The project's definition of affectedness was decided to be rather broad: criteria for being selected as a member of an affected group were experiences with the respective technology as a patient, a patient's relative, or professional[27]. Non-affectedness was conceptualised as having no contact to the discussed technology on the personal and kinship level. Whether someone was decided to be part of the affected or the lay group was mostly done on grounds of people's self-categorisation on the application form and on short telephone interviews before the actual focus groups. A special focus was put on an overall balanced composition concerning gender, age, religious background, and education. We did so to assemble groups which did not miss to include any significant part of society concerning the traditional socio-demographic criteria. Religion was included because different religious backgrounds were expected to have varying approaches to conceptualising the body in relation to technology, a further important issue for the project. In Austria, this also meant aiming at including migrant communities, which also would have been of strong relevance for discussing governance and participation. But while concerning the other criteria, the response may be described as quite balanced, we had hardly any answers from people with any other religious background than the catholic denomination dominant in Austria – even though we had put special emphasis on this aspect of recruitment. This raises obvious issues for a critical discussion of our own representation of 'community' – it is a community representing the dominant cultural majority. As similar

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[27] For example, the affected group for organ transplantation consisted of several persons who had received transplants, several relatives of receivers, one relative of a „dead donor" as well as a physician involved in organ transplantation. The group for genetic testing mainly was made up by people who had had a genetic test or were related to a person who had taken a test. A number of different diseases were represented, including breast and prostate cancer as well as Chrone's disease.

experiences were made in other countries, this clearly is an issue for further consideration.

A second difficulty in recruitment was to reach people affected by genetic testing. We had only very few responses compared to other countries, and our efforts to contact relevant self-help groups such as on breast cancer were denied by stating that this was "not an issue" for them. This signals a reluctance to discuss the topic in any public or semi-public forum such as a focus group – a reluctance very probably based on the potentially stigmatising character of the information and the fact that genetic testing is hardly discussed in the Austrian public so far.

The focus groups were all carried out and facilitated by the project team. No prior information input on the technology or on its implementation in the Austrian context in terms of legal regulation or institutional setting was given. Using an interview guideline the discussion was led from the level of general individual perception of the respective technology via personal decision scenarios highlighting ethically controversial aspects of the technology to a concluding reflection of possible alternatives of political steering, public information, and participation. Concerning facilitation, the moderator (Ulrike Felt) tried to walk the line between adhering to the agreed questionnaire to ensure comparability while at the same time trying to leave sufficient space to the participants to go into details relevant for the specific Austrian context, such as the specific legal regulation of organ transplantation.

All discussions were fully transcribed, translated into English and analysed with the qualitative research software Atlas.ti along a gradually revised and refined set of codes using Grounded Theory (Strauss & Corbin 2000).

10.2 Engaging Differently: The Round Tables of 'Let's Talk about GOLD!'

The "Round Table" method of the "Let's talk about GOLD[28]!" project takes a very different approach. The basic idea of the project was to stage a "collective experiment" in public engagement with the ethical and social dimensions of genome research. Much of the design of this project was based on the prior work surveying and analyzing public engagement activities and their role in a "socially robust politics of knowledge" in several

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[28] GOLD is the acronym of the associated genome research project, and it stands for "Genomics Of Lipid-Associated Disorders".

European countries (Felt, Fochler & Müller 2003), which I have touched on in a previous chapter[29]. It was an "experiment", because our explicit goal was to selectively modify a number of key elements and dimensions of classical participatory designs building on the results of this prior work. And it was "collective" in the sense that we did expect participants to actively participate in shaping the design and process of the actual engagement.

One and maybe the most central of these results was that even though public engagement is often stressed to aim at a 'true dialogue' between scientists and laypeople, scientists are quite often involved in public engagement designs in very reductive roles. In many classical engagement models (e.g., consensus conferences) the idea of the public 'talking back to science' is taken so far that there is actually very little room left for scientists to take part outside their role of providing expertise. Hence a first central objective was to allow for both the laypeople and the scientists to equally engage in a process of mutual learning. This process of mutual learning is of crucial interest also to analysing their perceptions of governance and public participation, as well as their models of science in its relation to society. In continuous interaction, both groups of participants need to explicate their own assumptions to make their argument, as they react on and possibly contest statements implying a different background. And they may do so on the basis of prior statements of the respective discussion partner and of tensions they identify. For example, in the course of the discussion, the project head of the genome research project would often state that he was not interested in societal application, only in doing "science for science's sake". This internalist model was repeatedly questioned by the laypeople by pointing to prior statements on the project, which emphasized its potential to solve problems assumed to be central to society, such as obesity.

This leads to the second important point: the length of the engagement process. Our assumption was that in order for true mutual learning to become possible, laypeople and scientists would need more time to interact as well as to reflect on the discussions in the timespan between the single discussion parts. In this way, we hoped to be able to observe how social relations between the scientists and the laypeople would develop, and how they would impinge on for example the laypeople's assessment of the ideal of scientific self-governance scientists put forward, or on the scientists' view on the idea of public participation.

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[29] See chapter 6

Thirdly, to facilitate this dialogue, we created a rather open discussion space imposing as few rules as possible. Accordingly, the moderator was briefed to intervene as much as necessary to maintain a fair discussion and keep it in the vicinity of the topic to be discussed, but as little as possible beyond that. In doing so, we were committed to an approach that was slightly "mechanistic" in Galison's terminology of representation. Though we were of course aware that non-intervention is impossible, we tried to minimise our interventions to be able to observe how the discussion would develop unbiased.

Fourthly, our objective was to situate the discussion as much 'upstream' as possible. We were interested in how the participants would discuss typical 'upstream issues', such as the values underlying specific technoscientific trajectories, and how they would imagine possibilities and limits of governing them.

To fulfil these 'experimental parameters', we chose to adapt a design of the Swiss foundation *Science et Cité*—the Round Table (Gisler 2002)[30]. Its basic principle is to have a group of laypeople accompany a topic over a longer period of time. The Round Table is strongly process-oriented, which means that the precise structure of the engagement design is not pre-defined but may and should be developed by the participants in the ongoing process. Further, no output is pre-defined in order to keep the discussion as open as possible without creating pressure to narrow down issues for a final consensus statement.

In our project, the Round Tables brought together fourteen laypeople with seven genome researchers of a bigger consortium working on lipid disorders. Their research project served as 'anchor' and example to discuss the social and ethical aspects of genome research. It fulfilled our requirements concerning upstream engagement as it had clear and explicit visions of the societal problems to be addressed (obesity, diabetes), but still was quite far from any possible clinical or other application. Thus, the genome research project was - as a 'basic research' project - situated quite far 'upstream' in a possible development of 'anti-obesity' drugs while at the same time already incorporating - even though very vague - promises for the future.

The laypeople were selected from a nation-wide call for participants. The call was issued via posters and leaflets displayed at public institutions like museums as well as by bulk mail and a newspaper advertisement in the city where the Round Table took place. Our

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[30] http://www.science-et-cite.ch/projekte/tableronde/de.aspx, accessed February 8, 2007

'technology of representation' mainly focussed on achieving as much heterogeneity as possible concerning the experiences people brought with them and the way they related to the topic of the Round Table. In this sense we were clearly committed to a 'judgement'-approach to representation, though we did not aim to represent clearly defined social groups, but to capture an as heterogeneous group of approaches to the issue as possible. Beyond that, our goal was to have an evenly distributed group in terms of gender, age and formal education. We were quite successful concerning gender and age, but only very little so for formal education. Not surprisingly, our group presented nearly an inversion of the distribution of education degrees in the Austrian general public. This very likely is related to the slightly arcane nature of the issue (genomics of lipid disorders...), as well as to the fact that quite some time investment was necessary to participate at the Round Table discussions. It is interesting to note that as in the focus groups of the Challenges of Biomedicine project, none of the participants was part of a religious or cultural minority.

The participating scientists were 'recruited' via a project internal call. In total, thirteen different scientists participated, eight of which on a regular basis. All hierarchical levels from doctoral students via post-doctoral researchers to project leaders were present. The gender ratio not surprisingly showed a strong negative correlation with the hierarchical position – all project heads were male and nearly all doctoral students female. These hierarchies were reflected in the discussion, where the younger scientists were much less likely to contribute without being explicitly addressed than their senior counterparts.

The actual Round Tables were whole-day discussions, which took place in a reconfigured seminar room of the researchers' laboratory. A series of six meetings was held over a period of eight months. The first three were dedicated to discuss the genome research project itself including a laboratory visit. During these Round Tables the participants collectively identified topics to be discussed in the remaining meetings: (1) science and the media, (2) ethical issues of genome research and (3) regulatory issues. A specific expert was invited for each of these thematic discussions (a journalist, an ethicist, a representative of a state regulatory body). Generally, discussions took place in the plenary, however, at some meetings small group discussions were included to allow for a different discussion dynamic or to develop inputs for the plenary.

Qualitative interviews were conducted with all participants before the first and after the last Round Table to trace changes in the participants' positions and opinions. The laypeople also met for a seventh Round Table, at which they reflected on their experiences in the absence of the genome researchers. These concluding reflections of

both scientists and laypeople are enormously rich material for my research question, because they allow tracing how the participants reflected on their role in the design with some temporal distance.

All discussions and interviews were taped, transcribed and coded with Atlas.ti. The analysis was done in a grounded theory approach (Strauss & Corbin 2000). In this thesis I will use both all Round Table discussions as well as the concluding interviews.

10.3 Different Methods, Different Answers – On the Relation Between the Empirical Settings and my Research Questions

As the methodological settings of the two projects described above are quite different, they also contribute to answering my research questions in different ways.

Firstly, the 'density' and form of the evidence for the two central concepts I aim to identify, 'lay models of science in its relation to society' and 'lay political theories', is very different. Both sets of materials contain ample evidence for the participants' lay political theories. Still, this evidence is much more implicit in the focus groups than it is in the Round Tables, where reflections could continually develop over a period of time. Hence, in sum the Round Table material is richer in density, however the lay political theories which may be extracted from the focus groups have another important feature. Other than those in the Round Table discussions they have been developed in a context which is uninfluenced by any interaction with scientists or experts. In the Round Tables, participants tended not to put their views in a too provocative stance in order not to endanger the social relation with the scientists. This is different for the focus groups, where the contrasts between the statements put forward were much sharper. Hence, both sets of materials provide valuable insights for understanding lay political theories on the governance of science, and on public participation – and I will analyse both on these issues in the following.

For the lay models of science in its relation to society however, there is only very little evidence in the focus group discussions, especially if compared to the Round Table debates. This may be explained by the fact that obviously the interaction and the friction between the very different assumptions of laypeople and scientists on this issue was crucial in creating a material which may contribute to answering this question. Hence for this part of my conceptual framework I will limit myself to the "Let's talk about GOLD!" material. This equally applies to my sub-question on how the social relation between the scientists and the laypeople affected their mutual perceptions of governance.

Beyond this, the subject areas discussed in the two settings create an interesting matrix for comparison. Firstly, especially the focus groups allow for contrasting the views of affected and unaffected participants. Within the Round table setting, differences of opinion between laypeople and scientists will be a central category of analysis. Further, the three subject areas discussed in both settings are situated at very different points in the historical development of the inscription of a technoscience into society. While organ transplantation is an established socio-technical system, post-natal genetic testing is in the process of being implemented in Austrian society. The applications of the knowledge produced within the "Let's talk about GOLD!" setting only exist in the visions of the scientists and the lay participants which shared or disputed them. This implies that also the potential objects of and challenges to governance are very different. While organ transplantation focuses on a quite material process of explanting and implanting organs, genetic testing produces information on the individual genetic risk status as compared to a collective. This again is crucially different to the knowledge and possibly the patents developed in basic research, which are likely to have concrete applications in and implications for society only at an unknown point in a near or distant future.

As a final remark on the different empirical settings, it remains to be said explicitly that the term "lay person" has a slightly different meaning in both project contexts, and again a different meaning in my use of "lay political theories" or "lay models of science in its relation to society".

In both actual empirical settings, the term "lay person" designates a member of a wider public, which has not explicitly been in touch with the issues discussed before. However, what "being in touch" means is differs for the two projects, as does the "non-lay" category against which being lay is also implicitly defined. In the "Challenges of Biomedicine" focus groups, "having been in touch" means being affected by the technology or a disease connected to it, either personally, through a person of near kin, or as a professional. In turn, "lay" designates the absence of such a personal relation. At the "Let's Talk about GOLD!" Round Tables, being "lay" first and foremost meant not being "(GOLD) genome scientist". Actually the lay people involved in this project comprised both "lay" and "affected" in terms of the "Challenges of Biomedicine" categorisation. There were participants affected by diabetes and other lipid disorders, as well as people in a, albeit distant, professional relation to genome research, e.g. as a technician building diagnostic

machines.

The "lay" in "lay political theories" or "lay models of science in its relation to society" on the other hand in my use means not being an expert on the respective issues. This equally applies to "lay" people in any of the above senses, but also to those affected, and to the GOLD scientists. After all, none of them may be expected to be an expert, or even to previously have explicitly thought about issues of governance and public participation in relation to science, or about their own models of how science works, and how it relates to society.

11 Governing Organs, Governing Genes: Discussing Technology and Identifying Challenges for Governance in Focus Groups on Two Different Biomedical Technologies[31]

In the following chapter, I will analyse the focus groups of the Challenges of Biomedicine project, aiming to identify the respective participants' lay political theories. In doing so, I will first (chapter 11.1) briefly discuss the specificities of the two technologies and their implementation in the Austrian context, as a background to my actual analysis. In a next step (chapter 11.2), an overview of which political issues and challenges to governance were identified in the different focus group settings will be given. This chapter should also serve to provide the reader with an overview of the discussion dynamics as the context in which the subsequent arguments are to be situated. A main point of this chapter will be that the main difference concerning the participants' positions on governance and public participation did not so much run along the lay/affected divide, but between the two technologies. Hence, chapters 11.3 and 11.4 will focus on one of the two technologies respectively, and analyse the lay political theories of the participants in this setting. To do so, I will structure my discussion in three parts. The first focus will be on perspectives on government both as an institution and as a mode of governing[32]. Secondly, I will trace visions of governance in the argumentation of our participants. Thirdly, positions on the role, the limits and possibilities of public participation will be discussed, and related to the first two dimensions of my analysis. Chapter 11.5 will compare the results of the discussion of the two different technological settings, and sum up the main findings from the analysis.

11.1 Organ Transplantation and Post-Natal Genetic Testing: Two Very Different Ways of Thinking and Doing Medicine

Organ transplantation and genetic testing represent very different historical ways of performing and 'thinking' medicine. The basic rationales of the technologies, but also the way the body is conceptualised in their construction and performance are central dimensions that differ fundamentally. Transplantation medicine can be seen as a

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[31] The arguments in this chapter are partially based on Felt et al. in press a.
[32] For a discussion of the concepts of government and governance see chapter 2.

paradigmatic example for the concept of the body as a 'machine' consisting of discrete elements with specific functions. Organ exchange is a way of 'repairing' the body in the instance of a 'malfunction' of one of its parts. Although the idea of a simple mechanistic exchange cannot be fully maintained in practice, as the person undergoing the transplantation has to take life-long medication to prevent rejection reactions of the body, this metaphor stays alive and is dominant in media debates as well as in people's minds (Sanner 2002). In contrast, post-natal genetic testing is associated with metaphors of information technology. This conception of the body, influenced by information theory, sees the body as a medium carrying information or a specific code which may be mapped and read by medicine, and thus as being more than the sum of its parts (Kay 2000, Keller 1992).

These different ways of conceptualising the body affect the relationship between the technology and the individual in the medical encounter. While organ transplantation is seen as classical clinical intervention involving the cutting of bodies to exchange parts, genetic testing is an intervention of a very different kind. It could be interpreted as helping to reveal, 'read' and utilize the biological information bodies carry in new ways. In organ transplantation, the individual is both the focus and frame of reference of the medical diagnosis and intervention. A test to determine genetic risks, on the other hand, may only be interpreted by referring to population-based data. The test result thus does not directly tell anything about the status of the person tested with regard to categories like health or illness, but reveals only the person's risk of developing an illness based on his or her membership of a genetically-defined risk collective (Rabinow 1996). The oft-cited shift from case-based individual treatment to population-based medicine (Armstrong 2002) may thus be seen in the comparison of these two technologies.

This shift has significant consequences for patients' construction and perception of their illness. While in organ transplantation the illness is a localised malfunction of the body that can be 'repaired', in genetic testing the abstract probability of developing a certain hereditary disease has to be given meaning on the patient's side (Lambert & Rose 1996). Furthermore, the abstract risk information given by a genetic test does not (yet) necessarily result in any concrete medical operation or treatment, which makes living with it even more complex.

Organ transplantation and genetic testing may also be described as technologies that alter basic socio-cultural categories such as death and illness. After the first transplantations of vital organs, the legal definition of death was changed from heart

death to brain death in many countries to ensure a legal basis for the implementation of this new technology. Thus, the boundary between life and death was shifted in the process of embedding organ transplantation in the socio-cultural context. Genetic testing in turn blurs the boundaries between health and illness. Novas and Rose (2000) argue that people who are "genetically at risk" for certain disorders are conceptualised as neither healthy nor ill, but as something in between.

Within Austria, there are further differences between the two technologies concerning organization, legal regulation and public discussion.

In the case of organ transplantation, the roles, duties and hierarchies of the institutions involved are clear-cut. Potential donors are reported to regional transplantation centres, which organize the allocation and distribution of organs. Austria is a member of the European organization Eurotransplant. Most of the organs are distributed nationally, in order to minimize the time between organ removal and implantation (Hohmann 2003). However, they may also be distributed to recipients in other member countries. In contrast to this centralised system, the infrastructure for genetic testing is more complex and de-centralized. While in organ transplantation, the institutions involved in the system are strictly defined and limited, genetic testing can be carried out by any institution holding a licence. This makes the 'market' of genetic testing quite complex and lacking transparency. Since genetic testing is generally not covered by the Austrian health insurance scheme, the tests are treated as 'goods' on the health care market.

The respective clarity and complexity of the two technological systems correspond to their legal regulation. Organ transplantation involving dead donors is not covered by a distinct transplantation law. Instead, it is referenced only in a single paragraph of the general hospital law.[33] Genetic testing, in contrast, is regulated by a specific law on genetics that is approximately 80 paragraphs long. Although the gene technology law also covers agricultural use of genetics, the different treatment that the two medical technologies receive from a legal perspective is significant. The brevity of the legal regulations on Austrian organ donation seems astonishing in light of the potentially controversial nature of the procedure. The regulation, which is known as the 'objection solution'[34], dictates that each person on Austrian territory is automatically considered an organ donor, unless

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[33] Organ transplantation involving living donors is not regulated in the Austrian law at all.
[34] My use of the term ‚objection solution', instead of ‚objection regulation', is based on the direct translation of the German term ‚Widerspruchslösung'.

there is knowledge that the person made an explicit, prior objection to being one. Furthermore, there is no obligation for the state to inform citizens of the legal situation (Hohmann 2003), as there is in Belgium, for example. Since the state follows a 'politics of discretion', significant parts of the Austrian population remain uninformed of the regulation. It might be speculated that the low number of people who have registered their names on the objection list is a consequence of this politics[35] - which may be described as quite successful, in so far as Austria is among the countries in Europe with the highest rate of organ donations per capita.

Although the 'objection solution' may be seen as a potential source of conflict, it has never been the subject of a public controversy, not least because the Austrian media supports the 'politics of discretion'. Organ transplantation is framed as a national success story by the extensive description of the achievements of the 'world-class' transplantation practitioners, while controversial aspects are neglected. In contrast, genetic testing is much more controversial in the Austrian media, particularly in terms of data protection and possible genetic discrimination. Furthermore, success stories comparable to spectacular organ transplantations are lacking in the field of genetics, especially since treatments like gene therapy are still far from being realized.

Hence, the ways in which they may be described to be political, the challenges to governing, as well as the local constellations any governing intervention must build on, are very different for the two technologies - even though they both are high-tech biomedical interventions. Whether these differences will be reflected in lay and affected people's discussions on issues of governance and public participation will be analysed in the following chapters.

11.2 Identifying Political Challenges in Discussing Organ Transplantation and Genetic Testing

As I have indicated in the preceding chapter, organ transplantation and genetic testing are very different both concerning their basic technological rationale and their implementation in the Austrian context. Accordingly, also the way both technologies were discussed in the focus groups, and the possible problems and issues to be governed identified by the discussants were quite dissimilar. In the following, I will give an overview

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[35] The objection may be deposited in a central registry called 'Widerspruchsregister' at the Austrian health institute (ÖBIG).

over the main issues discussed.

In the focus groups on organ transplantation, there was rather little discussion on the technical properties of the technology itself, and of the technological processes associated with it. Quite prosaically, transplantation was seen as the surgical removal of a body part from one body and its transfer to another. Other aspects beyond 'cut and paste', such as the life-long medication transplanted individuals have to take were hardly mentioned in the discussion. This applies to the lay discussion group, but surprisingly also very much to the affected group. By both audiences, transplantation was mostly seen as a beneficial opportunity offered by science, and its technological history was told as the linear progress story of a maturing technology, which develops according to its own technological rationale, hardly influenced by societal factors or interests. In the dominant narration, this technological solution is perpetually optimised, and its risks are accordingly perpetually minimized. For example affected people would tell their personal story as waiting for the moment to 'opt in' as soon as the technology is safe enough to risk transplantation. The general conceptualisation of the technological development of organ transplantation as an optimisation also entails that existing applications are brought to perfection. No radically new applications are developed, but rather existing techniques are refined and made more effective.

Accordingly, possible issues to be governed were not seen in new developments and possibilities arising from the technology, but in the organisation of the present socio-technical system around it, especially concerning the procurement and allocation of organs. Generally the allocation of organs was seen as working well, and as based on fair principles which also were not fundamentally questioned. There was hardly any discussion on problems in organ allocation. Misuse and potential problems in this area were situated elsewhere, as for example "in China". While many participants just did not touch on this issue, some actually expressed their awareness that this is due to the mode of organ procurement, which gives Austria one of the highest organ 'emergence' rates in Europe. This mode of procurement, the 'objection solution' was subject to intense controversy especially in the lay focus group – where most participants were unaware of the regulation -, but also among the affected people. Whether it is the right of the state to take the organs of every deceased citizen without his or her prior consent was the issue of governance most intensely discussed in these focus groups.

In the focus groups on genetic testing, participants hardly had any concrete concept or image of the technology itself. While this may be seen as less surprising among the laypeople, interestingly this was also very much the case for those affected. Much rather genetic testing was discussed as representative for the development of the medical system as a whole. All three focus groups hardly discussed specific issues and problems of genetic testing by itself, but would constantly relate them to and argue them to be part of larger trends in modern medicine.

Only very few participants took genetic testing as an opportunity they themselves would consider to use. Most rejected it and saw it as part of a general trend which is reshaping and medicalising the identities of those it touches. Rather than solving any problems for them or providing them with additional opportunities for choice, the test would render them an 'individual at risk', largely without any treatment options available, especially the laypeople feared. Many would argue that this move to create risk identities would be part of a more general trend to outsource the responsibilities for one's own health to the individual, and to at the same time reduce the responsibility taken by the state or by health insurance. Genetic testing was thus seen by many as having quite some potential do endanger and undermine the value of solidarity they saw current health systems based on. This worry was particularly strong among the affected people, especially those engaged in self-help groups.

Other than for organ transplantation participants were very concerned with the future potential of the technology, with the ways in which it might change society. They would imagine that genetic testing might eventually lead to being able to select one's children according to their prospective health, and thus also to optimise humans. Several affected participants saw the danger that the societal solidarity for disabled people might diminish, because disability might even more become seen as something which might have been prevented than as fate. A further major issue was the fluidity of genetic data and its possible misuse on the labour market. Participants voiced the fear that they or others might be stigmatized because of a genetic disease, or because they carry the risk of a future disease. This fear was connected to the fact that genetic testing as a technology produces data, which may travel fast and be copied and turn up in unexpected places.

In all these visions the development of genetic testing as a technology did not follow a pure technological rationale, but was seen driven by social actors and interests. Thus, other than for organ transplantation there is no separation between a 'pure' technology

and its social context of application, but the development of genetic testing was discussed as deeply interwoven with social actors and interest. Accordingly, also the participants' visions of how these socio-technical systems were currently governed and which role public participation might play in them were very different.

11.3 Government, Governance and Public Participation: Lay Political Theories in Focus Groups on Organ Transplantation

Government

In the discussions on organ transplantation, government, or more precisely the Austrian nation state, was described by the participants as a powerful, sovereign and autonomous actor. Much of the discussion and the controversy in the groups actually centred around the role and rights of this actor. This is reflected in the central topic of discussion: The relationship between the individual and the state. The question of how far the sovereign state is allowed to intervene in the legal sphere of the individual is one of the classic dilemmas of governmental politics, and it becomes especially salient if this intervention truly means intervening in the citizen's bodily integrity. In the Austrian legal framework, which most participants, except for those directly affected, were unaware of, the removal of organs may take place after brain death, without prior consent by the deceased or his relatives. After the facilitator introduced this regulation in the group discussion, two opposing argumentative positions could be identified.

Some strongly supported this existing legal regulation, because they saw the state as acting rationally. In their narration, the state curtails the rights of the individual only for the sake of a collective value - which is seen as more important than the rights of a dead person: to maintain the transplantation system, which is saving the lives of many others. This discursive coupling of the autonomy of the state and its rationality can be seen in statements such as that of a young medical student commenting the Austrian objection solution:

> P5m: [...] that we are fortunately in a situation in Austria, where the law is actually very much based on reason in some way, even if this is explained in terms of history, and this was not a decision made by Austrians. [...] (Q3, OTaff: 75)[36][37]

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[36] Speaker codes for the „Challenges of Biomedicine" project consist of a unique speaker number (PX) and the sex of the participant: e.g. P11m stands for the male participant number 11. Focus Groups are identified as 'GT' for genetic testing or 'OT' for organ transplantation, and as 'aff' for the affected and 'lay' for the non-

Thus, even if it was not a democratic decision, it is legitimised by the virtue of its rationality and the effects it has. According to this conceptualisation, the current regulation follows a beneficial logic by rationally serving the collective needs of its citizens, even if they themselves would not know what the 'best' solution is. In this logic, the 'rational' regulation should be prioritised over the individual right to freely decide for oneself:

> P5m: [...] I also find, not only for one's personal decision but in respect to the decision of an entire state. I believe indeed, we are in the fortunate situation to also consider individual cases, e.g. if someone still decides against it, as we have many organs in Austria. But in respect to legislation and the general decision of a state I definitely believe that one should prioritise rational considerations over religious or any other notions. (Q4, OTaff: 175)

The Austrian state is portrayed as a legitimate political actor, a rational and 'caring' state that carries out regulatory practices that ensure a high donation rate and thus saves lives.

> On the other hand, some people were critical of the current regulative practice and questioned its legality, especially since to them it seemed to violate the fundamental civic right of self-determination. The current regulation was even termed as a "state of lawlessness" (Q5, P13f OTlay: 299) by one especially upset participant. This position is rooted in the conviction that it is legally wrong for a state to overrule the rights of a brain dead person, especially the right of corporal integrity, without having the prior consent of the respective person, as expressed in the following quote of a young bookseller from a lay focus group:

> P18f: The human being has indeed his own will and should decide during his lifetime what he would like to do thereafter. That the state is saying, if there is no response available, then we will remove the organs - I don't believe that this is right and also not ethical. Now he is assuming a position that he should not have. Because I believe, the state is not allowed to rule about the person. (Q6, OTlay: 139)

Further some argued that the lack of opportunity for individual choice was a fundamental

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affected group. The two lay focus groups on genetic testing are indicated as GtLay1 and GtLay2. The translations of the quotes into English were done by a native English speaker, though in a way which preserves as much as possible of the German word order. In the project, we have on purpose refrained from changing them into stylistically more correct English, because to do so in many instances would have meant to shift implicit and explicit meanings. The German original quotes may be found in the Annex labelled as Qx.

[37] Quotes are used for exemplifying my argument. If a number of quotes in a section are taken from one specific focus group and only a minor part from another, this does not necessarily mean that the argument was more strongly present in the former. It only means that the statements made in the former group concerning this issue were more 'quotable'.

problem of the current regulatory practice, and that any 'superior' altruistic logic building on this injustice could not be justified. The effectiveness of the regulation in 'saving lives' is not questioned; the central point of dissent is the moral legitimacy of the means used to achieve this goal, as expressed by a participant describing himself as an "active catholic":

> *P11m: He [the brain dead person, M.F.] still has his rights, his human rights. He still has his dignity, his human dignity and I cannot simply take it away from him, based only on the assumption: I could save another person with it. I cannot play off people against each other. (Q7, OTlay: 37)*

In this quote, the current regulation's implicit preference of a collectivistic logic to the individual right of self-determination is regarded as illegitimate. Thus the current governmental practice is perceived as a highly problematic act of paternalism that deliberately restricts the rights of the individual, rather than as an act of a 'caring state'. Nonetheless both conceptualisations – the caring and the paternalistic state – share a view of the Austrian state as the central political actor that should decide on and implement regulations to best serve the public need. The means by which this is accomplished are subject of conflict. It is the sovereign state towards which the individual citizen has to define its position, and law is the central form for negotiating the possibilities and limits of the state.

In addition to these discussions about the relationship of the individual citizen and the state, participants also discussed the relationship between the state and the public. In this discussion, both positions shared the perception that the exclusion of the public (by not being informed) plays a crucial role in the current regulative practice, as the lack of awareness of the public ensures high 'donation' rates. Those in favour of the government's policy discussed the lack of publicly available information as necessary protectionary measure to defend a rational governmental regulation against a public that is perceived as irrational and unable to understand the logic of the current regulation. For those opposed to the government's policy, this functional exclusion was regarded as simply an extension of governmental paternalism.

Governance

Thus, since the discussions and controversies within the groups were dominated by the conceptualization of the state as a dominant and central actor, the 'mode of ordering

organ transplantation' in Austria presumed by the participants resembles classical conceptions of government rather than new modes of governance. Focussing on the network character of governance though, traces of other actors active in the governance of organ transplantation in Austria become visible in the participants' narrations.

The scope of actors included in the debate was restricted to institutions close to the state or the health care system itself, such as self-help-groups or the medical profession. In contrast to the discussions on genetic testing, 'non-medical' actors such as players from the economy or the scientific community were not part of the network of governance referenced in the discussions. Also hardly any interests or rationales of their own were ascribed to the actors present in this network. Rather, they were seen as 'silent supporters' of the rationale of the current regulatory practice.

While the assumption of the existence of these silent supporters was implicitly shared in the group discussions, the positions taken by individual participants towards these actors depended on whether they accepted the legitimacy of the current regulation. For example, since the Austrian regulation depends on the diagnosis of brain death, participants opposing the current regulation questioned the latter's legitimacy as the only possible definition of death, as well as the authority of the medical profession to assert this diagnosis. One participant even argued that physicians are *"probably not able to deal with ethical questions"* (Q8, OTlay: 355) and thus should not be left the decision to determine death:

> P11m: *I don't want to leave this question up to physicians, because physicians unfortunately tend to reduce the human being to organs, this is simply in their professional routine. [...] (Q9, OTlay: 355)*

In this quote, the medical diagnosis is not a neutral arbiter capable of pronouncing when an individual is dead both physically and socially and therefore looses his or her personal rights. Rather, it is described as a rationale that supports the existing system. It is not capable of adding any legitimacy to a practice that is already seen as unjustified.

The public is the only actor present in the governance narratives on organ transplantation that is described as a qualitatively different type of silent supporter. It is conceptualised as silently supporting the system through the acceptance of its exclusion from it. The public thus becomes an actor in the governance of organ transplantation by being a "present absence" (Law 2004). Still, there was a strong notion especially among those in

favour of the current regulation that this absence and exclusion is not equal to being powerless. In a sense, the power of the system depends on the 'discretion' of this seemingly powerless actor. This was very well expressed by a young woman who received a lung-transplant:

> P3f: I, as someone who is affected would not want it to change. Well, the system that has been built up, the transplant system seems to function very very well, particularly in Vienna,. [...] I would also worry - if that is discussed in public - that many people actually think about it and rather register themselves really in the objection list; and that we then actually, just like it is in Germany, have to wait much longer for an organ. [...] I would rather fear, - precisely, as you have said - if people who are not very familiar with it, all of a sudden join in the discussion. And their thoughts appear to be rather emotional and not based on one's own experience and on being affected.
> (Q10, OTaff: 570)

In this quote, the public is attributed the power to change the system, but for the worse in the eyes of this participant. If this 'sleeping giant' awoke and became aware of the current regulation, the regulation would likely have to be altered and the efficiency of the system would be diminished. In this storyline, the state is no longer absolutely sovereign, but is sovereign only on the condition of the public's silence.

My colleagues and I have termed this model of governance described in the discussions on organ transplantation a 'governance of discretion'. Discretion in this case carries a double meaning. On the one hand, a 'governance of discretion' denotes a system in which most actions are at the discretion of a central actor, referred to in the literature as "discretionary governance" (Hagendijk & Irwin 2006). Hence this model of governance is strongly related to the concept of government. On the other hand this governmental structure can also be thought of as conditionally sovereign, its sovereignty and success being dependent on the discretion and silence of the seemingly most powerless actor – the public.

In summary, only a few traces of 'governance' are visible in the discussions on organ transplantation, even though the role of the public may be seen as an important element from a governance perspective. Organ transplantation was seen as a stable, centralised system whose elements are clearly identifiable by both the participants opposing and those supporting the current regulation. The question whether the Austrian state as the central actor is capable of ordering and regulating the way organ transplantation is done in Austria was not broached, even though the government may be dependent on the

public's discretion. Possible issues of misuse or deviant behaviour within the system such as organ trade or corruption were hardly mentioned at all, or discursively located 'elsewhere' (in China, for example). It was the means by which this ordering is done - by keeping large parts of the public uninformed and taking organs without prior consent - that were subject to intense controversy.

Public Participation

Towards the end of the focus group discussions, participants were asked explicitly about the possibilities and limits for public participation in the respective fields. This discussion very much reflected the implicit models of government and governance that have been implicitly deployed previously. Reflections on the chances and limits of public participation often nearly took the form of 'conclusions' to be drawn based on visions of governance and government. As I have argued above, it is the public's unawareness about the current regulation and the fact that it is kept uninformed by the dominant actors in the system that ensures the smooth running and success of the 'Austrian approach' to organ transplantation. This was consensual among virtually all focus group participants.

Thus, introducing the possibility of public participation as a thought experiment was slightly provocative. The sovereign space of action reserved for the Austrian state in this system was assumed to be dependent on the public's exclusion, and so participatory procedures were seen as holding a potential to endanger the existing social order. This was a shared notion within all groups, but since the legitimacy of the present regulation was controversial so was the question whether this change would be desirable.

Those participants defending the current system and its 'superior' rationality mainly see public participation as 'unnecessary', as the current regulation is fully satisfactory. This view was expressed by a medical student who was generally in favour of the consensus conference model, but argued differently for the particular case of organ transplantation:

> P5m: [...] And I believe the model is very, very reasonable. I only believe that for organ transplantation this is actually not necessary for the moment, as we have a law that actually everyone is somehow very satisfied with, yes. And if this should not be the case anymore, then this will probably be brought up within the political discussion, and then this entire democratic decision procedure is getting off the ground and there are elections, and so forth, but for the moment, I don't believe this is actually necessary, yes, to question anything. (Q11, OTaff: 568)

Questioning the current regulation through public participation is thus seen as

unnecessary by those in favour, and it is also seen as potentially dangerous. This view was especially strong among the affected participants arguing that participation and discussion should be restricted to those who are either affected and therefore 'know the system' or to experts such as physicians or scientists. The wider public was described as either being too emotional or too uninformed to join the discussion.

This position is strongly opposed by those questioning the legitimacy of the current regulation. In their line of argumentation, the success of the system may not be used as an argument to cancel what is seen as a basic right and a basic feature of a democratic society: that important regulatory issues should be discussed in public and that this discussion should be taken into account in making political decisions. The following exchange between two participants from the lay group exemplifies this:

> *P15m: [Discussion on regulating organ removal in the hospital] You cannot always sort out this by way of popular discussion with the public, because people have very weird thoughts. Let's ask the people first e.g., if genetically unaltered tomatoes do still contain genes. 35% of all people will say: Organic tomatoes don't have genes. People are simply not...*
>
> *P11m: The question is not, whether people are so ignorant or have different opinions, but that is a removal of organs, it is a political decision. And with such an important question it should be found by way of a public discussion and, I believe, not hidden in a chamber. (Q12, OTlay: 385)*

Regardless of whether this was seen as positive or negative, public participation was in any case ascribed quite some potential to endanger the existing order of things, and to cause quite some trouble for the strong state.

11.4 Government, Governance and Public Participation in Focus Groups on Genetic Testing

Government

While the group discussions on organ transplantation conceptualized the state as a central and sovereign actor, the perceptions of classical government structures voiced by the discussants on genetic testing could not be more different.

Often, the 'state' as an actor was completely absent from the discussions. The term 'state' was not mentioned a single time in each of the three focus groups; the participants used terms such as 'politics' or 'the politicians' when referring to the actors of classical government. However the term 'politics' was far from being a mere synonym for the

'state' as it was used in the discussions on organ transplantation since it carried very different connotations. 'Politics' was rarely used to denote an entity capable of acting independently and according to its own rationale. Instead, 'politics' or 'the politicians' were mainly understood as actors who are driven by other actors' intentions and expectations, and can only be understood when considering the interests and logics of these other actors.

For example, a key problem anticipated in all groups on genetic testing was the possibility for discrimination on the basis of genetic information. When the facilitator asked the affected focus group how this problem could be prevented, the participants identified governmental actors as carrying the responsibility to solve this problem:

> P19m: This is a sensitive topic and it can only be solved by politics. And it will for sure not be solved in our favour. [P25f+P20m simultaneously]
> P25f: Laws could be... [simultaneously]
> P20m: We won't be able to influence that. Only during elections and they don't do what we want anyway. [simultaneously]
> P24m: Politics is shaped by economic interests, not by an interest in the human being. (Q13, GTaff: 652)

Politics, in this quote and in many other discussions, is not an actor that follows its own rationale and makes autonomous decisions. Instead, it is constantly shaped and influenced by other actors, but not necessarily in the interest of ordinary citizens. Its capacity to solve problems exists only on the surface, on a merely symbolic level. This capacity to solve problems is seen as jeopardized because governmental sovereignty and authority has been undermined by a plethora of different, in many cases labelled as economic, interests. The state as regulatory actor is perceived as a sham king, a puppet dancing on the strings pulled and to a tune played by other actors.

Thus, government is conceptualised as weak, and this weakness extends to its ability to effectively exert regulatory power. The state will not be able to legally prevent genetic discrimination. This assertion was mostly based on personal experiences cited by the participants such as the state's inability to prevent other kinds of structural discrimination on the labour market. Participants in the lay groups pointed to the state's inability to prevent gender related discrimination, while the affected people drew analogies with the ineffectiveness and partially even counter-effectiveness of current disability regulations, as one senior representative of a cancer self-help group did:

P19m: [...] Because a future employer isn't very likely to hire you if you are disabled up to 80%. Even if you couldn't tell just by your look. And it is the same with genetic testing. (Q14, GTaff: 105)

Contrary to the conceptualisations of government present in the organ transplantation discussions, laws and basic rights were not perceived to be strong enough to protect individual interests. Instead, governmental regulation was seen as weak and hardly able to make a meaningful difference in practice.

This described weakness of government and politics also affects the relationship between the individual and society. While in the discussions on organ transplantation the strong state was described as reducing individual agency and responsibility in favour of a collective solidarity, the opposite is the case for the state in the genetic testing focus groups. Here, responsibility is 'sourced out' from the state to the individual citizen. In genetic testing, the individual becomes responsible for 'knowing his/her genetic future' and acting accordingly to prevent illnesses and costs that may arise for society. This was expressed in the following exchange between a general practitioner and a representative of a self-help-group:

P21f: It is already here. Acceptance for one's own decision is not given in society. [...]. It is my own fault if I don't make use of tests. If I make use of tests, then I will have problems with my private insurance or with a loan that I want to get from the bank. [...]
P19m: It's also the following: [simultaneously] last year on the occasion of a 10-year-anniversary of cancer aid Vienna, Mrs. Federal Minister stood on stage saying: Cancer is preventable. [Some are laughing.] And this is the next step: it is your own fault.
P21f: It's your own fault, why didn't you prevent it?
P19m: And that's a very dangerous statement. (Q15, GTaff: 157)

The perceived pressure to know one's genetic identity and to responsibly act on the basis of this knowledge was also seen as part of a shift in the equilibrium of rights and obligations between the sick individual and society. Instead of illness (and similarly disability) being an 'accident' for which the individual is not responsible, illness is increasingly seen as the result of personal negligence and irresponsibility.

While there was consensus concerning the diagnosis that responsibility is outsourced to the individual, there was no agreement on whether this should be seen merely as a burden or also as an opportunity, both in terms of improving the individual health status, but also of contributing to a responsible dealing with a health care system under financial

pressure. In the narrative of the few speakers supporting the 'opportunity' position, the individual citizen is expected to take responsibility to compensate for the lack of agency of a weak and multiply undermined government. A senior citizen affected by prostate cancer expressed this by stating:

> P20m: [...] Well, I believe it is also a responsibility towards the health care system, because the sooner the treatment is begun, the cheaper it is most likely. [...]
> (Q16, GTaff: 99)

Governance

Thus, in contrast to the conceptualisation of government in the groups on organ transplantation, hardly any traces of government as a mode of ordering were found in the focus groups on genetic testing. Far from being a central actor, the state was conceptualised as just one of a number of players active in shaping genetic testing and its implementation in society. A number of other actors, such as the pharmaceutical industry, insurance companies, employers, patent holders and scientists compete with government in the control of genetic testing. The governance model implicit in the discussions on genetic testing is not an ordered and stable network with clearly discernible actors, but is rather described by the participants as a chaotic and fluid system where each of the actors is trying to enrol others, as well as the technology itself, into its own rationale in order to serve its interests.

> P33m: I ask myself what is behind these genetic tests, because, well, I wouldn't put that past anyone, neither the pharmaceutical industry nor some physicians that the only intention to develop and manufacture genetic tests in the first place, is altruism or any other idealistic good. [...] But I suspect tangible material and economic interests. And I ask myself whether that's to be desired? Whether that is to be desired that a society invests funds by public and private organs so that a handful of elite scientists are able to make a name for themselves, are awarded Nobel prizes or any other thing and a few corporations make profit. [...] (Q17, GTLay1: 769)

In this quote, the participant describes two main actors as controlling the development of genetic testing and its implementation in society. Both of these actors, 'corporations' and 'elite scientists', are not interested in the collective good but are serving their own interests by seeking to increase their profit or personal reputation. Generally in the focus groups, while a number of different actors and motivations can be discerned, economic motivations are the most frequently cited. The perceived strength of economic actors and

their role in governing genetic testing also is cited as a reason to doubt the state's capacity to act in regulating the protection of genetic data.

The dominance of an economic rationale was predominately (but not exclusively) conceptualised as negative. Responding to this widely shared critical perception, a single participant, who advocated a 'liberal' position concerning the outsourcing of responsibility from the state to the individual, countered that economic interests are not necessarily negative:

> P26m: I believe - because you have addressed the pharmaceutical industry - well they actually want to make profit with it. Well, I still have a little of a rural influence, and I don't know any farmer, who would do his job based on altruism, but he wants to live of it and that's his right. And the pharmaceutical industry. Well I don't want to somehow defame them more than they are. And on the other hand I am grateful to everyone, who gives me the opportunity [...] to decide beforehand. I don't have to do it, but today, thank God, we are able to choose between many options of treatment. [...] (Q18, GtLay2: 791)

In this excerpt, the speaker views profit as a reasonable motivation for pharmaceutical companies, no less than for farmers and other economic actors. This participant also strongly separates between the context of the production of a technology – in this case driven by interest – and its use, which here is simply portrayed as offering him more options.

As in the case of organ transplantation, participants' views of governance imply that the public holds an important but special position in a fluid and rapidly changing system: the public is an important ally for corporate actors and scientists, as a minimum of tacit public approval and consumer support is necessary to further their interests. Though viewed as an important actor, the public was treated differently than the other actors involved: the public did not follow its own interests or try to enrol other actors; rather, public opinion was easily manipulated and highly malleable:

> P39m: It is indeed important how such an [public, M.F.] opinion arises. It's pretty clear, if a firm invests billions in producing such a test, it will also make sure that the public will have the opinion that that's a good thing. They will do advertisements; they will order studies that prove without any doubt, that it is good for us. As they are expecting profit, one can't even imagine, how much return something like that brings. There are opinion leaders and all of us are all depending; I mean we are influenced from

different sides. And no matter how educated you are, I mean, we are all influenced from the outside. (Q19, GtLay2: 1159)

In summary, the governance of genetic testing was presented in our focus groups as a confused system of multiple actors that was difficult for the participants to comprehend. Given this confusion and the assumption that the development of genetic testing is driven by obscure economic interests, the risks, dangers, and possible misuses of the technology seem to be more difficult to predict, monitor and regulate than in the case of organ transplantation. The complexity of the system is not the only reason for this, however: the diagnosis is also strongly related to a perception of genetic testing as a technology, which is in itself very fluid and difficult to grasp. It could be argued that this is because it is a new technology in the process of being implemented in society, while organ transplantation is more established. However, the participants often cited the fact that the technology produces data that can travel quickly and may be copied and turn up in unexpected places as reasons for the complexity of genetic testing. This danger was often related through telling small anecdotes or jokes:

P33m: Well, I don't know what happens with such data. I am worried enough, when I think my preventive check up could lead to some data ending up at the health insurance agency, even though I don't really want that. And if some, I don't know, some clerical assistant will get my files by chance thinking: Oh my God, he lives next to me or...

P27f: What, he wants to marry my daughter and is affected by that? [laughing] Coincidences have always occurred. (Q20, GTLay1: 935)

Thus, while organ transplantation was described as an ordered socio-technical system, genetic testing was conceptualised and discussed as a complicated, confusing and difficult to localise system associated with high levels of social and technical uncertainty.

Public Participation

While the groups that discussed organ transplantation viewed public participation as having potential for changing the current system, the groups on genetic testing expressed nearly the opposite opinion. They saw public participation as futile in a system where the power of central political actors is extremely reduced and other actors have taken up the main roles. While the participants generally advocated public participation in governance, they also agreed that the voice of the public would remain largely unheard given the

chaotic nature of the current socio-technical system and the limited role that politics plays in it. Interestingly, though the discussants bemoaned the loss of classical participation mechanisms, they did not take up the idea that there might be other political mechanisms, such as consumer protests. Instead of envisioning other 'uninvited' forms for voicing public opinion, they seemed nostalgically to long for a strong state that would 'listen' to the voice of the public.

Furthermore, they viewed public participation as futile, not only because it had lost its main addressee, but also because the basic democratic rationale underlying the idea of public participation seemed to have lost importance as compared with other competing rationales. They portrayed economic interests and rationales as largely displacing political considerations. This was exemplified by a discussion of ethics commissions in a lay focus group. In the discussion, ethics commissions were considered to be an important deliberative forum by the participants, which could include actors representing different groups and sectors of society. When the discussion turned to how a decision might be produced in such a setting, a retired person, using the dissent in the focus groups as her point of reference, questioned whether it would be possible to formulate a consensual statement.

> P27f: Will it be done democratically? [by voting, M.F.] There are six who are saying: yes, now everyone has to get genetic testing – and for two it is too much to ask for; or how will that take place?
> P30f: There will be an economic consensus.
> [...]
> P27f: Yes, exactly, there will be economic experts, economic lobbyists are very competent within the EU. (Q21, GtLay1: 1185)

In this exchange, a democratic decision making mechanism is presented as inherently weaker than a 'consensus' enforced by an economic rationale.

The participants also related to their conceptualisation of the public as a highly malleable actor in their assessment of the feasibility of public participation. They suggested that the public's opinion may easily be shaped, even manipulated, by other actors. Participation was not only seen as futile, but even as a "waste of money" because it was thought to be a sham and a mere enactment of other more powerful actors' interests:

> P30f: And, I mean, we all know ourselves, if surveys are conducted how it is dealt with it. They are initiated with a lot of money, conducted and pocketed – it will indeed, it will not even be ignored. [some are laughing]

P26m: [...] The information that I am provided with shapes my opinion, because I am no specialist or because I am not an expert. And therefore I am incredibly easy to be manipulated . [...]. And those are stories, where I am saying: If we allow for a broad public to have a say, and then they may be manipulated again with a lot of money [...] – it is actually wasted money. (Q22, GtLay1: 1161)

Some focus group members viewed public participation not only as futile, but also as potentially dangerous, since it would lend legitimacy to the non-democratic interests that manipulated it.

11.5 Different Technologies, Different Visions of Governance. A Discussion of the Focus Groups on Organ Transplantation and Post-natal Genetic Testing

The findings described in the preceding chapters show that even in focus group discussions without any kind of prior input, citizens developed quite complex lay political theories and concepts of the role of government in the respective technological setting, the networks of governance associated with it, and which role public participation might play in it. However, it is important to note that for the two technologies that have been discussed, these assessments could hardly be more different.

Indeed, the difference between the two technological settings is much larger than the difference between affected and laypeople in one technological setting. For both technologies, affected and laypeople did share a set of common basic assumptions on the nature of governance, which was in complete contrast to those shared by the discussants for the other technology. For example, the affected and lay groups on organ transplantation were very different concerning their normative assessment of the role of the state in the governance of organ transplantation, but they shared the assumption of the state as a strong central actor. This differed completely from both affected and lay groups on genetic testing, where the state was assigned only a minor role. Thus the technology discussed made much more difference than whether one is affected by it. This is surprising in so far as many central arguments in STS assume that the individual situated perspective is one of the strongest structuring elements in building a position towards a technology, and respectively one would expect, also towards its governance. Our data much more support the hypothesis that the specific features of the technologies and participants' perceptions of them seemed to play an important role in developing visions of government, governance, and public participation.

Concerning organ transplantation, participants drew on a widely disseminated story of success and progress combined with a dominant role for the state. It was conceptualised as a system based on solidarity and a culture of exchange, with clearly discernible actors and structures. Potential risks such as organ trade were seen as manageable by governmental regulation. The state was seen as a necessary central actor in order to assure the future of this field, even though criticism was raised particularly by the non-affected participants with regard to the means by which this was accomplished. Still,

there was no fundamental doubt that the field as such was working well and should continue to do so. From a governance perspective, the focus groups on organ transplantation showed strong awareness that the current system is dependent on the discretion and 'silent support' of an excluded public. A change in public participation – shifting the public from the role of a silent supporter to a more active one – might thus endanger the organization of organ transplantation in the Austrian context, which was seen as unwanted even by those critical of the means of the current regulation.

Concerning genetic testing the discussion dynamics were quite different. Narratives on this technology were mainly built around problem-accounts and much less on clear success stories. Genetic testing was linked to monetary interests, potential discrimination, unclear power structures, and unknown dangers. The socio-technical system was described as complex and difficult to grasp. Even the affected people, who in part stressed the usefulness and importance of tests, often accompanied their statements by some criticism and doubts concerning the consequences of this new type of knowledge. The state was virtually absent in the debate and could best be described as weak and steered by a changing set of actors who were mainly driven by economic interests. Thus, the dominant model of governance was based on the co-existence of competing rationales, with political logics being only marginal. Hopes for public participation were thought to be illusory, in the sense that there would be little potential impact without a central powerful political actor to be addressed. Democratic participatory structures were seen as a weak counterpart to single powerful economic players, and participants feared that participatory structures might even be described as lending the legitimacy of democratic procedures to the vested interests of these actors who might 'manipulate' the public.

It is interesting to relate these differences to the participants' perception of the respective technology. Organ transplantation, as an established technology, was seen as a technological system built around a set of values such as solidarity, which no one questioned. Also none of the actors described in the network of governance was seen as not supporting this value system. The state was seen as the institution safeguarding these values, and thus partially even granted the right to curtail other rights for their sake. Possible negative developments within the system were mostly conceptualised as misuse, which means a violation of this value code, for example by organ trade. But as all actors in

the system were trusted to adhere to the basic values, the state was seen as able to prevent this abuse and it was mostly located 'elsewhere'. That the technology itself might develop in any unexpected direction which would raise issues of governance not covered or even violating the established value system was not an issue of discussion.

For genetic testing on the other hand, it was quite unclear and highly controversial which values this technology is based on or would try to realise in society. It was even seen as eroding certain values such as solidarity. Different actors were ascribed quite heterogeneous interests in fostering the development of the technology, none of which was to serve 'the common good', as is implied in the idea of organ transplantation as built on and putting in place a logic of solidarity. Also the technology itself, as a far more recent development than organ transplantation, was ascribed more potential to develop in unexpected directions and to raise new challenges to its governance, such as concerning the selection and improvement of humans. Thus it might be argued, while the technology itself was seen as much more intertwined with societal actors and interests than was the case for organ transplantation, at the same time the question how public participation might intervene into this quite chaotic process of negotiating the relation between the technology and societal values remained unanswered for genetic testing. While it seemed quite clear in the discussions that the way the technology is shaping medical realities as well as how it will develop further is a question deeply influenced by social factors, how to establish a framework in which these factors might be considered was completely unclear. Hence, the political issues and questions around this technology seemed far less closed and "naturalized" (Akrich 1992) than was the case for organ transplantation. However, participants seemed to lack any vision of a political process in which these issues might be addressed.

12 'Basic Research' at the Round Table: Political Issues, Boundary Work and Visions of Governance and Participation

In this chapter, I will analyse the bottom-up perspectives on governance and public engagement the participants of the Round Tables of the "Let's talk about GOLD!" project voiced. However, as was argued in chapter 10, the conceptual contextualisation of these perspectives will be broader than for the focus groups analysed in the preceding chapter. Besides perspectives on government, governance and public participation, I will also trace the models of science in its relation to society used by the participants in the discussion. The reason for doing so is the assumption that how science as a social and epistemic enterprise is positioned in relation to society is a crucial background for developing positions on governance and public participation.

For this chapter, the term "participant" clearly is in need of some further explanation. While for most discussions on public engagement, as well as in my prior empirical setting, terms such as the "the participants" or "the citizens" clearly referred to lay people only, this does not hold for a setting such as the Round Table. Following our argument for symmetry between lay people and scientists[38], in this chapter I will equally treat the scientists as participants (and citizens) and trace also their bottom-up perspectives on governance and public participation. Of course, I will continually comment on the differences between lay people and scientists – and as will become clear, this very difference in fact is crucial for grasping the discussion dynamics.

After a short introduction of the discussed genome research project in the remaining part of this introductory chapter, in analogy to the preceding section, chapter 12.1 will deal with the political dimensions and hence the issue to be governed participants identified. For the Round Table case at hand however, I will do so in slightly more detail because this question is of special relevance in an upstream setting in which there are hardly any societal discussions to refer to in building one's position. Hence, which issues are at all identified as amenable to political discussion, governance, and ultimately maybe public participation is a crucial analytical question in itself. In chapter 12.2, I will then trace how models of science in its relation to society were employed in the Round Table discussions. The main argument this chapter prepares will be that boundary work efforts building on

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[38] See chapter 10.2

such models were crucial in building arguments why certain forms of governance were sensible and trustworthy, or futile, respectively. Then in symmetry to my analysis of the focus groups, I will discuss the perspectives on government participants voiced in chapter 12.3. The arguments made in this context may teach us as much about the meaning of government in an upstream context as about which challenges participants saw as crucial to be met in an upstream governance of basic research. In chapter 12.4, perceptions of governance will be described. This section will also touch on an aspect of governance that was not mentioned for the focus groups analysed in chapter 11: the self-governance of science. Finally, in chapter 12.5, again perceptions of public participation will be discussed and related to the bottom-up visions of governance described before.

For the "Let's Talk about GOLD!" project, we deliberately chose a setting, which was as upstream as possible in the sense that it is a basic research project whose goals do not include the development of any imminent applications. However, to allow for a discussion and also to give the laypeople some ground on which they could construct any relevance and were able to discuss possible ethical and social dimensions, it was important to choose a project, which expresses a vision concerning the long-term aims of the knowledge it produces. For the accompanied project, this was clearly the case.

As the project description states:

> "In the western world obesity, non-insulin-dependent diabetes mellitus and cardiovascular diseases are epidemic. [...] [M]ore than 50% of the population is overweight, and throughout the world about twice as many people die from cardiovascular diseases such as heart attack and stroke as die from cancer. Among other factors, one underlying cause of all the above-mentioned diseases is dyslipidosis (disruption of fat metabolism). The goal of this project is to discover and explain the function of each gene and protein involved in the process of uptake, storage and mobilization of lipids (fats) by cells." [39]

The project thus deals with a topic that seems to touch (at least potentially) a very large segment of the population and thus participants could rather easily build very concrete connections to their every-day situation. The different imaginable contexts of application range from treating a quite clearly defined disease, diabetes, to the general public health problem of obesity, and might possibly even be extended to developing 'life style drugs'.

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[39] www.gen-au.at, accessed 03.10.2004

Thus the project related to the wider discussions on the 'shaping' of bodies and the transformation of social issues, in the present case of the link between individual life style, weight problems and cardiovascular diseases, to medical problems defined in terms of genetic defects. The project hence touches upon basic normative concepts of health, illness and the body and therefore may be situated in the discussion about biomedicalisation touched on in the introduction to this thesis. Indeed, questions such as how existing identities will be transformed, and which new identities may be created by the knowledge produced within the project were at the centre of the discussions about government, governance and public participation at the Round Table.

12.1 Issues to be Governed: What is a 'Political' Question Around Basic Genome Research?

Which political questions and challenges to governance did our participants identify in the discussions? To answer this question, a definition of what precisely a political question is, is needed. A convenient way to solve this issue would be to resort to the in-vivo codes of our participants, to the issues they themselves labelled as political. By doing so in the concrete case, however, one would miss many controversial aspects of the discussion, which are of direct relevance to the topic of governance. A main reason for this is that especially the laypeople generally avoided labelling the issues they would open up and the concerns they phrased concerning the present scientists and their work. Labelling an issue as a "political", "ethical" or even "legal" question meant not only to open up this issue, but to associate it with a framework of actors by whom and by whose rationale these questions are to be discussed and taken care of. For example, if the limits of animal experimentation are labelled as an ethical question, then in our setting this would mean for many participants, and especially for the participating scientists, that it is the task and responsibility of professional ethicists or ethics committees to discuss, decide and advise on these issues. To open up a certain issue in a labelled form thus also often meant to simultaneously close it down and to displace it to an institutional context beyond the concrete setting (Felt et al. in press b). Politics in this respect was not a much less 'dangerous' label than ethics.

However, participants and especially the laypeople did open up a number of issues which for them seemed crucial to consider, and where they saw potential present and future problems which should be addressed. A first important feature of these problems is that they were concerned with contingency. The discussion on these issues opened up that

things might be otherwise concerning a certain question, and it often was the starting point for an exchange on which of the possibilities discussed is to be preferred. This might concern present practices and whether they might be replaced by others, such as in the case of animal experimentation and "alternative methods", as well as imaginations of possible future effects and applications of the genomic knowledge produced. A second important criterion for what I will label a political discussion is that the debate of these contingencies was structured by a reference either to values assumed to be collective and/or by reference to constellations of power within society. If the argument raised is that research rather will benefit those in the first world than those in developing countries, then the difference in power between those two spheres is weighted against a certain imagination of equality as a societal value – that everyone should equally benefit from the products of scientific research.

Essentially the political issues touched upon in the discussions may be divided in two groups, which also were treated very differently. On the one hand, there was a discussion on the means by which knowledge is generated both within the concrete project at hand, as well as in genome research in general. This discussion touches upon both the issue of research ethics, as well as on the governance and legal regulation of practices in the biosciences. On the other hand, the knowledge produced, how it enters society, which effects it might have and who might take responsibility in governing these processes was a major topic.

The means of producing knowledge

Concerning the means by which research is done, animal experimentation was the major issue discussed. Most of the research groups involved in the genome research project, as well as many of especially the junior researchers present, were working with mice. This essentially means to breed, genetically modify and in the end to kill or "sacrifice" the animals. Whether this is permissible and morally legitimate, and if so to which extent and for which ends, was a burning issue to many discussants, as the following quote exemplifies.

> *L13m: I find it quite hard to justify basic research in that respect for only the end of quenching the human thirst for knowledge. I would personally find it hard to justify the killing of animals as a means for the basic need to know more. Out of a superficial*

egoism so to say, because it might not be of any fundamental importance whatsoever, but I just do it out of curiosity. (Q23, RT5/4/313)[40]

We could observe that even though it obviously was an issue for many people, this topic was hardly opened in the plenary discussions. It was present in small group discussions where scientists and laypeople were separated, as well as in the interviews before and after the Round Tables. In the plenary discussions, this topic was only touched upon with great care and partial uneasiness, as any provocative statement on these issues would have meant a direct attack on the participating scientists and thus would have endangered the social setting.

However, the topic clearly was a "present absence" (Law 2004) at the Round Tables in the sense that virtually everyone knew it was there, and it was often negotiated in proxy discussions. One such proxy discussion was whether the laypeople would be allowed to see the mice-stables or not. At first the scientists had argued this to be impossible due to legal issues and the possible health hazard for the laboratory animals which would be induced by a large group of people walking through. Further they stressed that there would not be much to see anyway and that the laypeople probably would not want to go there if they knew how badly it smells. This argumentation caused mistrust among the laypeople, as well as a number of imaginations what actually may be hidden "in the cellar". However, after they had finally been allowed to see part of the mice stables and after they had had a discussion with a scientist working very closely with these mice, for many the issue seemed to be closed on a first level, even though they would continue wondering whether there might not be alternative methods to replace animal experimentation.

Analysing our ex post interviews, it might be argued that this closure is strongly related to the establishment of trust in the individuals carrying out the experimentation. This trust was very much grounded on the scientists' performance of emotions and of suffering involved in having to kill and hurt the mice, which was perceived as a sign of reflexivity and ethical conscience. Generally this issue was mostly discussed in relation to the concrete project, and not for genomics in general. The only issue to which this observation does not apply is the question which kinds of animals may be used for

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[40] For the „Let's talk about GOLD!" project, speaker codes consist of the following elements: *L* or *S* indicates layperson or scientist, the number is to identify the speaker, and *m* or *f* stands for male or female. The second code indicates the source of the quote: AI for ex ante interview, RTx/x/x for Round Table Number x,/number of the discussion section/line of the ATLAS-TI printout and PI for ex post interview. All quotes have been translated by the author, and the original German quotes are to be found in the Annex.

research and which not. This discussion very much met the interest of the participating scientists, and it allowed them to present themselves as ethical individuals by arguing that they would not do experiments on primates, dogs or hedgehogs. Beyond this, however, the general topic of which means may be used in research did not feed into any broader discussions on the governance of science.

The relation of knowledge and societal values

The second major topic around which issues of governance were discussed was the knowledge (to be) produced and its relation to societal values. In the presentations of their project, as well as in the discussion, researchers would often refer to the "epidemic" increase of obesity and diabetes type 2 in the western world as an argument for the wider relevance of their research. And they were posing this "epidemic" as a problem, which may best or even only be solved by genetic research, as other attempts such as inducing life-style changes would obviously fail.

> S6f: The problem we are working on is the new plague - that is obesity [...] – which is a very complex disease. [...] The main cause of course are changes in lifestyle [...] and there are of course a number of possibilities to solve that. The simplest one would be to go to the gym [...] and eat a bit less – an apple a day. [...] But obviously that does not work in the long run. It would be the best and most healthy thing, and most of all the cheapest – but still it does not work. Which means that there must be other possibilities [to address the issue, M.F.] (Q24, RT1/2/14)

For the laypeople, this did open up the question how society defines and "handles" the problem of obesity at all, and which difference the knowledge produced within the project at hand might make for society. Two sides of this issue relevant for the topic of governance were discussed. On the one hand, it was asked which topics of research are at all taken up and chosen to be funded, and which are not. On the other hand, the impact the knowledge produced might have on society and who might take responsibility for it was a topic hotly debated.

While the scientists mostly argued that research would be funded due to its scientific excellence and that societal relevance was only an add-on-criterion, the dominant assertion among the lay participants was that research topics were chosen to be funded because of the perception of a societal problem, which is to be solved or at least addressed by the knowledge produced within the project. However, for the concrete case

at hand, it did not seem to be uncontroversial to at least some among the laypeople, that obesity was indeed a disease, and that it is to be addressed by biomedical means, or more concretely by the means of genome science:

> L4m: So on the one side there's your argument that it [causes, M.F.] the highest mortality rates in the world. On the other hand there are people who might say there's nothing worse than this hype about being young, about loosing weight and being slim. There are enormous amounts of guilt being asserted there, even though there may be no numbers to prove that. And there's also the saying that the fat ones are jovial people. [...] They don't want to lose weight at all. (Q25, RT1/2/379)

Seen in this framework, the decision to conceptualize a genome research project on obesity as well as to fund it becomes a political statement that potentially affects the identities and lifestyle choices of a very large number of people. And it becomes a political statement in the sense that the value assumptions, as well as the assumptions about society, it is based on become open to contestation. While the scientists would frame obesity as an enormous health problem with serious economic implications, some laypeople would disagree and, as in the quote above, argue that being overweight might as well be an expression of a certain lifestyle which would be discriminated against by framing it as a health problem. Declaring such large proportions of society to be ill would be an act of medicalisation, which in their line of argumentation should at least be open to a societal discussion and could not simply be done on the basis of medical 'facts'.

This discussion led to exchanges at the Round Table which were full of 'lay sociologist' arguments, in which each side of the controversy would try to mobilise "society" for their own argument, and to argue that "society" would support their perception of the problem. The scientists would argue that current society was characterised by a tension between a hedonistic fixation on consumption on the one hand and a desire to be slim on the other, as may be seen expressed on "every cover page" of popular magazines. Still, the diets offered in these magazines would obviously not lead to much success, and thus a solution by other means – genome research – might be needed. In this version of the story, it is society which has a need or problem which is taken up and addressed by research.

While in this line of argumentation as in many others, scientists would refer to "society" as a quite undifferentiated entity which produces problems or expresses needs to be addressed by science, the laypeople did in a number of instances also try to open up the question for whom precisely in this society knowledge will be produced. For instance, they argued that from their point of view a project doing research on lipid disorders, which

obviously is a big issue in the developed world and thus has a considerable economic potential, would be much more likely to be funded than a project trying to study the development of malaria and any possible countermeasures which might aid people in developing countries. Thus it is not only the question how the framing of research is done and how it defines 'the problems' of a society that was discussed as a political issue, but also who might benefit or even profit from the knowledge produced, and at whose costs. Especially economic actors and interests were often seen as driving forces in the background, also for the concrete project discussed, even though the laypeople who did suspect economic involvement would again not openly address this in the plenary, but only in discussions and interviews where the researchers were not present. In common discussions, this issue was opened up by referring to proxy issues, such as the malaria case described above.

The second political dimension of how research and the knowledge produced relates to societal values is which impacts the knowledge produced might have on society. For this issue, the notion of a "fat pill" quite quickly developed in the discussions as a metaphor for a technical fix for obesity, which might result from the knowledge produced within the genome research project. Even if the researchers would deny that they themselves would in any way be involved in the development of a medication against obesity, they would agree that the knowledge they produce might eventually be used for such an end. This opened the discussion how such a technological solution would affect society, and which changes it might mean for the individual. In the light of their critique of a medicalisation of obesity discussed above, some laypeople saw a danger that such a medical fix might increase the pressure on obese people to conform to implicit societal norms and might even lead to a compulsory use of this pill to save health care costs. Others would welcome such a medication as a solution also to their own weight problems, while a third group of laypeople would agree to the assertion that obesity should be reduced but asked whether this might not be achieved by other more "soft" and "humane" means. This mostly implied either social or psychological solutions such as education programmes on nutrition, diets or even a "fat tax" on food containing too much unhealthy fat. This third group would accept the definition of obesity as a societal problem, but they were critical of the technical biomedical solution offered by the results of genome research.

While they would disagree on whether the "fat pill" would be a good innovation or not, most laypeople did agree that the question who would take responsibility for the societal

consequences of the knowledge produced and how these consequences might be governed was an important issue. This was the topic relevant for governance, which was most often referred to in the discussions and which was mostly used as an example when talking about issues of governance in the concluding interviews. Thus, most of the discussions analysed in the following chapters will refer to the question which effects the knowledge produced might have on society and how, by whom and at which point in time the way any new knowledge potentially affecting society may be governed.

12.2 *Closing Down Political Issues at the Round Table. Boundary Work and Displacement Strategies*

In a setting whose goal is to discuss the social, ethical and also political dimensions of a concrete genome research project, albeit of course as an example for genomics in a wider sense, not every political issue raised may always be welcome to all participants, especially the scientists. Stating that a certain issue, be it the use of animals for experimentation or the impact of the knowledge produced for society, has a political dimension and should be subject to governance at the concrete moment in time and for the project discussed implies to re-define and very probably limit the scientists' authority to autonomously define their spaces of action. This certainly applies if other actors such as government, ethics commissions or even the public are called upon to become active in the governance of the issue in question.

Thus, we could observe that most discussions around political issues at the Round Table involved one side – mostly the laypeople – trying to open up a certain question, while another – mostly the scientists – tried to close it down by arguing that this question was not a political issue, at least not for them and at this point in time. They did so by either emphasizing certain properties of their own scientific work to argue that it at least for the concrete case was not an activity to be politically discussed or governed, or in certain cases by delegating and thus displacing the question to other existing institutional contexts such as governmental regulation.

In the following, I will discuss the former as "boundary work", referring to Thomas Gieryn's term (1995, 1999). I will argue that most of the processes of opening up and closing down political questions at the Round Table may be understood as such boundary work to protect the cognitive and social authority of the particular scientists present in particular, and of science in general. This simultaneously means to exclude other societal actors, and the laypeople present in particular, from the definition and discussion of these issues. The boundary work I will analyse mainly uses the distinction between basic laboratory science which is the 'hard epistemic core' only to be governed by science itself, and applied science, which is seen as in society and hence accessible to processes of external governance. This distinction is operationalised in the discussion by a densely connected network of arguments concerning the nature of the scientific inquiry, the relation between scientific facts and societal values, the spatial organisation of research, and most importantly its temporal dimension. I will discuss each of these in turn.

The nature of the scientific inquiry

Why should the science done in the discussed project not be subject to political discussion and possibly even governance efforts? The standard answer to this question given by the participating scientists was very often related to the nature of their scientific inquiry, more precisely that they were doing "basic research" and thus could not be held responsible for any effects the knowledge they produce might have on society. For example, at the fifth Round Table the invited ethicist asked the scientists to consider the possible ethical dimensions of their research as well as their responsibility for the knowledge produced. They were asked to do so in a peer group discussion, while the laypeople were working on similar questions on their own. In his introductory statement, the ethicist had claimed that actually any kind of research would be based on certain moral assumptions. This assertion as well as the working assignment given to them caused quite strong resistance among the scientists. In direct response to the ethicist, a scientist argued that these questions were of no relevance to them, as they were engaged in doing purely basic research.

> S7m: [...] but now you've made the same mistake again, which I already criticized in the beginning. You mistake basic research for application. Yes, yes, that's precisely what it is. [...] Basic research doesn't mean that there will be any outcome. If we find some gene, then we have really done nothing else but finding some gene; and it's a long way to anything else. (Q26, RT5/2/122)

In this quote, the responding scientist situates his own work in the realm of basic research, far from application. He does so by referring to an attribute of basic science which is connected to a basic assumption (or myth) on the nature of the scientific endeavour: That science is about "discovering" nature, or as he puts it, about simply finding things which are there. These things they find, the scientists would go on to argue, at first have no political qualities. Facts and artefacts in themselves have no politics. Accordingly, another scientist would use the examples of the car and the typewriter to make this point even more 'forcefully':

> S6f: The problem is, who says what's right and what's wrong? Are there things, which always are good or bad? A drug will always have side effects - is it bad because of that? Is driving a car bad because you could die doing it, or is it good because it takes you from A to B? [...] I can strike someone dead with a typewriter, does that mean I am not allowed to produce typewriters anymore? (Q27, RT5/2/15;45)

In her argument, objects a priori exist devoid of societal and political context, they may only acquire political qualities in their concrete context of application, such as when a typewriter is used as a weapon. The argument that the scientists would be merely producing 'pure facts', which are given in nature and thus do not a priori have any political attributes alludes to the separation between nature and society or nature and politics, which has been argued to be maybe one of the most fundamental cultural assumptions of modernity (Latour 1993). It thus might be hardly seen as surprising that many laypeople assumed this to be a very convincing argument, which they found very hard to counter on a general level, as the following quote from a concluding interview shows:

> L1m: Well, I think, what it's about, how shall I put it, the facts are actually there in some way, aren't they? I mean, they somehow all float around there, they are in us, and they [the scientists, M.F.] just find something. And considering this they probably could not accuse themselves to be doing something illegal, or something particularly negative, because it's there anyway, and they just discover it. (Q28, PI, 331)

In his argumentation, it is hard to claim any responsibility of the scientists towards society, as the scientists do not influence the shape of the facts they find. Nature is given before scientific inquiry and is only uncovered but in no way influenced by the basic scientist. Thus even the idea to govern this process already seems strange: What use might it be to govern the pure discovery of truth, if this discovery is completely untouched by societal interests? Would governing then be about banning the discovery of truth – and would such an activity not rather remind of the medieval inquisition than of a modern enlightened society?

The relation of facts and societal values

A further important dimension of the boundary work efforts to close possible political discussions at the Round Table hence was that basic science is only about facts, but that these facts are in no way related to societal values. The scientists would argue that basic science per se can not really follow any societal aims, as its success depends on nature. Much of scientific research would also be characterised by serendipity. Even many important discoveries would have been accidental and did not follow any prior planning or even societal interests, scientists would argue. As can be seen from the quote below, again from a concluding interview, a number of laypeople found this to be quite convincing.

L9m: The basic scientist first needs to say, what is all there, what does exist, and how does it look like? And how can one change it, and so on. That in my view is basic research. And he can't consider [...] any kind of goal. (Q29, RT7/1/284)

But what is the motivation driving the basic researcher, if it is completely devoid of any societal aims or influences? In this line of argumentation, it is purely the curiosity of the researchers which is driving research, a curiosity for discovering new facts which is taken to be a basic anthropological constant and which thus does not need any further legitimisation.

S7m: My personal approach to research is just curiosity. In the first place, I don't care at all what will be the result in the end. (Q30, RT1/3/373)

S8M: Research is primarily a cultural effort, similar to an artistic effort.
(Q31, RT1/3/377)
[...]
The goal of our research is not to have a product, I also don't feel as if the public had commissioned me to produce a product, but I feel commissioned to produce knowledge in the cultural effort science. And the larger and more important these knowledge outputs are, the more internationally visible they get, the more credit they will receive and the more I will feel my commission in producing a cultural output to be fulfilled. (Q31, RT3/2/875)

Especially the project leader of the genome research consortium would stress that in his vision, science should be seen as very similar to the arts - as a contribution to a wider notion of culture, which does not need any further legitimisation or connection to societal interests or values. For him, doing science as a contribution to culture implies doing it for its own sake, and according to the rules which science itself has autonomously defined. Any economic application, as the sale of a work of art, may be an interesting add-on, but could never be the reason the cultural artefact was produced for in the first place. Just as a work of art produced merely for the market could in his argumentation not be seen as real art, science only done for the sake of application for him is "bad science". Relating science to art, of course, is meant to call up associations of disinterestedness and autonomy.

While the laypeople found it quite hard to argue against this group of arguments for science in general, many of them would disagree with the diagnosis of a pure and disinterested science untouched by societal values for the particular project discussed.

Employing a specific vision of the temporal order of the innovation process, some would argue that while a phase of pure basic research would indeed exist, the project the present scientists were working on would already have left this phase. Others would claim that the vision of basic research they drew would be an illusion in the first place, as any research project would have to state at least some aims to be funded and thus could not be seen as just an unguided and disinterested discovery of nature. In any case, most laypeople had concluded from the way the scientists had presented their project that it was indeed following a clear aim: to produce a medication against obesity, even if they would argue it to be "merely basic science". The scientists' efforts to maintain the boundary between basic and applied science, and to position themselves on the 'basic side', was partially even implicitly classified as boundary work – and commented on with quite some irony in settings where the researchers were not present.

> L6m: Well, if my child would ask me, if I'm home tomorrow; and there would be five friends standing behind and giggling; and I say no, and then they are incredibly relieved; and when I ask them, why: "Just because, just wanted to know". Then I would find it hard to believe that they just wanted to know (laughs). Now, who is standing behind and hoping or not hoping for a patent, I cannot tell. Whether it is the researcher himself, who would rejoice, whether it is the project head whose aim it is to keep his project or his group alive, whether it is the research fund, or pharma companies [...] I can't tell. But it is so obvious, doing research in an area, which is only an issue in the Western world, and which makes enormous revenue in terms of medications. And then to say: "I just wanted to know". I can very hardly imagine that. (Q32, PI, 108)

Hence the laypeople mostly did not buy the boundary work argument that the science done in the discussed project really was a quest for discovering facts about nature, driven by pure curiosity and unfettered by societal interests. For them, the project in question already did quite strongly relate to societal values, as discussed in the last chapter, and was quite likely to have impacts on society, which would need to be governed or at least discussed. However, they found it quite hard to make this point in the discussions with the scientists, as these could draw on a broad repertoire of densely connected boundary work strategies with which they tried to uphold their image of science as an apolitical activity.

Within and outside the lab: Spatiality

As a further dimension of the boundary work described in this chapter, spatiality was mostly touched upon by drawing sharp distinctions between what one does within the

laboratory and what happens outside in "the real world".

> *S7m: As a researcher I strongly separate between the things I do in the laboratory, where I am forced by the law to let nothing escape; to take care that my mutants really stay in the lab. And as it is not able to do harm - I am in a very different position than a plant physiologist, who plants corn; or any company, whatever, which releases genetically modified potatoes, tomatoes or whatever on the open field [...]. But I as a natural, as a laboratory scientist, [...] I am in an entirely different position.*
> *(Q33, RT5/2/263)*

Relating to the distinction of basic/applied research the researcher quoted stresses that as a "laboratory scientist" he is not concerned by ethical considerations, because the laboratory is a closed space with impenetrable boundaries towards society. The epistemic culture of the biological laboratory is perceived as neutral, bare of any ethical and social dimensions, and its walls prevent the hybrids and mutants created within to enter society and thus acquire these dimensions. Any possible danger of genome research only starts if the laboratory and society intermix, or if any organisms from the lab escape. Therefore, societal, political, and ethical concerns may be kept out of the laboratory in order not to hinder the creation of pure, i.e., context-free, knowledge. As long as everything remains in the laboratory and one is just aiming at the creation of "pure knowledge", ethical concerns and political questions are thus either irrelevant or simply do not apply to his practice. Problems only arise for those researchers who cannot fully insulate their laboratory from its context, such as in the cited case of applied plant sciences.

Other than the arguments cited above, which mostly related to governing the impact of the knowledge produced on society, this line of argumentation was a means to close down the discussion of political questions related to the scientists' daily research practices and the means by which they did their research. This for example applies to the creation of mutant mice in the laboratory.

Between basic and applied science: Temporality

In the discussions, the boundary between basic and applied science, or between a phase in which science is and should be free of any political dimension and another phase when governing efforts should set in, was very often defined in temporal terms. In these discussions, the crucial issue concerning the question of governance mostly was at which point in time one may have enough knowledge about the possible properties and effects of the knowledge and artefacts produced by research, and also sufficient means to control

the trajectory this innovation will take as it enters society. Again, for the researchers it seemed clear that this point in time when the societal governance of scientific knowledge production should set in was "not now", but certainly later – more 'downstream'. For example, the laypeople would regularly question whether the generous funding of the project would not be due to the fact that it is in the area of obesity and lipid metabolism disorders. Thus, their argument would be, a certain vision of the ends of the knowledge produced would already be present from the very start of the project, opening possibilities for ethical and political discussion. In countering this argument, scientists could be quite creative in defining the political timelines of their research.

> S6f: [...] Within our research aims we have classified it like this: we have direct aims, which are ours in the laboratory. Our direct aim is to identify genes and to clarify metabolic pathways. [...]. Then there are indirect and long-term aims [...]. ... And the long-term aims would be to reduce obesity, to reduce arteriosclerosis, heart attacks, cancers and so forth. But these indirect and long-term aims are not our aims. These are only societal aims, which are realised by others – we do not do them ourselves. We cannot even do it. (Q34, RT5/2/314)

The distinctions the researcher makes in this quote simultaneously creates divisions of labour between basic and applied science, science and society and a temporal order of the innovation process to which these distinctions relate. The discovery of nature described above is separated from the application of this knowledge in society both temporally and in terms of the social actors connected to both actions. Since the researchers claim not to be involved in making their research usable for society - they even lack the abilities to do so – they also cannot take any responsibility for the consequences this process might have. To identify and govern these aims is the task of "society", at a later point in time. This argument was intrinsically connected to the assertion that even if they would like to do so, they could not take any responsibility because the future meanings and applications of their knowledge would be unforeseeable to them.

> S6f: And another issue, which struck me is [that the laypeople have claimed M.F.] that you cannot shirk responsibility, because you have to assess before what may happen later. That will work if I invent a slingshot, then it is foreseeable that if someone will be hit by a stone on the head, and he will die, or whatever. It becomes more difficult of course, if I, as in our case am investigating the metabolism. [...] Mr. Pasteur did not know when he discovered penicillin, discovered by chance, that there will be multiple

resistances resulting from that. [...] and at some point in time I will have a problem with that at the hospital, but it is still better to have an antibiotic with resistances than no antibiotic. [...] (Q35, RT5/2/25)

The argument she uses here makes an implicit reference to complexity. Taking the responsibility asked for by the laypeople is difficult, if not even impossible, because the properties and uses of the things discovered are uncertain. This is due to the fact that the science they are doing is dealing with complex things, compared to the slingshot which seems to have a quite straightforward and easy use. The discoverer of a thing such as penicillin in her argument might not be able to predict its future use, let alone any side effects that might arise from it. To make a similar point, examples from the history of science, in which clearly negative developments have sprung from basic science research, were often used in the discussion.

S6f: Where does one need to stop? So, Niels Bohr, the model of the atom, is he already [responsible, M.F.], because he should not have invented that? Or does it start only with the Manhattan-Project itself, where there's the application. Because they had the goal to build the atomic bomb, that was the aim. Is it then this application, where the "Stop!" is, or is it before? (Q36, RT5/2/192)

We may not conclusively tell whether the scientist would argue that the discoverer thus has no vision at all of the ends his or her discovery might have. Considering the many other narrations about heroic inventors and their dedication to humanity invoked at the Round Table this however seems improbable. Much more, she seems to be making an argument about the quality and certainty knowledge about the possible effects of a discovery needs to have in order to make it governable. One needs to know what the effects are in order to take any political action. In this argument, political action comes after the facts are established – and facts in this case does not only imply the knowledge produced by research but also the knowledge of the effects it will have on society. Thus, she temporally shifts the space for any governance of scientific knowledge downstream to a point in time when this knowledge has already been inscribed in society. The shaping of this knowledge itself has no political dimension, as knowledge is not shaped by the researchers, but only discovered.

Even more so, as not only the future negative but also the positive effects of any discovery or invention are uncertain, a too early and too rigid governance of scientific knowledge production might even prevent these benefits and hinder progress. Another researcher

compares the current technology assessment efforts around genomics to the development of the automobile, and guesses that similar scrutiny might even have prevented the establishment of the latter.

> *S4m: If all these criteria had been applied in the past, when the automobile was developed, well then we would walk by foot or have any other means of transportation, but not the car. Because as many people as have been killed by cars, this impact on air pollution, all these things; and we know that, and still we accept it, simply because it is necessary to move. (Q37, RT2/2/352)*

As the facts about the future impacts of the technology remain uncertain and cannot be known for sure, in the boundary work argumentation of the scientists the only form of governing intervention imaginable in an upstream setting is a complete ban of research on a certain topic. This in turn is set equal to a fundamental opposition to any kind of technological progress, as the positive sides of the respective development will also be banned.

> *S6f: Then I have to say, we keep the current state of technology, and we ban research and development in general; then I can be sure, that nowhere from any research output any negative effect will arise. […] That's the only possibility, how I can make sure that nothing bad will result from it; but, I also, there will also be no good results, but nothing new which is bad also. (Q38, RT5/2/29)*

As with the other dimensions of the scientists' boundary work to close down the discussion of political issues, the laypeople also found it very hard to counter this line of argumentation insulating science from society in temporal terms on a general level. However, for many laypeople a deep uneasiness remained about these arguments, because to them they seemed to be quite out of tune with the visions about addressing the "epidemic of obesity" the scientists also quite often expressed. This discrepancy was ambivalent to them, because they would assess the vision of the world drawn by the researchers in their boundary work strategies as something quite positive from a normative point of view. In the concluding interviews, some laypeople would even express a certain longing for a science, which would be about the pure discovery of truth without any 'pollution' by societal interests. However, given the many observations they had made in the discussions with the scientists, which did not fit this picture, they were not able to fully believe the 'fairy tale', as the following quote illustrates.

L10f: Someone who does externally funded research needs to say what he wants to do. […] So, that's all, in my opinion, a bit of an illusion, the way they [the scientists, M.F.] put it, that science is so free – and "we don't know what will be the result in the end." That's quite an illusion. That's how we would like it to be, but it's not how it is. (Q39, RT7/1/208)

Even if the laypeople accepted the two-phase basic/applied science model offered by the scientists, the most pressing question that remained unanswered to them was at which point in time one might know enough about possible consequences of the knowledge produced to enter a political discussion. To them, the historical evidence cited by the scientists could also be interpreted in a very different way. In the following quote, a lay person does not read the example of the atomic bomb in defence of Niels Bohr and basic science, but emphasizes the difficulty of finding the right point in time when dangerous developments might be addressed.

L9m: Well, as a negative argument we've had the atomic bomb. When they started doing atom research, nobody thought: "We'll make a bomb from this." And then at some point the bomb resulted from it. And then nobody said, well now would actually be the "Break-In-Point", as they say so beautifully, that's when it stops. And it will also not be the case with genomic research, that one stops at some point, before some things are done which one should not do, which are not acceptable ethically.
(Q40, RT5/2/65)

The imagination of a "point" in time when governing becomes possible confirms the cultural dominance of the two-phase model of basic and applied research also among the laypeople, and it expresses their longing for an instance in which governing the effects of genomic knowledge on society might become possible. At the same time however, the two-phase model did not hold this part of the promise for them, as they were implicitly aware that this 'point' is not much more than a theoretical construct which might only be recognized after it has already passed. Relating to the scientists' denial that they would be involved in the development of a 'fat pill', a lay person states:

L3f: And that's true. They aren't part of the pharmaceutical industry, which then produces the medication. At that point in time maybe one would expect them to start and think about it. But then it's more or less too late, when the product is in development and you start thinking how it will be actually applied. Then it actually already is in application, then it may not be regulated anymore. […] You only know that

it's too late when it's too late – and then the point in time which was just before is already past. (Q41, PI, 217;267)

This quote nicely illustrates the double-bind many laypeople felt to be in: as they could not counter the boundary work of the scientists, governing research in the phase of basic science seemed hardly possible for them. As soon as basic research turns into application though, the knowledge has already entered society, institutional commitments such as those assumed for industry in the quote are in place, and governing also becomes very difficult if not futile for reasons I will discuss in detail in the next chapter.

12.3 The Challenge of Governing Genomics – On the Strengths and Weaknesses of Government

This chapter will address how the most traditional mode of governing – government as top-down regulation by institutions of the state – was discussed. In doing so, my main argument will be that with very few topical exceptions, government was by most participants seen as ill equipped if not even incapable to meet the challenges a governance of (genome) science poses. On the one hand the arguments brought forward to ground this incapability will allow me to highlight what issues were seen as the main challenges in governing genomics and the knowledge it produces. On the other hand, the few issues where governmental regulation was perceived as trustworthy and effective will serve as an example to identify the boundary conditions producing such an assessment. I will start by lining out for which issues government was seen as an effective and trustworthy means of regulating genome science, and discuss for which issues this was not the case. Discussing the difference between the two sets of issues, I will develop an explaining hypothesis, and distinguish two sets of reasons given why the state is ill equipped to meet the challenges posed: the first set is related to attributes of the science system in general and the knowledge it produces in particular, while the second is connected to features and problems of the state as an actor itself.

Government and the means of doing research

Concerning this issue, governmental regulation was often referred to by the scientists to legitimate their actions, especially concerning animal experimentation. For this political question, most of the boundary work strategies described in the previous chapters could not be applied, because obviously experiments were taking place 'here', in basic research, and at this very moment in time. The argument that basic research is done for pure curiosity and is untouched by societal interests could and was even turned against the scientists concerning this issue. Is it morally legitimate, a lay person asked, to cause suffering and kill animals for the sake of pure curiosity? In their answer, the scientist used the authority of governmental regulation as a means to displace this question. The following quote is the direct response by one of the scientists.

> *S6f: But you are not allowed to do that! There are regulations. [...] You don't get a free ticket to do all animal experiments. Every time we for example want to make a certain*

knock-out-mouse, with a certain gene, we have to apply for, explain … what kind of function that gene has, and what our presumption is, and why we need that.

L13m: And according to which criteria is that decided then, whether that is ok or not?

S6f: That's a good question, I have no idea. You have to ask the person from the ministry, he knows that. I don't know. (Q42, R5/4/315-319)

In her response, she invokes governmental regulation as an instance setting limits to the possibilities of experimentation. These limits are legally defined, or, as the scientists sometimes would argue "defined by society". Experimentation needs a scientific legitimisation, but interestingly, beyond that none of the scientists is aware which criteria actually are applied to determine whether an experiment is allowed or not. This is due to the fact of course that they never have been denied to do a certain experiment. The scientists would strongly argue that they personally would not operate even near the legal limits in any way, mainly also because of their own ethical standards. Thus two important observations for the function of governmental regulation in this argument may be made. First, the institutional setting of government is used as an instance to which the discussion of a political question may be displaced. These means of closing down a political discussion do not rely on the strategies of boundary work described in the last chapter, as they do not involve any definition of science. Rather, government is invoked as an institution, which has already decided the issue in question. Thus science does not need to deal with this question anymore, as long as it remains within the legally defined boundaries. The second important observation to be made is that the laypeople mostly accepted this line of argumentation and, at least for the project at hand, would assess it to be trustworthy, even though the scientists quite frankly admitted that they were quite unaware of how precisely this regulation looks like. As already hinted at in discussing the issue of animal experimentation as a topic for governing in a previous chapter, this is strongly related to the impressions they had of how the scientists personally were dealing with the issue. In the discussions, most of the scientists would display quite some degree of emotional involvement. One researcher talked of the transgenic mice he bred, experimented with, and thus also killed, as his "family", describing in detail how cute they looked. It was stressed that doing the animal experiments involves some kind of emotional suffering, and that this suffering is necessary to ensure the ethical integrity of the experimentation, as the following quote shows.

S8m: If anyone reacts the way you have just bluntly put it: When can I finally [kill, M.F.] my first mouse; that guy needs a doctor. That guy definitely does not belong into a lab. I do not know a single person, who is happily looking forward to her first visit to the mice stables to kill a mouse. That in any case is a step which one needs to get used to, though it is necessary. (Q43, RT1/2/103)

The scientists' efforts to convey a sense of emotional and ethical authenticity in their dealing with the animals is of key importance for understanding the role of governmental regulation in this respect. In the scientists' argument, governmental regulation is de facto a black box, which would only come into play in case of severe ethical misconduct by single researchers. That this misconduct will not happen, however, is not so much guaranteed by the governmental regulation, but by the ethical sensibility of the researchers and the values institutionalised in the research group in particular, as well as in science in general.

Concerning this topic, the lay people perceived values guiding the scientists' action, and they judged the performance of the internalisation of these values by the researchers as authentic. In my argument, this is of key importance for understanding why governmental regulation was seen as effective for these issues by the laypeople, but not for the issue of the impacts the knowledge produced might have, which I will discuss below. Here, governmental regulation is seen as a 'last resort', which only would acquire relevance should the normative structures of science which otherwise prevent misconduct fail. This however means that the perceived effectivity and trustworthiness of the regulatory framework depends on a value system external to it, which in this case is provided by science itself.

Government and the relation of genomic knowledge to societal values

For the second set of issues to be governed previously described, the relation of genomic knowledge production to societal values and the effects of the knowledge produced on society, a value system guiding the scientists' actions could not be discerned by the laypeople. Very different than for the issue of animal experimentation, the scientists would refuse to take any responsibility or at times even to discuss the effects the knowledge they produce might have on society. To do so was part of their boundary work strategies. Many laypeople, however, took this as a sign that for this issue a stable system of values preventing any negative developments was not present. The following exchange

taken from the laypeople's concluding discussion exemplifies this.

> *L5f: Yes, I can agree to that, that it [the discussed project, M.F.] already is a step beyond basic science; often they argued: "we are just doing basic science", and as soon as a question concerning any consequences were put, they were quick to retreat to this.*
>
> *L11m: Yes, I would say, especially this statement was very central and nearly shocking, in any case quite disturbing.*
>
> *Moderator: Which statement?*
>
> *L11m: Well to retreat to the statement "we are just basic scientists and don't care about the consequences". Latin verse: Quidquid agis, prudenta agas et respice finem.*
>
> *L2f: In German? (Laughing)*
>
> *L11m: Whatever you do, do it wisely and consider the consequences. And if you don't subscribe to this - then that somehow violates a general ethical principle.*
>
> *L5f: They might not be able to influence them [the consequences, M.F.], but they could at least think about it. Maybe that's the main point. (Q44, RT7/1/316-320)*

This quote quite clearly shows the agreement of most laypeople that the researchers in their boundary work efforts denied taking any responsibility concerning the ends of their knowledge production. In the obvious lack of a shared value system to prevent any "dangerous developments", governmental regulation is left to itself in its efforts to do so. However, its chances of success were seen rather sceptical. This was related to two sets of reasons, one concerning science itself and the knowledge it produces, and another government as an actor and the context it operates in.

In the absence of a normative framework guiding the actions of the individual researcher, how might government prevent that something will go wrong? The first reason given why it de facto cannot do so is connected to the complexity of the science system and the sheer number of scientists and projects to be controlled. Is it an option, as an invited expert asked, to put a policeman behind every researcher? For most laypeople – as of course for the scientists – this did not seem a feasible option, as the following quote illustrates.

> *L5f: I don't think it's a very good idea that someone – I don't know – in Brussels or elsewhere says: You are allowed to do that – or you aren't. Because he can't control that anyway, and control anyway always is lagging behind. In my opinion, the people*

[the scientists, M.F.] should be given support to be able to judge what they are doing.
(Q45, PI, 371)

In this quote, the lay person denies governmental regulation to have any effectiveness, and asserts supporting the scientists in developing a moral sensitivity for the consequences of their actions as the only reasonable means of governing. The scientists would agree that governmental regulation on its own may hardly prevent any misconduct. Rather, a too dense net of control and evaluation would keep them from doing their job. Furthermore, they stressed that governmental regulators were in any way hardly able to assess any possible dangers of scientists' work in time, because they lack the knowledge and expertise to do so.

While in the quote above quite some trust is put that the scientists will be able to "judge what they are doing", other laypeople did not only argue that science does not provide a normative framework for assessing and governing the effects of knowledge, but that its normative structure even promotes the transgressing of ethical boundaries, and that government will have no chance to prevent this. Describing a scientist in his lab, a lay person states in a concluding interview, invoking an imagined scientific discovery:

L9m: Now he is one step before the discovery! Will he really pause for a moment? Or does he think: Well, I will do just this one experiment more. That's human, humans aspire, even if he does not want to be part of history in the first place, but just the knowledge by itself! [...] You can't stop a scientist with a law. (Q46, PI, 19-23)

In this argument, scientists are seen as strongly driven by an intrinsic urge for discovery and as caught in their own rationale, sidelining values and points of reference external to this scientific logic. Hence, the very 'pure curiosity' as a basic anthropological constant which was a central element of the self-identity the scientists had fashioned in their boundary work turns into a dangerous and hardly controllable rationale.

In the quotes above, the existence of governmental regulation alone is seen as insufficient to prevent negative developments in the absence of an additional framework of values and norms internalized by the scientists. Of course, the argument that breaches of any law or regulation may not be effectively prevented by governmental means can be made for many areas of governmental regulation, or as one lay person put it:

L13m: Legislature is always lagging behind reality [...] passing laws is one thing, but whether people adhere to them is another. But, there's nothing you can do about that

anyway. You can't prevent a murderer from killing someone either, even though it is illegal. (Q47, PI, 249)

Other than L13m however, most laypeople made a difference between the area of regulation referred to by him and the governance of scientific knowledge. Besides the lack of a value system to support the regulation, this was also argued to be due to specific properties of (scientific) knowledge. Firstly, knowledge was described to be irreversible. Once a discovery has been made, the discovered may not be 'forgotten' anymore. Secondly, knowledge was ascribed a tendency of autopoietic reproduction – as soon as a knowledge production process has been started, the knowledge produced may and will be taken up by others and will be developed further, or as a scientist puts it:

S7m: As soon as I start a knowledge production process, I cannot really stop it anymore and say: Okay, now there's a point in time where I condemn all people never to think in this direction again. I will not be able to that. (Q48, RT5/2/108)

That he considers "stopping" to be the only kind of governing intervention possible is linked to the scientists' concept of innovation described in the previous chapter: knowledge is not shaped, it is 'discovered', and technological possibilities are 'realised'. As the form of the knowledge to be discovered is already given in nature, the prevention of discovery seems to be the only intervention possible.

These characteristics of knowledge were described by both scientists and laypeople. But while scientists would mostly refer to other researchers as taking up the knowledge, the laypeople would relate these attributes to the inscription of knowledge into society. As soon as the knowledge produced would have entered society, they argued, there would be hardly any way to stop or govern it.

L10f: That's like setting some kind of machine in motion, and there are incredibly many gears in motion. To stop that again, that is pretty difficult or impossible. [...] Because you don't know who will acquire that knowledge, how people are going to handle it, and what is going to happen then. You can't prevent that. Except by legal restrictions. But again, those will possibly be broken. (Q49, PI, 271)

In this picture in which knowledge fluidly spreads in society, legal regulation seems as powerless as for basic research. If it seems improbable "to place a policeman behind every researcher", then expanding this idea to society as a whole is impossible. Some laypeople would even argue that in equivalence to the scientist's curiosity as an anthropological constant, society would be doomed to realize every potential innovation.

Only after its implementation "has gone wrong", governing measures may be taken to reduce risks and negative effects. This rather evolutionary approach to governing knowledge leaves little room for precautionary efforts.

The fluidity of knowledge also plays a central role for the second set of reasons why government is ill equipped to govern the effects of knowledge on society. While the mobile and fluid knowledge may be taken up on a global scale, the actions of governmental actors were perceived to be limited to national boundaries. What is more, a small state such as Austria also was seen as constrained in its ability to autonomously decide on the governing of any scientific innovation. His sovereignty was seen as impeded by more powerful global actors, be they other states or global economic players.

> L4m: So, even if I would for example decide against that [an innovation, M.F.]. If I then consider how certain economic markets determine that, like America, like China; so they just determine that and we may not be able to do anything about it, because they just dictate it. Like, the biometric data in the passports – we are coerced by America to adopt that. (Q50, RT7/1/112)

Furthermore, the international context which a state moves in also restricts its agency because it puts him into direct competition to other nations, which due to a different cultural or political background may have less rigid legal regulations. Thus, what is banned in Austria, may be done "elsewhere", which would result in impeding Austrian science, while the knowledge in question would still be produced, only in another country.

> L10f: And if I regulate too much, then I will impede science. This reminds me of that one example we had on these hedgehog enzymes which were supposed to be researched. And that was impossible in Austria, because it is a wild animal. Okay. So you go to China. And if I regulate these things too much in Austria, more will happen in other countries. That danger exists. (51, PI, 367)

This argument was also often used by the scientists to plead against a too strict regulation of scientific knowledge production. If research was done in Austria and under the control of Austrian institutions, they would claim, much more control would be ensured than by a ban which would only result in the research being done in another place.

To sum up the arguments made in this chapter, I have first distinguished between two

topics of governance for which the role of government was discussed very differently, and offered a hypothesis for the nature of this difference. For the means by which research is done a solid value system and normative framework was seen to be in place - and thus the setting of boundary conditions and their enforcement by government were seen as effective. This was not the case for the relation of the knowledge produced to societal values and its impact on society. Here, a normative framework guiding the actions of the scientists was felt to be missing, and thus governmental regulation by itself was not seen as able to guarantee effective governing. Hence, in the discussions our lay participants seemed to implicitly link the effectiveness of governmental regulation to the existence of a normative framework external to this regulation, in this case to the normative ethos of the participating scientists.

The inability of government for an 'upstream-governance' of scientific knowledge was further grounded in the fluid nature of scientific knowledge, and in the globalising context in which this knowledge production takes place. This means that for the issue of governance laypeople were most concerned about, the government of the future consequences of the knowledge produced, government both as an actor as well as a mode of governing was seen as ill-suited.

12.4 Imagining the Governance of Genomics beyond Government

Beyond government, which other actors and networks were used in the discussions to describe and understand the dynamic processes of governing genomics? Employing 'governance' as an analytical focus, two very different positions may be discerned, which again very much run along the groups of scientists and laypeople. These two models mainly differ concerning their framing of the actors relevant for the governance of science, as well as concerning the relations between those actors. The scientists and a few laypeople conceptualised the current governance of scientific knowledge production mainly in terms of a scientific-self-governance. Most laypeople on the other hand would describe their impression of governance dynamics as a strongly decentralized network of heterogeneous actors. I will discuss both models in turn.

The self-governance of science

If any government of science is as difficult as outlined in the previous chapter, who might then be able to ensure that science will not develop into any unwanted direction? While for many laypeople this was a more than pressing issue, the scientists and a few laypeople would have a seemingly quite simple and straightforward answer to that question: to rely on the self-regulatory powers of science. In the vision of governance they developed, science was portrayed as a self-regulatory system based on a dense network of institutions and shared moral values. They would argue that science has historically developed a well working system of critique and internal quality control, which is much better suited to prevent any dangerous developments than any external governing efforts. Especially the participating researchers would remark that hence scientists would actually be the ones to be trusted in when it comes to governing questions - implicitly criticizing that they were often seen as those causing the problems to be governed rather than as those preventing them.

> W8m: That's why one has to, I think, disband this dichotomy. On the one side there are the evil scientists, who try everything to circumvent some regulations and to do bad things, and on the other side there is the good legislator, who has to keep an eye on them somehow; and who at best should place a policeman behind every researcher, so he won't do all these things. Fact is, the opposite is the case. The legislator only

notices the problem areas through the scientists, just like with Asilomar, for example.
(Q52, RT6/2/127)

As they are the experts for the issues they do research on, the project leader argues in this quote, scientists are able to assess any dangers which might arise from it much earlier than government or any other societal actor ever may. Especially political interventions, scientists stated, often lack a deeper understanding of the long-term dynamics of the scientific field and thus often would lead to rather short term effects and very little sustainable changes. He refers to the Asilomar conference, in which in 1975 leading scientists in the field had gathered and decided on a self-regulation of recombinant DNA experiments, including a moratorium on some experiments. Citing this example may be read as an effort to demonstrate this foresight ability of science, but also to present science as a social system which shares a value commitment to the safety of its activities, and which is able to pass binding regulations on these issues. It is much more this institutionalised shared moral commitment that prevents misuse than the policing governmental regulator, which is presented in a somewhat ridiculing manner.

The scientists aimed at demonstrating that this shared moral commitment is deeply woven into the institutions of scientific quality control, and would be ever more strongly so in the recent past. For example, they would argue the publication system and the institution of peer-review to be of key importance in this respect. The sensibility of the leading journals in the field to ethical issues has increased, they would claim. It would be impossible to publish without proving that the work publications are based on has been carried out according to ethical standards and been approved by ethics commissions. This argument mirrors the displacement to another institutional context described in a previous chapter as an argumentative strategy to close discussions on the researchers' own animal experiments. As in this argument, also here and largely also in the Asilomar reference, the issue of governance is narrowed down to the means by which research is done. Again, the self-regulatory capacity of science is supplemented by governmental bodies, which set boundary conditions the moral researcher will never really touch. Those in the research group working with patients in epidemiological studies would also argue that the standards asked for by science would most of the time be much higher than those asked for by the local Austrian ethics commissions.

A main advantage of this science portrayed as a moral social community is that it is global. Hence the possibility to do illegal experiments in countries with less strict

governmental regulations remains, however the researchers carrying out these experiments will be denied recognition by the international scientific community.

> *S3m: Yes, to the Chinese researcher, who is doing an animal experiment which is illegal according to our standards, theoretically only one loophole remains – to publish it in a Chinese journal [...]. But in practice this is of no importance these days, because nobody reads those journals anyway. (Q53, RT6/3/188)*

Following his argument, any 'immoral' knowledge will be ignored by science, but it is important to observe that the morality of the knowledge is again restricted to the means of its production. If we take into consideration the argument referred to by many scientists and laypeople that knowledge has the tendency to multiply and that its development may hardly be stopped or governed, a quite manifest tension arises. However, also for 'stopping' the development of certain forms of knowledge and applications, the scientific community was seen as best suited, as the following quote illustrates.

> *S3m: So when can one realistically stop this? Only if as many as possible, or the most central ones, act in concert. And that can only happen if the world moves together ever closer, and especially we scientists have an important contribution to that – we are international. And as the world moves together, then there's talk and then there hopefully will also be supranational coalitions; and hopefully a situation where everyone is committed to consensus. (Q54, RT2/2/368)*

For the participating scientists and those laypeople sharing this line of argumentation, who tended to be older and to have some kind of affiliation to the academic world, how science actually is governed was not too far apart from how it ought to be governed. The institutional structure of science was portrayed as perfectly able to govern itself and to provide a stable system of values of norms to guide the actions of individual researchers in a quasi-Mertonian fashion.

As argued in previous chapters however most laypeople did not share the perception that there was a stable moral framework, which would ensure self-governance – at least not for the issue of taking responsibility for the consequences of the knowledge produced. This on the one hand is due to the scientists' refusal to consider these issues, but on the other hand the laypeople did also identify developments in science itself, which to them seemed to question the story told by the scientists. For example, they referred to the

observation they had made at the Round Table that the competition between research groups as well as between the individual researchers within a group was increasing. Since success, they argued, would rather be measured in terms of spectacular discoveries than in those of moral integrity, such an increase in competition could very well lead to a transgression of ethical boundaries.

> *L10f: But I think, really every scientist should take responsibility for himself – but of course this is also difficult. [...] Everybody has his goals. [...] And the one who is less ready to take responsibility may be the better scientist, may have the better results. And that's what counts, unfortunately, in our society. [...] And there's a pressure of competition. (Q55, PI, 359-363)*

Other laypeople would also argue that a science which merely relies on its own rationale will very likely become blind to any societal values external to it – an issue which was seen as especially pressing for the question of which effects the knowledge produced might have on society. However, most laypeople did not share the strong distinction the scientists made between the institutions and rationales internal and those external to science. While the model of a self-governance of science portrayed by the scientists strongly depends on an image of science largely unfettered by and autonomous from other societal actors and rationales, many laypeople would argue that in their impression science was much more intricately linked with other societal actors and their rationales. To them, the governance of science much more resembled a decentralised and chaotic network of actors and rationales.

Governance as a de-central network

Discussions among the laypeople on this aspect of governance mostly started from the issue of responsibility. As previously referred to, the scientists' tendency to shirk the responsibility to consider the consequences of the knowledge they produced was one of the most 'shocking' experiences for most laypeople. Starting from this denial, they would try to identify other actors or institutions, which might take up this role. This however proved to be futile in most cases and the laypeople tended to find this quite disconcerting, as the following quote illustrates.

> *L6m: [There was no one, M.F.] who felt responsible to decide what will be done or what will not be done, [...] to take responsibility for the fact that the consequences are more or less closely related to himself. Neither have we found any kind of structure which might be the ultimate regulatory entity – be it a plebiscite, so that the people*

will say: we want that, or we don't. We saw, that that does not work, because there are economic interests. Be it that politicians, in which way ever, will arrive at any decision. Somehow there was no one, who would have said, it's our fault, that this is being done, or we are the ones to prevent that this will we done. But everyone pointed to someone else. And for me actually the answer is that in essence we are unable to prevent such a development. (Q56, RT7/1/202)

In the constellation this lay person describes, responsibility is diluted in a system of heterogeneous actors. Without a central instance such as government to rely on, the laypeople found it difficult if not even impossible to imagine how any kind of deliberate governing action might take place in such a system. They were not able to identify the point both in the network as well as in time at which any action concerning the production of scientific knowledge and its inscription into society might be taken. At the same time, as the quote clearly indicates, this was a very unsatisfactory situation to at least some of them. They expressed the longing for a strong central actor or instance which might be able to reach collectively binding decisions. However 'in reality' they were not able to find any promising candidates for such a role. Neither the state, to whom this role traditionally may be attributed, nor science itself seemed capable to take up this position. Much more, the governance of science seemed to them as a complex self-controlling process in which a multitude of actors follow their own particular interests and rationales, without even considering the system as a whole.

L13m: Well, the scientist somehow tries to answer original questions, to publish in as prestigious journals as possible. Journalists try to maximise viewer levels or paper sales. Politicians want to attract votes. Businesses try to make money. And like this everyone has his own yardstick, against which he measures his activity. And somewhere the circle closes. So, it does not have a beginning or an end so that one might say: If A does that, then B must do this. But somehow that's a closed circle which just works; and which changes dynamically because of external influences. But in essence everyone moves on his own territory and bases his actions on certain specific criteria, against which he measures his success. And everything he does consequently derives from his personal success and from having that personal indicator as high as possible. (Q57, PI, 175)

The system portrayed here has no centre from which any effort in steering its future development might be taken. Science appears as one actor among many, following its particular rationale, deeply constrained by the boundary conditions set by the other

actors' actions, and also hardly able to control its future development. It is also interesting to observe that in this vision of governance, the complex institutionalised system of moral reflexivity claimed by the scientists has been replaced by a quite narrow rationale towards which actions in the system are oriented: to publish or not to publish.

By the lay participants, the constellation implicit in the quote above was mostly perceived as rendering the system uncontrollable and thus threatening – situating the *is* of governing science quite far from the *ought*. To them, actually none of the actors seemed to be committed to taking any responsibility beyond maximizing his own benefit, let alone to consider the development of the system as a whole, even though each actor is strongly influenced by and constantly has to adapt to the other actors' actions, such as science to new political funding priorities.

While some would describe the heterogeneous actors in this network to be equal, others would stress the dominance of a transgressive economic rationale which affects the actions of most actors. Also science, they would argue, today would much more follow economic interests and goals. While some took a rather critical stance, as they saw this tendency as a sign of a general progressing economisation of society, others would evaluate this more positively. The latter equalled economic orientation to "leaving the ivory tower" and becoming more sensitive to societal needs.

In any case, most laypeople could not share the scientists' faith in the self-regulating capacities of science, because to them it seemed to be far to densely inter-connected with other actors and rationales to truly be able to act autonomously. Some would conclude from this observation - and the lack of any other central actor - that governing science itself and the production of scientific knowledge would have de facto become impossible. Dangerous developments could not be prevented and also more long-term aims for the development of this knowledge in relation to society may neither be set nor negotiated.

12.5 Which Participation in this Kind of Governance?

This chapter will analyse how our participants saw the limits and possibilities of public participation in general and of the method of the Round Table in particular. I will start from the hypothesis that the imaginations and perceptions our participants had of the role of public participation in governing science were closely linked to their assessment of how science actually was currently governed. As described in the preceding chapter, the two dominant conceptualisations of governance in the discussions very much differed in relating the current state of governance to how it ought to be. In any of these visions of governance public participation was seen as an intervention meant to change the current state of affairs, as none of the concepts of current governance featured the public in any significant role.

Even though we asked our participants to reflect on the meaning of public participation in general, their imaginations of it were of course closely tied to the method they themselves had lived through for more than half a year. They would hardly distinguish between public participation in general and the concrete method in particular. This is not surprising given the fact that they had no prior experience with any other engagement design and as public participation concerning technoscience is hardly discussed in the Austrian public. Hence, in the following I will describe four different versions of the meaning and of the ends of the Round Table as a method of public participation: the Round Table as a means of education, as a contribution to political decision making, as a space for public discourse and as an instance of feedback and supervision for the participating scientists. I will discuss each of these in turn, highlighting how they were assessed from the perspective of different visions of governance.

The Round Table as a means of education

For those pleading for a self-regulation of science, the dominant role assigned to the setting was that of the Round Table as a means of education and information of the public. A central argument in this vision is that adequate knowledge is required to be able to assess possible future developments and impacts of science and thus govern them. Possessing this knowledge is what sets scientists aside from policy makers, let alone from the public, which is portrayed as fickle and easily influenced by opinion makers such as the media. Also a long-term setting as the Round Table is not seen as sufficient to build the "contributory expertise" (Collins & Evans 2002) necessary to participate in the

processes of governing science. It is however to be welcomed, as it is expected to reduce prejudices against the scientific enterprise and may build trust. This reduction of prejudice is due to a transfer of knowledge about science "how it really is" which is not mediated by the media. The scientists generally saw these as likely to distort their work for the sake of a quick headline. In its essence, the science/society relation portrayed here follows the classic deficit-model. In the narration of many scientists, the public per se would actually in most cases not really object genome science. Fear is produced by the media.

> *S6f: Generally I think the public is smarter than especially the media believe it to be. [...] Well, I believe only very few people are really informed. A lot of people are afraid, especially because they are not informed; and I think you need a certain involvement before you can participate. There are certainly some who are sufficiently informed and who would like to contribute – an indicator for this is also that people volunteered to take part in these discussions; but I simply believe that the general discussion culture here is much too low. (Q58, PI, 277; 285;)*

Of course, the participants sharing the idea of the Round Table as a means of public education argued, the long-term method they had taken part in would only appeal to a minority, and probably to those already more interested. However, as some participants proposed, the laypeople who have taken part may act as multiplicators and may help to "filter" the enormous amount of information they have received according to the abilities, needs and interests of the wider public.

In this model of public 'participation', public support of and public trust in science is seen as important, and it may be won by information. Thus, the idea of good governance shared by those supporting this model is that of a self-governing science supported by a benevolent and informed public, which does not interfere in any way beyond its silent support. For those perceiving the governance of science as a decentralised network however, just being informed by science seemed a very little promising way of improving the current state. If scientists shirked any responsibility and were mainly interested in maximising publications according to their own rationale, what good might being informed by them be?

It is interesting to note that the support for this model shifted quite strongly over the period of the Round Table discussions. While in the beginning of the discussions and the preceding interviews this view may be described as dominant both for the majority of scientists, but also for many laypeople, towards the end only very few lay participants and

also only a minority of scientists would strongly refer to it - though it remained an implicit point of reference. Many of those who had shifted their perception, especially among the scientists, would towards the end of the Round Tables rather refer to the model of the method as a means of supervision and feedback, which I will relate below. This model grants more active agency to the public, while it at the same time largely maintains and protects the autonomy of science.

The Round Table as a contribution to political decision making

The notion of a participatory design such as the Round Table as a contribution to political decision-making is probably most often referred to in the literature, and thus also was raised by the facilitator and the research team both in the discussions and in the concluding interviews. At first it was very surprising for us that in neither setting we could find any support for this model, neither among the scientists, nor among the laypeople. While this may be read as a general effort to shirk the responsibility implied in taking a clear political position towards the issues discussed, I will argue in the following that it is rather due to the lack of fit of this idea with the respective perspectives on the governance of genomics participants had. That the rejection of the use of the setting as a contribution to public participation is based on more than personal unwillingness to take responsibility is supported by the fact that the laypeople did not only not want themselves to be part of a political decision scenario, but would reject this idea also for any other lay group. The following excerpt from the laypeople's concluding reflection round illustrates this:

L6m: Well, I'll just argue the other way around. If this group [the laypeople, M.F.] was society, just assuming, we really represent society, then the question is for me, can the societal process of opinion formation be represented in this small group? [...] If we now would come to any kind of agreement, might that not be a representation of society as a whole?

L12m: But isn't that what should actually happen in parliamentary debate? [...] That's why we have parliament, that's why the big politicians are debating. I mean, that's different, in parliament debates are public. Anybody may listen and think to himself, well these guys are pursuing their own interests. But we as a little group which hidden in a chamber would pre-discuss something and then present a ready-made solution in parliament? From my basic democratic attitude, I wouldn't like that. That's like this bioethics commission. [...] I think that's dangerous. They always discuss something

behind closed doors, and then people say, well if they've said that it must be good, let's do it. Now how does this correspond to democracy? (Q59, RT7/2/198-204)

There are several interesting dimensions to this quote. While the first speaker introduces the idea that the group present may very well be taken as a representation of Austrian society and may thus legitimately voice an opinion on its behalf, the second speaker rejects this idea. However, he does not question the representativeness of the group[41], but rather expresses that the general idea of the design does not fit with his idea of democracy. He puts the Round Table in line with other advisory bodies such as bioethics commissions, which from his point of view pre-empty the political discussion. Political debate in his opinion should take place inside political institutions such as parliament, where it is visible to the public. If this visibility is lacking, he goes on to argue – and is supported by other participants – then very easily particular interests might win over the interests of society as a whole. It is interesting to see that in this lay person's view a method such as public engagement which might be argued to be aimed at democratizing decision making and at opening up public discussion is equalled to bioethics commissions, which indeed have been regularly criticized to pre-empty political decision making and removing political debate to an at best semi-public space. However, if we read his story against the arguments that have been described in the preceding chapters on the weakness of government, his objection also carries a slightly different meaning. His narration of the emptying of political discussion by secluded gremia is not restricted to the Round Table, it is a general observation to which the participatory method at hand is compared. His main worry is that secluded interests may steer political decision making via these non-public forums. Thus the state or government implied here is weak, it is not a sovereign actor able to provide or even negotiate public values in areas were a stable value system is lacking. Rather, it is undermined by other actors present in the decentralised networks of governance perceived by our participants, who aim at imposing their rationales in the secluded arenas more and more replacing public political discussion. The worry expressed in this quote and also by other participants is that public participation under these circumstances may be misused for other interests, which are beyond the control of the people participating. To put it differently, they did not have trust in the political process the final statement of such a design would fit into, mostly because they did not know how this political process would work out and in whose interest the

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[41] This was done in several instances, especially due to the obvious educational bias among the participants.

statement would be interpreted. But they were rather sure that it would not follow their expectation of an open and transparent decision-making process. Hence, the legitimacy given by the representativeness claimed by any public participation design might also be misused.

The arguments described above mostly were used by those laypeople who perceived the governance of genomics as a de-central network. Those who advocated for a self-governance of science also rejected the model of the Round Table as a contribution to political decision-making, but for different reasons. Central to the line of argumentation in this model, as also described in the section on the Round Table as a means of education above, is that adequate knowledge is required to be able to assess and discuss the issues involved in governing science. Essentially, this ability is mostly ascribed only to scientists themselves, and not to governmental regulators, let alone the general public, which is portrayed as ignorant and fickle, as the following quote illustrates:

> L8f: I think no decision should be granted to the average citizen for anything beyond his horizon. […] And people mostly think they are much smarter than they are.
> (Q60, PI, 275)

Here, it is not the role of public participation in a wider governance context, which seems problematic, but the lacking ability of the public to fully understand the issues at hand.

The Round Table as a space of public discourse

For those who saw the governance of genomics as a de-central network, one of the biggest problems in this state of affairs was the lack of any instance or institution which might relate the different rationales present in the system to each other or even coordinate them. If the consequences of scientific knowledge for society are 'governed' by a multitude of uncoordinated actors each following its own rationale, how might any reasonable output be expected, laypeople would ask. The lack of controllability felt by many lay participants of the way science and the knowledge it produces is inscribed into society mainly is due to the lack of an institution which might consider the actors and rationales present, and negotiate a set of binding values which all actors involved share. In the absence of such a space the current network of governance was not only seen as decentralised, but also as opaque to the public. As our participants wished for, but could not identify any spaces or institutions which might fulfil this role, some of them experimented with the idea that the Round Table could play a role in this process as a space for public discourse. To them, this space would have two main functions:

First, our participants argued, by making the different rationales visible a kind of public accountability could be achieved which might prevent any "extreme developments", as for example one powerful actor directing the network according to his (hidden) rationale.

> *L1m: The more transparent something is in different areas of society – I mean science, politics, the public, funders - the more this will maybe just govern itself somehow. (Q61, PI, 559)*

In this quote, the mutual visibility of the basic rationales and interests of the actors is seen as inducing a self-governing capacity in what was before a seemingly chaotic network. This self-governing is due to two effects which are caused by the different rationales being made visible in a public space, such as a Round Table. On the one hand, the single actors are forced to consider the interests and rationales of other actors in the network in their own actions. On the other hand, their own actions and interests are made visible and thus need to be legitimated to other players and the public. In this vision, a dissociated network of nearly autistic actors may thus turn into a more densely connected collective. The place of a strong central actor such as government, which was often longed for but never found by the participants, remains empty in this model, but is replaced by the creation of a public space, in which the negotiation of different interests and rationales allow at least some kind of coordination.

The second function of this space is related to the role attributed to the public itself in this model. Our lay participants often saw themselves and the public in general as a balancing force between the different interests involved. Their reason for doing so was that they attributed themselves – as well as the general public - no interests of their own.

> *L5f: Because there are not so many self-interests standing behind [the lay group, M.F.]; maybe there's a certain independence, no immediate advantage or disadvantage arising from the opinion voiced. A lobbyist most of the time is interested in effecting something.*
> *L2f: Yes, precisely, we don't have any economic interests. [...] We are independent. (RT7/2/168-170)*

> *L1m: And if there is no public participation, then some powerful opinion leaders might manage to direct society in some direction. But if society is more involved in these issues, then I believe a much more balanced picture will emerge. (Q62, PI, 419)*

In these quotes, society appears as a neutral arbiter and facilitator of the processes of self-governance to be induced by public participation.

This model of the Round Table was only referred to by those who saw the current governance of genomics as a de-central network. Since they mostly did so in their concluding reflections, we have no material of how those who did not share this view would have reacted to this model. The participants arguing for scientific self-governance certainly did not touch upon this idea, because its basic assumptions are quite far from how they perceived the governance of science. In its essence, this model may be read as an attempt to regain control over a system which currently to most lay participants seemed out of balance. They wanted to restore some institution or space in which the consequences of the knowledge produced and the various interests involved in this process might be debated. From the analyst's point of view, in the model outlined above, they did so for a price. The idea of the Round Table as a public space they advocated depends on the assumption that the public as a facilitator is a non-agent, which has no interests on its own. Or, put differently, it relies on a very specific definition of interest which does include direct economic or other kinds of profit, but excludes future affectedness e.g. by the consequences of a technology. Thus, in this idea of public participation, the public's interests are excluded for the sake of regaining a sense of control.

The Round Table as an instance of feedback or supervision

Even though the lack of a central effective and trustworthy institution in the governance of genomics was perceived as a problem by many participants, developing any possible solution for this on a macro-level also proved to be quite tricky. Hence, another approach taken by a number of laypeople was to bypass any institutional level of governance completely and to focus on the ethical behaviour of the individual scientists. As any kind of governmental control was seen as futile if the values and norms expressed in this regulation are not accepted and internalized by the single scientist, this single scientist and his or her ethical conscience should also be the prime target of any intervention.

> L8f: Because [one, M.F.] can't stand beside any single person and watch that he doesn't make any mistake, or loses some kind of bacteria somewhere. How does one want to do that, that is out of the question. So it must be to educate people, young people, children, adults, to be responsible individuals. (Q63, PI, 231)

While those arguing for a self-governance of science thought this ethical conduct to be sufficiently guaranteed by the scientific ethos, a majority of the laypeople would describe their impression of the scientists as caught within their particular rationale, often

sidelining any ethical or societal considerations beyond that. To them, this seemed to be particularly obvious in the scientists' rejection to consider or to take responsibility for the effects the knowledge they produce might have on society. Thus, in this model the role of the Round Table and of public participation in general is seen as an instance of feedback or maybe even supervision. It should serve to aid the scientists to re-integrate broader societal values and considerations into their daily research routines and to reflect on their work beyond the narrow scientific context, or as one lay put it

> *L7f: I believe that the scientists are so much into their field that they can't be objective about it anymore. And the public may raise many questions, and also opinions, which they cannot even imagine, that someone might be worried about that (Q64, PI, 275)*

In this role, ignorance for the public may even be bliss, as it was argued, because knowing too much about the subject at hand might mean assimilating parts of the scientific rationale, and thus not being able to ask as naïve and at the same time critical questions as before. Its role is to be the "conscience" of science and to aid the individual scientists in developing reflexive capabilities and thus becoming "ethical individuals". The negotiation of scientific and societal values induced by this process might even lead to a different and more reflexive form of co-evolution between science and society, as the following quote indicates:

> *L2f: [As a participant, M.F.:] one rather is the conscience, which points to: Help, people watch it, there are negative developments too. [...] Maybe then research is more human – under apostrophes – maybe not as successful [...], but that develops more slowly and together with the people. (Q65, PI, 239)*

Of the visions of participation and the Round Table discussed, this last perception of the Round Table, though mostly put forward by the laypeople, was the one most participants could agree to. It does on the one hand address a number of central problems identified by those critical of a self-governance of science, such as the limited ability of scientists to consider societal and ethical issues, but on the other hand leaves considerable autonomy to the scientists who in the end need to govern themselves as ethical individuals. Further, it seemingly does not depend on any institutional background as the other models described above. And probably most of all, it builds on a concrete experience both laypeople and scientists claimed to have made at the Round Table: that the long-term debates in this setting did not necessarily cause dramatic changes in anyone's opinions, but that it opened perspectives and horizons which one had not taken into account before.

Asked which forms of public participation she would deem to make sense, a scientist answered:

S2f: What makes sense are discussion rounds just like this project. These things make sense. Where maybe there's some information first, with a discussion afterwards. And where the scientist is influenced indirectly, because he is there and listens to the viewpoints of the participants. (Q66, PI, 375)

13 Conclusions: Technoscience(s), Governance(s) & Participation(s)

What may the arguments brought forward in the empirical part of this thesis contribute to a deeper and more fine-grained understanding of the complex contemporary relations between technosciences, their governance, and public participation in the life sciences? The preceding chapters brought together the perspectives of citizens (mostly lay people, but also scientists) on the governance of technoscience and the role, limits and possibilities of public participation in a number of quite different contexts. Organ transplantation, post-natal genetic testing and basic genome research on obesity share that they are part of the broader technoscientific field of biomedicine, which especially on the research side recently has been re-labelled to be the science of life itself (Rose 2007). Beyond this, as will have become apparent to the reader in the preceding parts of this work, they raise very different ethical and social issues and hence challenges for governing them.

To include these three contexts I have worked on with colleagues in the past years in this thesis is a conscious choice. And as every choice in a research process, it comes for a price. Another feasible option in tracing bottom-up perspectives on governance of course might have been to concentrate on one setting and to analyse the respective context in more detail. The reason for not having done so is grounded in the fact that this partially was and will be done in the contexts of the projects this thesis is built on. While it is possible to adequately treat one setting in a project based journal publication, attending to the complexity and multiplicity which becomes visible when different settings are related is a very hard thing to do in the word limits imposed by most journals. A dissertation provides room to adequately treat different contexts, and to relate them to each other. Especially concerning a topic such as the bottom-up perspectives on governance and public participation, on which not much prior work exists, I believe showing the variety of ways these phenomena may be played out in different contexts is an important issue.

The three biomedical contexts this thesis brings together serve to highlight the similarities and differences of bottom-up perspectives along quite different axes. First, the technosciences concerned may be situated along different points in a downstream-upstream continuum. As upstream engagement becomes more and more prominent in academic and political debates, while at the same time experiences with public participation so far mostly have been limited to downstream contexts, knowing more

about the differences in lay political theories between topics situated along the upstream/downstream axis seems to be of central importance. Secondly, they represent different formats of engagement. While in the focus groups, due to the short interaction time and the little information input given, lay statements may be seen as relatively unbiased, the Round Table setting provides insight into an in-depth interaction between lay people and scientists. And thirdly, the technosciences themselves, their basic rationale and the objects they are concerned with are quite different. Governing the future of treating obesity raises different challenges than regulating organ transplantation as a technology mostly dealing with the quite material exchange of body parts, or the risk information produced by genetic testing.

In the following conclusions, I will draw on the richness of empirical data this combination of empirical settings and approaches provides to propose four main theses. First, I will combine the findings from all empirical contexts to comment on the multiplicity of public perceptions on technosciences and their governances, and propose some hypotheses which might help to grasp it (13.1). Secondly, I will explore how public trust in a technoscientific field and its governance emerges. For this conclusion, I will draw strongly on the results of "Let' talk about GOLD!" Round Tables, because they allow to comment on a process of building a position towards these issues (13.2). Thirdly, the topic of upstream engagement will be addressed, and again building on the Round Table setting, the lack of models of thought to tackle the challenges of upstream engagement will be commented on (13.3). Fourthly, I will again draw together all three settings to draw a conclusion on the meaning of the heterogeneous positions on public participation voiced in the different contexts (13.4).

As a reflexive end point to this thesis, a final conclusion beyond the cases (chapter 14) will then address the issue of my/our own involvement in producing the results the former four conclusions have laid out, and point to the necessity of a new expertise of community to address the challenges posed by them.

13.1 Public Perceptions of Technosciences and Governances – The Multiplicity of Technosciences/Governances

The results of this thesis do not confirm a general shift 'from government to governance' in the public perception of technoscience. Rather a complex pattern of perceptions of governance highly specific to the respective technoscientific setting may be observed. Standardized recipes and methods for enacting public participation in any technoscientific setting are insensitive to such differences and hence likely to fail. Particular attention and sensitivity to the specific configuration of technoscience and governance is required in developing and carrying out participation exercises.

The lay political theories, or the public perceptions of governance structures, discussed in this thesis vary strongly between the respective technoscientific settings my empirical work is based on. Some, such as the focus groups on organ transplantation, were characterised by a very strong focus on government and the state as a central actor. Others, such as the discussion on animal experimentation in the "Let's talk about GOLD!" project, featured a strong shared reliance on a model of scientific self-governance backed by a government which only needs to become active should scientific self-control fail. Many settings however were dominated by visions of a network-shaped governance in which government plays only a marginal role - such as in the genetic testing focus groups and in large parts of the Round Table discussion on the consequences of the knowledge produced. It is important to note though that for those settings which were characterised by a network-shaped vision of governance, participants also judged government to be weak and partially also explained the presence of this network governance by the very weakness of government.

Hence the perceptions of the participants analysed do not support the hypothesis of a general shift from government to governance. Rather, what may be perceived is a fragmented picture, with a relation between technoscience and governance which is specific to each setting.

What may be learnt from this observation for the issue of public participation? If we take the described multiplicity of technosciences/governances seriously, then any mechanistic application of standardized cookbook-recipe methods for public participation to a

particular technocientific setting seems likely to fail, because they necessarily are insensitive to these differences due to their standardisation. Instead, particular attention and sensitivity to the specific configuration of technoscience and governance is required in developing and carrying out participation exercises. This in turn will need knowledge on the reasons for the differences between different visions of governance in different technological fields.

How may the form of these specific configurations be explained? My argument here is that these differences do neither follow one linear trajectory, such as from 'upstream' to 'downstream'. However, neither are they arbitrary. They are structured along the interplay of a complex set of variables, whose interaction creates the fragmented picture sketched above. The challenge is to identify these variables and to analyse their explanatory power in producing different configurations of technoscience and governance. On the basis of my work in this thesis I may propose the following four hypotheses on what factors might influence the precise configuration of a specific technoscientific setting:

A) The first hypothesis is concerned with historical development and institutional structure. First, this is linked to the period of time in which a technoscience is inscribed in society. In the analysed settings, government was seen as much stronger for organ transplantation than for genetic testing, and as again weaker for regulating the future consequences of knowledge produced in basic science. This may be connected to the fact that organ transplantation as a technological system was institutionalised at a time when government generally was a much more dominant way of ordering society than it was for the last decade, when genetic testing was institutionalised. However, in the material this historical timeline may not be separated from the issue of institutional structure. Taking organ transplantation and genetic testing in Austria as examples, it may be argued that the institutional structure around organ transplantation also is more strongly characterised by the logic of centralised government than the one around genetic testing, which indeed is far more de-central. The social relations in organ transplantation as a socio-technical system link individuals, which remain anonymous to each other, mediated by the state as a central actor guaranteeing this anonymity. Genetic testing on the other hand creates a multiplicity of different de-central biosocial collectives (Rabinow 1996), both between patients and researchers but most of all between related affected people, who become part of one 'genetic family' (Müller 2007).

B) The second hypothesis is based on the question of the 'potentiality' of the respective technoscience, or the degree to which its risks and potential uses are seen as unknown and up to further human intervention. This issue is strongly linked to what Madeleine Akrich (1992) has called "naturalisation". As a technology 'matures' in society, or as it moves 'downstream' in the language of upstream engagement, its potentials and risks are more and more accepted, and the societal influences on shaping the former and accepting the latter become self-evident in the collective societal memory. For example, for organ transplantation the risks as well as the future potential of the technology seemed imaginable to our discussants. They did not expect any radical innovations or breakthroughs, but they also hardly suspected any 'unknown unknowns' and risks in the future technological and the corresponding societal development – as they already perceived order. The more 'unknown unknowns' were identified, the more uncertain and to be influenced by human intervention the future trajectory of the technoscientific field discussed seemed, the less our participants referred to government and the more to network-shaped visions of governance. This is the case for genetic testing, whose future impacts on society were seen as quite uncertain by the participants, and even more for the basic knowledge produced in the GOLD project, where the discussants even saw the concrete technological form of any later application to be uncertain.

However, it is important to add that, as the first, this second argument is not purely historical, and that it also does not follow a simple upstream/downstream logic. It for example is noteworthy that xenotransplantation was not an issue in the discussions on organ transplantation at all. Should any radical innovation in xenotransplantation occur, and possibly be discussed in relation to the risk of cross-species viral infection, then this is very likely to quite strongly alter the perception of organ transplantation's potentiality and hence the respective debates.

C) Closely linked to this former point is the question whether the discussants perceived a normative framework which is shared in society and which is seen as governing the respective individual and institutional actions connected to the technology. This marks the difference between organ transplantation and genetic testing. While for organ transplantation all actors were seen as normatively committed to the goal to save lives, not to make profit, this was not the case for genetic testing which was discussed as a complex system with a multitude of actors following their own rationale, however lacking

a common normative framework. The function of this normative framework may be demonstrated by the difference between the two dominant issues discussed in the "Let's talk about GOLD!" project. For the issue of animal testing, the laypeople perceived the scientists to have internalised a common ethos, and ascribed government the role to act as a 'last resort' should the single 'black sheep' violate this ethos. Concerning the consequences of their knowledge, the scientists rejected taking any responsibility, and the laypeople concluded that in this case a common normative framework was lacking. Hence, given the limited abilities of government to control the conduct of 'every single scientist', it was judged as weak and was replaced by more network-shaped visions.

D) My last hypothesis on which factors may influence the special configuration of the public perception of a 'technoscience/governance' is linked to the materiality of the objects a technoscience is concerned with. This is linked to thesis B), in as far as the questions how many 'unknown unknowns' and risks are perceived for a technology might be connected to the question how mobile and mutable the entities the respective technoscientific setting is concerned with are. For example, as organs are quite sensitive material objects which do not as easily travel and which need quite an infrastructure to be explanted and implanted, the danger of 'hidden' transplantations at least within Austrian borders was seen as very limited. On the contrary, the information produced by genetic testing or the knowledge generated in basic research was seen as travelling fast and as likely to be taken up in unexpected contexts. Hence, any effective governance of both latter entities was seen as hard if not even impossible. This partially explains why the regulatory powers of government were seen as weak, and why the governance of both areas was seen as a de-central network whose actors where also hard to delineate – after all, it was seen as highly uncertain where information or knowledge respectively might turn up next.

13.2 Publics Engaging with Technosciences/Governances: A Quest for Authenticity and Order

It is often argued that for establishing stable relations between science and the public it is of key importance to let society ‚enter the lab'. Our experience confirms that it is crucial to laypeople to experience the messiness of scientific work to establish a social relation to research. This implies that clean proxy-labs will not suffice. A purely positive picture will not create trust but appear to have been set up to deceive the public. It is the apparentness of tensions and contradictions, which creates a sense of authenticity.

However, my argument also is that sustainable relations also require to consider how society will again ‚leave the lab', to offer methods which will allow the public to acknowledge and experience messiness but at the same time establish trust that this messiness will be governed in a predictable and acceptable way as soon as their lab visit ends.

This however presupposes that the scientists are able to answer the challenges the questions of the laypeople may pose. To develop sustainable trust relations with society, it will be crucial for science to extend its own reflexivity especially on its own impact on society, and to develop an ethos to address this issue.

This second concluding point will deal with the process in which laypeople engage with a specific technoscience/governance, and how they come to build a relation to a particular technoscientific field or endeavour. In the following, I will mostly refer to the Round Tables of the "Let's talk about GOLD!" project, because the long term data from this project offer deeper insights into the interaction process between members of the public and scientists than the data from the focus groups of the "Challenges of Biomedicine" project.

In recent debates around science/society interactions both in the academic and the policy sphere, to „give society the key to the laboratory", to bring them „into science" is perceived as crucial for establishing sustainable trust relations between science and the public. Also in the "Let's talk about GOLD!" project, 'to engage' for our participants meant to have a look behind the scenes, to see the messiness of actual scientific work and its connections to other actors such as politics or the economy. As described in the empirical

parts, they insisted on seeing the 'real lab' scientists worked in as well as the mice stables, and they were very suspicious against those scientists who to them seemed to show only their rhetorical facade, while they sympathized with those who seemed to let them have a peak at their inner struggles with their work – such as the researcher who talked about the mice he killed as his 'family'.

In essence, they wanted to experience the contradictions and tensions of scientific work and the challenges it implies for governing. This is strongly connected to their perception of the presence or absence of a shared normative framework internalised by the scientists. In a way, the laypeople were probing the scientists on how they handled the contradictions inherent in their work. While a too smooth façade and the assertion that there were no contradictions created distrust, the readiness to talk about one's inner struggle and emotional involvement signalled authenticity and created trust – because it simultaneously conveyed the presence of an internalized ethos along which these struggles were solved.

Hence, while the laypeople wanted to see contradictions because they to them signalled authenticity, they at the same time longed for identifying an order which guarantees that the conduct of the social system science and its consequences for society will follow predictable and controllable patterns.

For the issue of animal experimentation this was successful, and closure of the debate was reached through the scientists' display of authenticity (Brown & Michael 2002). However this was not the case for the issue of the future consequences of the knowledge produced. Here, the scientists did not engage with the public and let them see 'into' the contradictions of their work and their inner struggles, but they rejected any responsibility to deal with these issues at large. Hence, the laypeople could not identify a similar moral ethos as for animal experimentation which would have allowed them to close the questions that had opened up for them in the discussion because of the many implicit visions the scientists voiced concerning future uses. Thus many participants remained puzzled and stuck with a sense of disorder, longing for other means of closure such as a strong central actor able to decide which innovations may enter society and which may not. They were however unable to identify such an actor or any other means of closure – and remained sceptical, if not even distrustful. Hence, their social relation with the scientists, and as how 'authentic' they judged them to be concerning a certain issue, directly influenced their assessment of governance for the respective issue discussed.

Tying this back to the aim to 'bring society into the lab', I may draw two conclusions.

Firstly, it is crucial that the lab society is lead into is a real lab, not a proxy laboratory merely set up for public display in which the messiness and the contradictions of scientific work have been wiped out for reasons of 'simplicity'. Such a clean picture will not create trust but appear to have been set up to deceive the public. It is the apparentness of tensions and contradictions, which creates a sense of authenticity and trust.

Secondly, it is interesting to note that in our material the way into the lab is only half way in establishing stable trust relations. Mechanisms of closure are at least as important. This implies considering how the public will again leave the lab to go on with their daily lives, to offer methods of closure which will allow the public to acknowledge and experience messiness and contradictions but at the same time trust that this messiness will be governed in predictable and acceptable ways as soon as they turn their gaze from the lab and return to their everyday context. In our context, the way this happened was by developing trust in the moral integrity and the ethos of the scientists.

This of course presupposes that the scientists are able to answer the challenges the questions of the laypeople may pose, and do not single-handedly deny their relevance, as the GOLD scientists did for the future consequences of their research. This points to an important conclusion to be drawn concerning the scientific ethos. It seems to be the case that while for traditional 'internal' issues such as animal experimentation scientists could draw on a normative framework to think about and argue their work. For the consequences of their work for society this was not the case. Hence, it seems that the ethos of science has not yet as well adapted to the new conditions of co-evolution as some optimistic accounts suggest (e.g. Nowotny, Scott & Gibbons 2001). To develop sustainable trust relations with society, it may hence be concluded to be crucial for science to extend its own reflexivity especially on its own impact on society, and to develop an ethos to address this issue.

13.3 Being Upstream, Without a Paddle[42]: On the Lack of Tools of Thought to Tackle the Questions of a Politics of the Future

The experience of the "Let's talk about GOLD!" project confirms that upstream engagement allows to ask more basic questions on the future techno-social trajectory of an innovation. However, asking questions is one thing, answering them at least tentatively is another. My work shows that a precondition to productively address these questions in an upstream setting is the development of methods and models of thought, which render the complexity as well as the inherent uncertainty of the possible future trajectories of a technoscience and its social context both comprehensible and discussable for the participants. This requirement however is not limited to public engagement, but applies to the way current societies learn to assess and develop their technosocial futures in general.

For public engagement, to this end it is of central importance that the participants reflexively develop an awareness of their own models of science in its relation to society. It is the implicitness of these models which on the one hand allows scientists to displace political debate downstream, and which on the other impedes a productive discussion on basic questions whose resolution is central to the success of upstream engagement.

One of the central aims of the "Let's talk about GOLD!" Round Tables was to establish an upstream setting in which 'the more basic questions' concerning the future impact of the knowledge produced in basic research on society could be discussed – and to analyse how this discussion took place.

Especially a majority of the participating laypeople were very active in trying to imagine future applications and consequences of the knowledge produced. Very much in the sense of an upstream governance of innovation they engaged in not only identifying and assessing risks of the knowledge produced, but they considered which constellations of scientific knowledge and social structures might be co-produced in the innovation process and how they are to be normatively assessed. They also considered in detail whether alternative pathways might be possible which could realise the same aims with different – to their perspective less negative – side effects. Concerning the obesity issue,

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[42] Wilsdon, Wynne & Stilgoe 2005

especially more 'psychological' and more 'natural' approaches were high on their agenda. However, reflecting on the discussion they themselves often found these 'upstream debates' to be very unsatisfactory.

On the one hand they did not feel able to transform the multitude of trajectories and options, which were imaginable to them into a limited number of discussable options which they could weigh according to their probability. Struggling to cope with uncertainty, they often expressed their difficulties to form an opinion before 'the facts' of the precise properties and consequences of an innovation were known. At the same time however, they were aware that at this point in time any intervention will very probably be too late, as institutional commitments will be strong.

On the other hand for them the picture of the related innovation system, of the actors relevant to the realisation of the respective innovation and their interrelatedness, was too complex and opaque. They could hardly imagine how an intervention which might change the system could look like, even if this intervention might be agreed on.

Both problems lead the laypeople to adopt a rather deterministic attitude towards the chances of influencing technoscientific development.

This impression was augmented by the fact that the scientists categorically rejected to discuss any future implications of their produced knowledge, basing their argument on a quite Mertonian model of an epistemic core of basic science untouched by political influences and debates which is strongly separated from application. In the previous chapter, I have described this as strategic boundary work to defend their professional autonomy. They were quite successful in this boundary work, their success mainly being related to the cultural dominance of the model they referred to. If we engage with the content of their arguments beyond their strategic intention however, also another interpretation is feasible. Not unlike the laypeople, they based their rejection of an alternative model and hence on the possibility of upstream discussions on their inability to imagine how precisely such a model could look like. They raised a couple of questions which to them – as to many laypeople – could not be answered in the frameworks of thought currently available to them. Typical examples of these questions were: In how far is the trajectory of an innovation open to societal influence, in how far is it determined by nature? In how far is it predictable? How could one assess the likeliness of certain trajectories and compare them to each other? Which actors can and should play a role in this process, and in which way? When is the right point in time to ask these questions, or

do they need to be asked continually all along the innovation process?

As a consequence, both laypeople and scientists strongly struggled with the challenges of upstream engagement. They lacked methods and models of thought which would have made a political process related to these upstream issues imaginable to them. It seems crucial to note that beyond the scope of this thesis this uncertainty of how to imagine, assess and come to terms with its technosocial future may very probably be said to be characteristic of current society. While promising better futures is becoming an ever more central resource (Felt & Wynne 2007) in technoscience, both science and society seem to lack models of thought and a semantic to truly debate the normative implications and the possibilities to influence these very futures.

Within public engagement settings however, any attempt to facilitate an upstream governance of the co-production of technoscientific innovations and society must be able to offer methods and models of thought which render these issues comprehensible and discussable to the participants.

A productive discussion of these questions in a participatory setting further seems to presuppose that the participants reflexively engage with their own implicit models of science in its relation to society. In the "Let's talk about GOLD project", it was the implicitness of these models which on the one hand allowed the scientists to displace political debates downstream, and which on the other hand impeded a productive discussion on basic questions whose resolution is central to the success of upstream engagement. Though both scientists and laypeople were puzzled by the same set of basic questions, they hardly found a common ground to discuss them because they grounded their arguments in very different implicit models of the relation of science to society.

13.4 Participating in Which Kind of Governance? – On the Rejection of the Classic Idea of Participation

Citizens (including scientists) do not a priori welcome the idea of public participation. Depending on the concrete technoscience/governance concerned (see 13.1), participation might or might not fit into their perception of the governance system and the relations between science and society.

In turn, a rejection of public participation by members of the public must not be read as a sign of political apathy in many cases, but rather be seen as based on the lack of perspective concerning the ends of participation, and most of all the institutional constellation of governance it is supposed to relate to.

Hence, initiators as well as organisers of ‚invited' forms of public participation need to both develop and offer a concrete vision of the aims as well as the governance system participation is meant to contribute to. In this, two issues are of crucial importance to be considered. Firstly, invited participation must not be seen as an exclusive representation of the public. Uninvited forms of civic engagement need to be seen as integral parts of the governance invited participation is to contribute to. Secondly, very often classic models of government are not seen as the main reference point by citizens, especially in upstream engagement. Hence, more complex visions of governance need to be developed.

Both in the academic as well as in the political discussion it is often more or less explicitly assumed that participation a priori is to be seen as a positive development, and hence will be asked for and welcomed by citizens. It may however also be argued that participation might also be seen as an element of a neo-liberal mode of governance, if this instrument is used to shift decisions and responsibilities of government to citizen groups. In the context of development aid, this has been captured by the phrase "Participation as Tyranny" (Cooke & Kothari 2002).

One of the most stunning results of the empirical work discussed is that laypeople did not unconditionally welcome public participation in any of the settings I have touched upon. As analysed in conclusion 13.1, their reasons for not doing so were closely tied to their perception of the respective technoscience/governance.

In the focus groups on organ transplantation, participants saw the state as the strong central actor, however they showed awareness that the current system is dependent on

the discretion and 'silent support' of an excluded public. A change in public participation – shifting the public from the role of a silent supporter to a more active one – might thus endanger the organization of organ transplantation in the Austrian context, which was seen as unwanted by virtually all participants.

In the discussions on genetic testing the governance system was described as complex and difficult to grasp. The state was virtually absent in the debate and could best be described as weak and steered by a changing set of actors who were mainly driven by economic interests. Hopes for public participation were thought to be illusory, in the sense that there would be little potential impact without a central powerful political actor to be addressed. Participants even feared that participatory structures might even be lending the legitimacy of democratic procedures to the vested interests of these actors who might 'manipulate' the public.

In the "Let's talk about GOLD!" project, as I have sketched in detail in conclusion 13.3, participants found it very hard both to pin down the actors relevant to governance and their relations, as well as to imagine a political process in which the challenges of upstream engagement might be addressed. They however agreed on the weakness of government as an actor both in these networks as well as in this political process. Hence, they were quite sceptical concerning the classical idea of public participation as an input to the governmental policy process, and rejected taking up any role related to such an idea. They tried to imagine alternative means of enacting participation, which however often remained rather vague or closely tied to the concrete setting of the Round Table.

However, in none of the settings the reasons why participation was judged critically were grounded in the personal disinterest of the participants in the political process, or in any other kind of political apathy. On a general normative level, participation was nearly always judged to be positive. However, this general idea of participation did not fit with their perception of the respective technoscience/governance, for different reasons. One reason for this might be, as was the case for organ transplantation, that the respective field is seen as well governed and that any intervention might cause more harm than it does any good.

For the technoscientific settings in which participation is more often conducted however, the experience from the two other settings seem to be of stronger relevance. In both cases participants were hardly able to identify any ordered system of governance to which they could relate their ideas of public participation. They found that known modes of

governing such as government or a self-governance of science could not adequately describe their respective impressions, but could not develop any concrete vision beyond that. Instead they invoked rather opaque and confused network-shaped visions of governance, whose relation to public participation was at best unclear. In the worst case however, they suspected secret powers to be at work behind this opaque system, which were feared to misuse public participation to legitimate their own particular interests.

Under such circumstances, which might very well be quite characteristic of upstream engagement, in order to enable participants to engage with the respective technoscience/governance organisers of ‚invited' forms of public participation need to both develop and offer a concrete vision of the aims as well as the governance system participation is meant to contribute to. In this, two issues are of crucial importance to be considered. Firstly, invited participation must not be seen as an exclusive representation of the public. Uninvited forms of civic engagement need to be seen as integral parts of the governance invited participation is to contribute to. Also our participants voiced a deeply felt uneasiness to be seen as 'the' representation of the public and hence possibly as silencing others who wish to speak up for themselves. Secondly, as discussed above, very often classic models of government are not seen as the main reference point by citizens, especially in upstream engagement. Hence, more complex visions of governance than to give an input to the governmental policy process need to be developed.

14 Beyond the Cases: Whose Responsibility? Towards a New Expertise of Community

The challenges for more fruitful public participation I have lined out in the previous conclusion require new forms of an 'expertise of community'. STS seems in a strong position to provide these new forms of expertise, but at present seems to lack both the disciplinary self-confidence as well as the competences necessary to effectively stage them (Hilgartner 2000).

However, to put it strongly, if its democratic commitment is as strong as both its history as well as the rhetoric of its proponents suggest, then to be worth its salt it will need to develop the forms of expertise and to produce new experts of community which might facilitate these interactions between science, politics and the public. This means both doing research and establishing training programmes, which develop both the necessary academic knowledge, as well as methods and skills to translate them and make them accessible to a wider public. If STS knowledge is to become part of civic epistemologies, then it will have to stand the trial of public proof (Jasanoff 2005).

The previous chapter has proposed four hypotheses how participation, and especially upstream engagement might be enacted and constructed in a more fruitful way. In doing this, four sets of requirements have been lined out - which do not seem easy to fulfil.

- The first conclusions addressed to the importance to consider the specificities of the respective technoscientific setting and of its governance structures.
- Secondly, I have argued that in order to build sustainable trust relations it is necessary to allow citizens to come 'into science' and experience the complexity and messiness of scientific work. However, it seems central to add that it is at least as crucial to offer models and tools, which enable them to grasp and comprehend this complexity without simplifying it. Further, also the scientists seem to be in need of advice on how to extend their ethos to address issues of societal responsibility.
- The third conclusion pointed to the importance of developing methods and models of thought to render the complexity as well as the inherent uncertainty of the possible future trajectories of a technoscience and its social context both

comprehensible and discussable. Especially a reflexive dealing with implicit models of science in its relation to society is central in this respect.

- And finally I have concluded how important it is to offer those participating a concrete vision of the governance system participation is meant to contribute to.

These are by no means requirements, which are fulfilled easily. To put them into practice requires detailed knowledge on the respective technoscientific fields, as well as on the general relation of science and society. Standardised designs carried out by public relations bureaus will be hardly up to the task. A new kind of an 'expertise of community' seems needed to produce the political impulses expected from public participation. Now, who could provide this expertise?

In order to answer this question I shortly would like to point back to the empirical basis of my results. The conclusions proposed here are based on my account of the problems and perplexities of our participants – and their will to share these with us researchers. Given that we were the 'experts of community' who set up the very experiments, which resulted in this perplexity, it seems naïve to treat these results as objective facts independent from their respective context of production. So, who is to 'blame' for this confusion? Partially, to my belief, my colleagues and I are. In the introduction to this thesis I have mentioned the differentiated ways in which STS has analysed different fields in the biosciences; I have written on how much we know about trust and the relations between technosciences and their publics, and outlined our repertoire of models of thought to grasp how science works and how social and political factors influence its processes of innovation. And last who but we should have detailed knowledge about the governance structures of the fields we are staging public participation in.

It is not that we did not have all this knowledge, or that it had not influenced our design. However we did not as openly use it in the discussion and did not make it accessible to our participants in a way which might have prevented at least some of these problems – in the Round Table setting, because this only seems imaginable in a more long term setting. A major reason for this to my view is that using Galison's (1998) terminology we were partially still caught in a model of representing our participants' opinion on these issues which resembles his concept of mechanical objectivity. We tried to create appropriate boundary conditions for our own experiments, however we also aimed at influencing the actual interaction processes in the participatory setting as little as possible, in order to remain 'neutral'.

Looking back, a role which more strongly resembles Galison's concept of "judgement" in my view very probably would have been more productive – in the sense of an intervention which is based on our own knowledge and which helps to render the process of representing public opinion more fruitful and the resulting picture may be sharper. That does not mean to reject the ideal of neutrality, which however needs to be given another meaning. In this respect, it seems crucial to render the background of these interventions as transparent as possible to those participating, and hence in the end letting them judge on the matter of the neutrality of the facilitation.

An important part of Galison's argument on the difference between "mechanical objectivity" and "judgement" is related to the self-confidence of the respective scientific discipline. In his argument, the less strong a discipline did historically perceive its own position, the more it tended to guise its expertise in the seemingly factual nature of mechanical objectivity. STS seems in a strong position to meet the requirements I have sketched and provide these new forms of expertise, but at present seems to lack both the disciplinary self-confidence as well as the competences necessary to effectively stage them (Hilgartner 2000).

However, to put it strongly, if its democratic commitment is as strong as both its history and the rhetoric of its proponents suggests, then to be worth its salt it will need to develop the respective forms of expertise and to produce new experts of community which might facilitate these interactions between science, politics and the public. This means both doing research and establishing academic training programmes which produce both the necessary academic knowledge, as well as methods and skills to translate it and make it accessible to a wider public. If STS knowledge is to become part of civic epistemologies (Jasanoff 2005), then it will have to stand the trial of public proof.

15 References

Abelson, Julia, Forest, Pierre, Eyles, John, Smith, Patricia, Martin, Elisabeth & Gauvin, Francois-Pierre (2003) 'Deliberations about deliberative methods: issues in the design and evaluation of public participation processes' *Social Science and Medicine* 57: 239-251.

Akrich, Madeleine (1992) 'The de-scription of technical objects', in J. Law (ed.) *Shaping Technology / Building Society. Studies in Sociotechnical Change* (Cambridge, MA: MIT Press): 205-224.

Andersen, Ida-Elisabeth & Jæger, Birgit (1999) 'Scenario workshops and consensus conferences: Towards more democratic decision-making' *Science and Public Policy* 26 (5): 331-340.

Anderson, Benedict (1983) *Imagined Communities. Reflections on the Origin and Spread of Nationalism* (London: Verso).

Armstrong, David (2002) 'The rise of surveillance medicine', in S. Nettleton & U. Gustafsson (eds.) *The Sociology of Health and Illness Reader* (Cambridge: Polity Press): 112-118.

Barry, Andrew (2001) *Political Machines. Governing a Technological Society* (London: Athlone Press).

Beck, Ulrich (1997) *The Reinvention of Politics: Rethinking Modernity in the Global Social Order* (Cambridge: Polity Press).

Bloor, David (1976) *Knowledge and Social Imagery* (Chicago: University of Chicago Press).

Bloor, Michael, Franklin, Jane, Thomas, Michelle & Robson, Kate (2001) *Focus Groups in Social Research* (London/Thousand Oaks/New Delhi: Sage).

Bogner, Alexander (2003) *Partizipative Politikberatung am Beispiel der BürgerInnenkonferenz 2003 (Analyse). Endbericht*: Institut für Technikfolgen-Abschätzung, im Auftrag des Rats für Forschungs und Technologieentwicklung und des Wiener Wissenschafts- und Technologiefonds.

Brown, Nik, Rappert, Brian & Webster, Andrew (eds.) (2000) *Contested Futures. A Sociology of Prospective Techno-Science* (Aldershot: Ashgate).

Brown, Nik & Michael, Mike (2002) 'From authority to authenticity: the changing governance of biotechnology' *Health, Risk & Society* 4 (3): 259-272.

Bundesministerium für Wissenschaft und Verkehr (bm:wv) (1999) *Grünbuch zur Österreichischen Forschungspolitik* (Wien).

Bunton, Robin, Nettleton, Sarah & Burrows, Roger (eds.) (1995) *The Sociology of Health Promotion. Critical Analyses of Consumption, Lifestyle and Risk* (London: Routledge).

Chalmers, Alan (1999) *What's this thing called science?* (Indianapolis: Hackett).

Clarke, Adele, Shim, Janet, Mamo, Laura, Fosket, Jennifer Ruth & Fishman, Jennifer (2003) 'Biomedicalization: Technoscientific transformations of health, illness and U.S. biomedicine' *American Sociological Review* 68: 161-194.

Collins, Harry (1981) 'The Role of the Core-Set in Modern Science: Social Contingency with Methodological Propriety in Science' *History of Science* 19: 6-19.

Collins, Harry & Evans, Robert (2002) 'The third wave of Science Studies: Studies of expertise and experience' *Social Studies of Science* 32 (2): 235-296.

Conrad, Peter (1992) 'Medicalization and social control' *Annual Review of Sociology* 18: 209-232.

Cooke, Bill & Kothari, Uma (2002) *Participation: The New Tyranny* (London: Zed Books).

Dutch Consumer and Biotechnology Foundation (2001) *Xenotransplantation: Is and should it be possible? Final report in respect of the public debate on xenotransplantation* (Den Haag: Dutch Consumer and Biotechnology Foundation).

Durant, John, Evans, Geoffrey & Thomas, Geoffrey (1989) 'The public understanding of science' *Nature* (340): 06 July 1989, 11– 14.

Einsiedel, Edna, Jelsoe, Erling & Breck, Thomas (2001) 'Publics at the technology table: the consensus conference in Denmark, Canada and Australia' *Public Understanding of Science* 10 (1): 83-98.

Epstein, Steven (1996) *Impure Science; Aids, Activism and the Politics of Knowledge* (Berkeley: University of California Press).

European Commission (2000a) *The Lisbon European council – an agenda of economic and social renewal for Europe* (Brussels: European Commission).

European Commission (2000b) *Science, society and the citizen in Europe* (Brussels: European Commission).

European Commission (2001) *European Governance: A White Paper* (Brussels: European Commission).

European Commission (2002) *Science and Society - Action Plan* (Luxemburg: Office for Official Publications of the European Communities).

European Commission (2004a) *Increasing Human Resources for Science and Technology in Europe* (Luxemburg: Office for Official Publications of the European Communities).

European Commission (2004b) *Governance of the European Research Area: Giving Society a Key to the Lab* (Luxemburg: Office for Official Publications of the European Communities).

European Commission (2005a) *Europeans, Science and Technology. Special Eurobarometer* (Brussels: European Commission).

European Commission (2005b) *Proposal for a Council Decision on the Specific Programme: "Capacities" implementing the 7th Framework Programme (2007-2013) of the European Community for research, technological development and demonstration activities* (Brussels: European Commission).

European Commission (2005c) *Science in Society Forum 2005: Setting the Stage.* (Brussels: European Commission).

Felt, Ulrike (2003a) 'Science, science studies and their publics: speculating on future relations', in: B. Joerges & H. Nowotny (eds.) *Social Studies of Science and Technology. Looking Back, Ahead* (Kluwer: Dordrecht).

Felt, Ulrike (ed.) (2003b) *Optimising Public Understanding of Science in Europe* (OPUS Final Report), available from www.univie.ac.at/virusss/opus (accessed October 30 2007).

Felt, Ulrike, Fochler, Maximilian & Müller, Annina (2003) *Sozial Robuste Wissenspolitik: Analyse des Wandels von dialogisch orientierten Interaktionen zwischen Wissenschaft, Politik und Öffentlichkeit. Expertise to the Office of Technology Assessment of the German Parliament* (Vienna: Department of Social Studies of Science).

Felt, Ulrike, Fochler, Maximilian & Strassnig, Michael E*valuierung des Diskurstages "Gendiagnostik" (Wien, 24.10.2002)*: Abschlussbericht eines Forschungsprojektes im Auftrag des bm:bwk, 2003 .

Felt, Ulrike, Fochler, Maximilian & Müller, Annina (2006) 'Sozial Robuste Wissenspolitik? Analyse partizipativ orientierter Interaktionen zwischen Wissenschaft, Politik und Öffentlichkeit im österreichischen Kontext', in E. Buchinger & U. Felt (eds.), *Technik- und Wissenschaftssoziologie in Österreich: Stand und Perspektiven* (Wiesbaden: Verlag für Sozialwissenschaften): 103-130.

Felt, Ulrike & Wynne, Brian (2007) *Taking European knowledge society seriously. Report to the Expert Group on Science and Governance to the Science, Economy and Society Directorate, Directorate-General for Research, European Commission.* (Brussels: European Commission).

Felt, Ulrike, Fochler, Maximilian, Mager, Astrid & Winkler, Peter (in press a) 'Visions and versions of governing biomedicine: Narratives on power structures, decision making, and public participation in the field of biomedical technologies in the Austrian context' *Social Studies of Science*.

Felt, Ulrike, Fochler, Maximilian, Müller, Annina & Strassnig, Michael (in press b) 'Unruly ethics: On the difficulties of a bottom-up approach to ethics in the field of genomics' *Public Understanding of Science*.

Felt, Ulrike, Fochler, Maximilian & Winkler, Peter (manuscript): 'Tracing technopolitical cultures in coming to terms with biomedical technologies: A comparative analysis in focus groups on organ transplantation and genetic testing in Austria, France and the Netherlands'.

Fleck, Ludwik ([1981 [1935]]) *Entstehung und Entwicklung einer wissenschaftlichen Tatsache. Einführung in die Lehre vom Denkstil und Denkkollektiv* (Frankfurt am Main: Suhrkamp).

Fochler, Maximilian (2003) *Magic Bullets with Butterfly Wings: The Cooperation between Experts and Laypeople in the Patients' Association Debra Austria and its Research Initiatives* (Univ. Vienna: Master Thesis)

Fochler, Maximilian & Müller, Annina (2006) *Vom Defizit zum Dialog? Zum Verhältnis von Wissenschaft und Öffentlichkeit in der europäischen und österreichischen Forschungspolitik* (Vienna: ITA manu:script), available from http://epub.oeaw.ac.at/ita/ita-manuscript/ita_06_04.pdf (accessed October 30 2007).

Foucault, Michel (1991 [1979]) 'Governmentality', in G. Burchell, C. Gordon & P. Miller (eds.), *The Foucault Effect: Studies in Governmentality* (Hemel Hempstead: Harvester Wheatsheaf): 87-104.

Galison, Peter (1998): 'Judgment against Objectivity', in: C. Jones & P. Galison (eds.): *Picturing Science Producing Art* (New York: Routledge): 327-360.

Gerold, Rainer & Liberatore, Angela (2001) *Democratising Expertise and Establishing Scientific Reference Systems: Report of the Working Group 1b for the White Paper on Governance.* (Brussels: European Commission).

Giddens, Anthony (1984) *The Constitution of Society. Outline of the Theory of Structuration* (Cambridge: Polity Press).

Giddens, Anthony (1991) *Modernity and Self-Identity: Self and Society in the Late Modern Age* (Stanford: Stanford University Press).

Gieryn, Thomas (1995) ,Boundaries of Science', in: S. Jasanoff, J. Markle, J. Petersen & T. Pinch *Handbook of Science and Technology Studies* (Thousand Oaks: Sage): 393-443.

Gieryn, Thomas (1999) *Cultural Boundaries of Science. Credibility on the Line* (Chicago: Univ. Chicago Press).

Gisler, Priska (2002): *Wissenschaftliche Berichte zum Runden Tisch Wasser*, available from http://www.eawag.ch/news/science_et_cite/wb/ (accessed October 30 2007).

Gottweis, Herbert (2005) ,Governing Genomics in the 21st Century: Between Risk and

Uncertainty' *New Genetics and Society* 24 (2): 175-194.

Grabner, Petra, Peissl, Walter & Torgersen, Helge (2002) 'Austria: Methodological Innovations from a Latecomer', in: S. Joss & S. Bellucci (eds.) *Participatory Technology Assessment: European Perspectives* (Gateshead: Athenaeum Press): 61-74.

Grove-White, Robin, Macnaghten, Phil & Wynne, Brian (2000) *Wising Up: The Public and New Technologies* (Research report by the Centre for the Study of Environmental Change: Lancaster University).

Hagendjik, Rob (2004) 'The public understanding of Science and Public Participation in Regulated Worlds' *Minerva* 42 (1): 41–59.

Hagendijk, Rob & Irwin, Alan (2006) 'Public Deliberation and Governance. Engaging with Science and Technology in Contemporary Europe' *Minerva* 44 (2): 167-184.

Heurtin, Jean-Philippe (2005) 'The Circle of Discussion and the Semicircle of Criticism', in: B. Latour & P. Weibel (eds.) *Making Things Public. Atmospheres of Democracy* (Karlsruhe/Cambridge, Mass.: ZKM/MIT Press): 754-769.

Hilgartner, Steven (2000) *Science on Stage. Expert Advice as Public Drama* (Stanford: Stanford University Press).

Hohmann, Elmar Sebastian (2003) *Das Transplantationswesen in Deutschland, Österreich und der Schweiz. Unter Einbeziehung ethischer und rechtspolitischer Aspekte* (Frankfurt a.M.: Peter Lang).

Hughes, Thomas (1983) *Networks of Power: Electrification in Western Society 1880-1930* (Baltimore: Johns Hopkins).

Irwin, Alan (2001) 'Constructing the Scientific Citizen: Science and Democracy in the Biosciences' *Public Understanding of Science* 10 (1): 1-18.

Irwin, Alan (2006) 'The Politics of Talk: Coming to Terms with the 'New Scientific Governance'' *Social Studies of Science* 36(2): 299–320.

Irwin, Alan & Michael, Mike (2003) *Science, Social Theory and Public Knowledge* (Maidenhead: Open University Press).

Jasanoff, Sheila (2003) 'Technologies of Humility: Citizen Participation in Governing Science' *Minerva* 41 (3): 223–244.

Jasanoff, Sheila (ed.) (2004) *States of Knowledge. The Co-Production of Science and the Social Order* (London: Routledge).

Jasanoff, Sheila (2005) *Designs on Nature: Science and Democracy in Europe and United States* (Princeton: Princeton University Press).

Jordan, Andrew, Wurzel, Rüdiger & Zito, Anthony (2005) 'The Rise of "New" Policy Instruments in Comparative Perspective: Has Governance Eclipsed Government?' *Political Studies* 53 (3): 477-496.

Joss, Simon & Bellucci, Sergio (eds.) (2002) *Participatory Technology Assessment: European Perspectives* (Gateshead: Athenaeum Press).

Kay, Lily (2000) *Who wrote the Book of Life? A History of the Genetic Code* (Stanford: Stanford University Press).

Keating, Peter & Cambrosio, Alberto (2003) *Biomedical platforms: realigning the normal and the pathological in late-twentieth-century medicine* (Cambridge/Mass.: MIT Press).

Keller, Evelyn Fox (1992) 'Nature, Nurture, and the Human Genome Project', in: D. J. Kevles & L. Hood (eds.) *The Code of Codes. Scientific and Social Issues in the Human Genome Project* (Cambridge: Harvard University Press): 281-300.

Klüver, Lars (2002) 'Denmark: Participation: a Given in Danish Culture', in S. Joss & S. Bellucci (eds.), *Participatory Technology Assessment: European Perspectives* (Gateshead: Athenaeum Press): 75-91.

Knorr-Cetina, Karin (1981) *The manufacture of knowledge: An essay on the constructivist nature of science* (Oxford: Pergamon Press).

Krohn, Wolfgang & Weyer, Johannes (1994) 'Society as a Laboratory: the social risks of experimental research' *Science and Public Policy* 21 (3): 173-183.

Kuhn, Thomas (1962) *The Structure of Scientific Revolutions* (Chicago: Univ. Chicago Press).

Lambert, Helen & Rose, Hilary (1996) 'Disembodied Knowledge? Making Sense of Medical Science', in: A. Irwin & B. Wynne (eds.) *Misunderstanding Science? The Public Reconstruction of Science and Technology* (Cambridge: Cambridge University Press) 65-83.

Latour, Bruno (1987) *Science in Action: How to Follow Scientists and Engineers through Society*, (Cambridge/Mass.: Harvard University Press).

Latour, Bruno (1991) 'Technology is society made durable', in: J. Law (ed.) *A Sociology of Monsters. Essays on Power, Technology and Domination* (London: Routledge): 103-131.

Latour, Bruno (1992) 'Where are the missing masses? Sociology of a few mundane artefacts', in: W. Bijker & J. Law (eds.) *Shaping Technology-Building Society. Studies in Sociotechnical Change* (Cambridge, Mass.: MIT Press): 225-259.

Latour Bruno (1993) *We Have Never Been Modern* (New York: Harvester Wheatsheaf).

Latour, Bruno (1998) 'From the World of Science to that of Research?' *Science* 280 (5361), 10th April 1998: 208-209.

Latour, Bruno (2004) *Politics of Nature. How to Bring the Sciences into Democracy* (Cambridge, Mass.: Harvard University Press).

Latour, Bruno (2005) *Reassembling the Social. An Introduction to Actor-Network-Theory* (Oxford: Oxford University Press).

Law, John (1986) 'On the Methods of Long Distance Control: Vessels, Navigation and the Portuguese Route to India', in: J. Law (ed.) *Power, Action and Belief: A new sociology of knowledge* (Henley: Routledge): 234-263.

Law, John (2004) *After Method: Mess in Social Science Research* (Oxon/New York: Routledge).

Law, John & Urry, John (2004) 'Enacting the Social' *Economy and Society* 33 (3): 390-410.

Leshner, Alan (2003) 'Public Engagement with Science' *Science* 299 (14 February 2003): 977.

Levy-Leblond, Jean-Marc (1992) 'About Misunderstandings about Misunderstandings' *Public Understanding of Science* 1 (1): 17-22.

Limoges, Camille (1993) 'Expert knowledge and decision-making in controversy contexts' *Public Understanding of Science* 2 (4): 417-426.

Luhmann, Niklas (1998) *Die Gesellschaft der Gesellschaft* (Frankfurt/Main: Suhrkamp).

Lupton, Deborah (1997) 'Consumerism, Reflexivity and the Medical Encounter' *Social Science & Medicine* 45 (3): 373-381.

MacKenzie, Donald A. (1981) *Statistics in Britain: 1865 -1930. The Social Construction of Scientific Knowledge* (Edinburgh: Edinburgh Univ. Press).

Macnaghten, Phil, Kearnes, Matthew B. & Wynne, Brian (2005) 'Nanotechnology, governance, and public deliberation: What role for the social sciences?' *Science Communication* 27(2): 268-291.

Marris, Claire, Wynne, Brian, Simmons, Peter & Weldon, Sue (2001) *Public perceptions of agricultural biotechnologies in Europe. Final report of the PABE research project* Available from http://csec.lancs.ac.uk/pabe/docs/pabe_finalreport.pdf (accessed July 31 2007).

Mehta, Michael D. (2004) 'From biotechnology to nanotechnology: What can we learn from earlier technologies?' *Bulletin of Science, Technology & Society* 24 (1): 34-39.

Merton, Robert K. (1973 [1942]) 'The Normative Structure of Science', in: R. K. Merton *The Sociology of Science: Theoretical and Empirical Investigations* (Chicago: University of Chicago Press).

Michael, Mike (1992) 'Lay Discourses of Science: Science-in-General, Science-in-Particular, and Self' *Science, Technology, & Human Values* 17 (3): 313-333.

Michael, Mike (2002) 'Comprehension, Apprehension, Prehension: Heterogeneity and the Public Understanding of Science' *Science, Technology, & Human Values* 27 (3): 357-378.

Michael, Mike & Brown, Nik (2005) 'Scientific Citizenships: Self-representations of Xenotransplantation's Publics', *Science as Culture* 14 (1): 39-57.

Miller Clark A. (2001) 'Hybrid Management: Boundary Organizations, Science Policy, and Environmental Governance in the Climate Regime' *Science, Technology, & Human Values* 26 (4): 478-500.

Miller, Clark A. (2004) 'Interrogating the Civic Epistemology of American Democracy: Stability and Instability in the 2000 US Presidential Election' *Social Studies of Science* 34 (4): 501-530.

Müller, Ruth (2007) *The One is the Many: Co-producing Individuals and Collectives in Genetic Testing for Hereditary Breast and Ovarian Cancer* (Univ.Vienna: Master Thesis)

Nature (2006) 'Science under attack (editorial)' *Nature* 439: 891 (22 February 2006).

Nature (2007) 'Enough talk already (editorial)' *Nature* 448: 1-2 (5 July 2007).

Nettleton, Sarah (2004) 'The Emergence of E-Scaped Medicine' *Sociology* 38 (4): 661-679.

Novas, Carlos & Rose, Nikolas (2000) 'Genetic Risk and the Birth of the Somatic Individual' *Economy and Society* 29 (4): 485-513.

Nowotny, Helga, Scott, Peter & Gibbons, Michael (2001) *Re-Thinking Science: Knowledge and the Public in an Age of Uncertainty* (Cambridge: Polity Press).

Lord Phillips, Bridgeman, June & Ferguson-Smith, Malcolm (2001) *The Bovine Spongiform Encephalopathy (BSE) Inquiry (The Philips Inquiry)* (London: The Stationery Office).

Pinch, Trevor & Bijker, Wiebe E. (1987) 'The Social Construction of Facts and Artifacts: Or how the Sociology of Science and the Sociology of Technology Might Benefit Each Other', in: W. Bijker, T. Pinch & T. Hughes (eds.) *The Social Construction of Technological Systems. New Directions in the Sociology and History of Technology* (Cambridge, Mass.: MIT Press): 17-50.

Popper, Karl (1959 [1934]) *The logic of scientific discovery* (New York: Basic Books).

Rabeharisoa, Vololona & Callon, Michel (1999) *Le pouvoir des malades: L'Association française contre les myopathies et la recherche* (Paris: Les Presses de l'École des Mines).

Rabinow, Paul (1996) 'Artificiality and Enligthenment: From Sociobiology to Biosociality', in: P. Rabinow *Essays on the Anthropology of Reason* (Princeton: Princeton University Press): 91-111.

Rey, Lucienne (2002) *'Publifocus zur Forschung an embryonalen Stammzellen. Bericht eines Mitwirkungsverfahrens'* (Bern: TA-SWISS).

Rhodes, Rod A.W. (1996) 'The New Governance: Governing Without Government' *Political Studies* 44 (4): 652-67.

Rose, Nicolas (1999) *Powers of Freedom: Reframing political thought* (Cambridge: Cambridge University Press).

Rose, Nicolas (2007) *The Politics of Life Itself. Biomedicine, Power, and Subjectivity in the Twenty-First Century* (Princeton: Princeton University Press).

Rowe, Gene & Frewer, Lynn (2004) 'Evaluating Public-Participation Exercises: A Research Agenda' *Science, Technology, & Human Values* 29 (4): 512-56.

Royal Society, The (1985) *The Public Understanding of Science* (London: The Royal Society).

Sanner, Margareta (2002) 'Exchanging Spare Parts or Becoming a New Person? People's Attitudes toward Receiving and Donating Organs', in: S. Nettleton & U. Gustafsson (eds.) *The Sociology of Health and Illness Reader* (Cambridge: Polity Press).

Schiebinger, Londa (1989) *The mind has no sex? Women in the origins of modern science* (Cambridge, Mass.: Harvard Univ. Press).

Schiebinger, Londa (1993) *Nature's body: gender in the making of modern science* (Boston, Mass.: Beacon Press).

Seifert, Franz (2006) 'Local steps in an international career: a Danish-style consensus conference in Austria' *Public Understanding of Science* 15 (1): 73-88.

Shapin, Steven (1978) 'The politics of observation: Cerebral anatomy and social interests in the Edinburgh phrenological debates', in: R. Wallis (ed.) *On the margins of science: The social construction of rejected knowledge* (Keele: University of Keele): 139-178.

Shapin, Steven & Schaffer, Simon (1985) *Leviathan and the air-pump: Hobbes, Boyle, and the experimental life* (Princeton: Princeton Univ. Press).

Stehr, Nico (2003) *The Governance of Knowledge* (New Brunswick: Transaction Books).

Stengers, Isabelle (1998) *Wem dient die Wissenschaft?* (München: Gerling Akademischer Verlag).

Steyaert, Stef, Lisoir, Hervé & Nentwich, Michael (2006) (eds.) *Leitfaden Partizipativer Verfahren. Ein Handbuch für die Praxis* (Brussels/Vienna: Flemish Institute for Science and Technology Assessment/King-Baudouin-Foundation/Institut für

Technikfolgen-Abschätzung).

Strauss, Anselm & Corbin, Juliet (2000) *Basics of Qualitative Research: Techniques and Procedures* (Thousand Oaks: Sage).

Stoker, Gerry (1998) 'Governance as Theory: Five Propositions', *International Social Science Journal* 50 (155): 17-28.

Wilsdon, James & Willis, Rebecca (2004) *See-through Science: Why Public Engagement Needs to Move Upstream* (London: Demos).

Wilsdon, James, Wynne, Brian & Stilgoe, Jack (2005) *The Public Value of Science. Or How to Ensure that Science really Matters* (London: Demos).

Winner, Langdon (1980) 'Do Artifacts Have Politics?' *Daedalus* 109 (1): 121-136.

Wynne, Brian (1992) 'Misunderstood Misunderstanding: Social Identities and Public Uptake of Science' *Public Understanding of Science* 1 (3): 281-304.

Wynne, Brian (1995) 'Public Understanding of Science', in: S. Jasanoff, J. Markle, J. Petersen & T. Pinch *Handbook of Science and Technology Studies* (Thousand Oaks: Sage): 361-388.

Wynne, Brian (1996) 'May the Sheep Safely Graze? A Reflexive View of the Expert-Lay Knowledge Divide', in: S. Lash, B. Szerzynski & B. Wynne (eds.) *Risk, Environment and Modernity. Towards a New Ecology* (London: Sage): 44-83.

Wynne, Brian (2005) 'Risk as Globalising ‚Democratic' Discourse? Framing Subjects and Citizens', in: M. Leach, I. Scoones & B. Wynne (eds.) *Science and Citizens. Globalization and the Challenge of Engagement* (London: Zed): 66-82.

Zilsel, Edgar (2003 [1942]) *The Social Origins of Modern Science* (Dordrecht: Kluwer Academic Publishers).

Zürn, Michael (1998) *Regieren jenseits des Nationalstaates: Globalisierung und Denationalisierung als Chance* (Frankfurt am Main: Suhrkamp).

Annex: Original Quotations

Q1:

" [...] in einzelnen – vor allem kontroversiellen– Fragen [...] von hohem Skeptizismus und Ängsten bis hin zu völliger Ablehnung wissenschaftlicher Entwicklung bei gleichzeitig niedrigem Kenntnisstand geprägt" (bm:wv 1999, 81-82)

Q2:

"Den wissenschaftlichen und technologischen Fortschritt zu akzeptieren, die wesentlichen Inhalte im Ansatz zu verstehen setzt Veränderungsbereitschaft in der Bevölkerung voraus. Vorbedingung dieser Bereitschaft ist jedoch ein offener Dialog zwischen Scientific Community und der Gesellschaft, der erst Verständnis für den Nutzen der Forschung in der und für die Gesellschaft begründet." (bm:wv 1999, 8)

Q3:

P5m: „[...] dass wir sozusagen glücklicherweise in Österreich in einer Situation sind, wo das Gesetz eigentlich sehr vernunftbegründet ist irgendwie, auch wenn jetzt das sich geschichtlich erklärt usw., und es keine Entscheidung der Österreicher war." (OTaff: 75)

Q4:

P5m: „[...] auch finde ich, nicht nur für die persönlich Entscheidung, sondern auch was die Entscheidung eines ganzen Staates anbelangt, die Gesetzgebung usw., finde ich schon, wir sind in der glücklichen Lage auf Einzelfälle Rücksicht nehmen zu können, falls sich jemand doch dagegen entscheiden sollte, weil wir eben viele Organe haben in Österreich, aber (.) was die Gesetzgebung und die allgemeine Entscheidung eines Staates anbelangt, finde ich auch definitiv, dass man rationale Überlegungen da über (.) religiöse oder welche Vorstellungen auch immer stellen sollte." (OTaff:175)

Q5:

P13f: „Das ist ein Zustand der Rechtlosigkeit so was." (OTlay: 299)

Q6:

P18f: „Der Mensch hat schon seinen eigenen Willen und sollte das schon bestimmen zu Lebzeiten, was er nachher gern machen möchte. Dass der Staat sagt, wenn keine Antwort vorliegt, dann entnehmen wir die Organe - finde ich jetzt nicht richtig und auch nicht ethisch, und das, da setzt er sich einfach in eine Position, die er einfach nicht hat, weil der Staat darf nicht so über den Menschen verfügen, denke ich." (OTlay: 139)

Q7:

P11m: „Der hat immer noch seine Rechte, seine Menschenrechte, der hat immer noch seine Würde, seine Menschenwürde, und die kann ich ihm einfach nicht nehmen, nur mit der Begründung: ich könnte jetzt einen anderen Menschen damit retten. Ich kann die Menschen da gegenseitig nicht ausspielen." (OTlay:37)

Q8:

P11m: „[...] sie können sich wahrscheinlich auch nicht wirklich mit ethischen Fragen beschäftigen." (OTlay: 355)

Q9:

P11m: „[...] diese Frage möchte ich auf keinen Fall allein den Medizinern überlassen, weil Mediziner ja leider auch dazu neigen jetzt Menschen auf Organe zu reduzieren, das kommt einfach aus ihrem Berufsalltag heraus." (OTlay: 355)

Q10:

P3f: „Ich als Betroffene, ich würde mir auch nicht wünschen, dass sich was ändert. Also, das System, das jetzt aufgebaut ist, also das Transplantationswesen funktioniert anscheinend, in Wien vor allem, sehr sehr gut. [...] Ich würde auch befürchten, wenn man öffentlich das diskutiert, dass viele Leute eben (.) nachdenken und dann eher halt sich wirklich in dieses Widerspruchsregister eintragen lassen, und dass wir dann halt, wie jetzt, wie's halt in Deutschland ist, auf ein Organ viel länger warten müssten. [...] Also, ich würde mich da eher fürchten, wenn eben, so wie Sie gesagt haben, wenn Leute, die nicht sehr viel davon verstehen, plötzlich mitreden. Und ihre Gedanken doch mehr jetzt gefühlsbetont rüberkommen und nicht aus der eigenen Erfahrung und Betroffenheit." (OTaff: 570)

Q11:

P5m: „ [...] Und das Modell finde ich z.B. sehr sehr vernünftig. Nur, ich finde, dass bei der Organtransplantation das im Moment nicht notwendig ist eigentlich, weil wir ein Gesetz haben, mit dem eigentlich alle doch sehr zufrieden sind irgendwie, ja. Und wenn das einmal nicht mehr der Fall sein sollte, dann wird das wahrscheinlich ja in der politischen Diskussion irgendwann einmal auf's Tapet kommen und dann (.) kommt auch dieses ganze demokratische Entscheidungsfindungsprozedere in Gang und es gibt Wahlen usw., aber ich finde das im Moment nicht notwendig eigentlich, ja, da irgendwas in Frage zu stellen." (OTaff: 568)

Q12:

P15m: „[...] Man kann so was aber nicht immer durch die populäre Diskussion der Öffentlichkeit regeln, weil Leute haben oft sehr komische Gedanken. Fragen Sie einmal die Leute z.B. wie

viele genetisch nicht-veränderte Tomaten trotzdem Gene enthalten. 35% der Menschen werden Ihnen sagen: biologische Tomaten haben keine Gene. Menschen sind einfach nicht...″

P11m: „Es ist ja nicht die Frage, ob die Leute so unwissend sind oder unterschiedliche Meinungen haben, aber das ist ja eine Entscheidung über die Entnahme von Organen, die wird ja politisch dann getroffen, und eine politische Meinung wird halt sehr oft, und bei so einer wichtigen Frage sollte sie halt über eine öffentliche Diskussion gefunden werden und, finde ich, nicht im stillen Kämmerlein.″ (OTlay: 385-387)

Q13:

P19m: „Das ist ein sehr sensibles Thema. Und das kann nur von der Politik gelöst werden und es wird ganz bestimmt nicht zu unserem Vorteil gelöst. [gleichzeitig P25f+P20m]

P25f: Gesetze könnte man... [gleichzeitig]

P20m: Da werden wir keinen Einfluss drauf haben. Nur bei der Wahl und die machen sowieso nicht, was wir wollen. [gleichzeitig]

P24m: Weil die Politik ist eigentlich durch wirtschaftliche Interessen geprägt und nicht durch das Interesse am Menschen. (GTaff: 652ff.)

Q14:

P19m: „[...] Weil ein zukünftiger Dienstgeber stellt Sie kaum an, wenn Sie 80% behindert sind. Auch wenn man es Ihnen jetzt nicht ansieht. (..) Und so ist das bei den Gentests auch.″ (GTaff:105)

Q15:

P21f: Das ist schon da. Die Akzeptanz für die eigene Entscheidung ist nicht gegeben in der Gesellschaft. [...] Ich bin selber Schuld, wenn ich Tests nicht in Anspruch nehme. Wenn ich Tests in Anspruch nehme, habe ich Probleme mit meiner Privatversicherung oder mit einem Kredit, den ich aufnehmen will, bei der Bank, ja. [...]

P19m: Es ist auch Folgendes: [gleichzeitig] vergangenes Jahr anlässlich der 10-Jahres- Feier der Krebshilfe Österreich, ah Krebshilfe Wien ist die Frau

Bundesminister unten auf der Bühne gestanden und hat lauthals gesagt: Krebs ist vermeidbar. [einige lachen] Und da ist der nächste Schritt: du bist selber Schuld.

P21f: Du bist selber Schuld, warum hast du's nicht vermieden?

P19m: Und das ist eine sehr gefährliche Aussage. (GTaff: 157ff.)

Q16:

P20m: „[...] Also, meines Erachtens ist es auch dem medizinischen System gegenüber eine Verantwortung, weil umso früher die Behandlung eintritt, umso billiger ist sie wahrscheinlich [...]." (GTaff: 99)

Q17:

P33m: Ich frage mich schon noch mal, was sozusagen hinter diesen Gentest überhaupt stecken soll, weil also ich traue das ja niemandem zu, weder der Pharmaindustrie, noch irgendwelchen Medizinern, dass die einzige Intention Gentests überhaupt zu entwickeln und die herzustellen, die Nächstenliebe oder sonst irgendein idealistisches Gut ist, wo man sagt, das ist wichtig, dass das irgendjemand weiß, sondern ich vermute ja dahinter handfeste materielle und ökonomische Interessen. Und da stelle ich mir schon die Frage, ob das wünschenswert ist? Ob das wünschenswert ist, dass halt in einer Gesellschaft so und so viele Gelder von öffentlichen oder privaten Stellen dafür aufgewendet werden, dass halt eine handvoll Elitewissenschaftler sich einen Namen machen können, Nobelpreise verdienen und sonst irgendetwas und ein paar Unternehmen dann, wie auch immer, profitieren. [...] (GTlay1: 769)

Q18:

P26m: „Ich glaube, weil Sie angesprochen haben die Pharmaindustrie, also (.) die, sie wollen eigentlich einen Profit machen damit. Also, ich habe so ein bisschen einen Einfluss doch noch den ländlichen, und ich kenne keinen Bauern, der's aus Nächstenliebe macht, dass er sich in der Früh auf den Traktor schmeißt, sondern der will leben davon und das ist sein gutes Recht und das hat auch die Pharmaindustrie, also ich möchte die nicht irgendwie schwärzer machen als sie (.) daist. Und auf der anderen Seite bin ich jedem dankbar, der mir die Möglichkeit gibt, wie gesagt, vorher mich zu entscheiden. Ich muss es nicht machen. Und wir können heute Gott sei Dank zwischen vielen Behandlungsmethoden wählen [...]" (GTlay2: 791)

Q19:

P39m: „Es ist halt irgendwie wichtig wie so eine (öffentliche, M.F.) Meinung entsteht. Es ist ja auch klar, dass wenn eine Firma Milliarden investiert, dass sie so einen Test

herausbringt, dann wird die dafür sorgen, dass die Leute die Meinung haben, dass das gut ist. Die werden Werbung dafür machen, die werden irgendwelche Studien in Auftrag geben, die was das eindeutig beweist, dass das gut für uns ist so. Weil die haben ja die Aussicht auf Gewinn, das kann man sich gar nicht vorstellen, was so was einbringen wird. Und wie eben die Meinung drüber, es gibt ja Meinungsmacher und wir sind alle davon abhängig, was, ich meine wir werden von allen Seiten beeinflusst, und egal wie viel Bildung dass man hat, irgendwie wird man trotzdem beeinflusst von außen." (GTlay2: 1159).

Q20:

P33m: „Also, ich weiß nicht, was mit solchen Daten passiert. Mir macht das schon Sorge genug, wenn ich mir denke, meine Vorsorgeuntersuchung könnte dazu führen, dass irgendwelche Daten bei der Krankenkassa landen, wo ich das eigentlich gar nicht will und wo dann ein, weiß ich nicht, irgendein Sachbearbeiter zufällig meine Akten in die Hand kriegt und sich denkt: Jössas, der wohnt ja neben mir oder...

P27f: Was, der will meine Tochter heiraten und hat das? [Lachen] Zufälle hat's schon gegeben." (GTlay1: 935ff.)

Q21:

HEL: Ja, ned. Wie werden die, machen die das dann demokratisch? Da sind sechs, die sagen: ja, jetzt müssen alle zum Gentest - und zwei sind überfordert oder wie wird das stattfinden?

MES: Da gibt's dann einen wirtschaftlichen Konsens.

[...]

HEL: Ja, genau, da werden auch Wirtschaftsleute sitzen, Wirtschaftslobbyisten in der EU sehr kompetent. (GTlay1: 1185ff.)

Q22:

P30f: „Und, ich meine, wir wissen selbst alle, wenn irgendwelche Bürgerbefragungen gemacht werden, wie damit umgegangen wird. Die werden für viel Geld initiiert, durchgeführt und in, gekübelt - es wird ja, sie wird, nicht einmal ignoriert werden's. [einige lachen]

P26m: [...] die Information, die man mir zur Verfügung stellt, prägt meine Meinung, weil ich kein Spezialist bin oder nicht fachkundig bin. Und damit bin ich also wahnsinnig manipulierbar. [...]Und das sind so die Geschichten, wo ich dann sage, eine

breite Allgemeinheit mitreden zu lassen, wo ich die dann wieder mit viel Geld manipuliere, dass sie eigentlich das sagen, was ich will - ist eigentlich rausgeschmissenes [unverständlich]." (GTlay1: 1161ff.)

Q23:

L13m: „[...] ich tu mir dann genau an dem Punkt besonders schwer die Grundlagenforschung zu rechtfertigen als reinen Zweck der Befriedigung des Wissensdurstes des Menschen. Also, wenn ich sage, wir machen das, wir wollen mehr Wissen, das ist so ein Grundbedürfnis, dann täte ich persönlich mich besonders schwer, an diesem Zweck zu rechtfertigen, dafür bringen wir Tiere um. Quasi aus meinem Oberflächlichen Egoismus eigentlich, weil das ist vielleicht gar nicht grundlegend wichtig, sondern das mache ich halt, weil's mich halt interessiert." (RT5/4/313)

Q24:

S6f: „Das Problem, an dem wir arbeiten, ist die neue Seuche, und zwar das ist die Fettleibigkeit [...] - es ist eine sehr komplexe Erkrankung. (.) [...] Der Hauptauslöser natürlich ist die Änderung des Lebensstils [...] jetzt gibt es verschiedene Möglichkeiten, wie ich das lösen kann. Der Einfachste ist, [...] ja, geh ins Studio, mach ein bisschen einen Sport und iss ein bisschen weniger, ein Apferl am Tag [...] , das ist halt, das funktioniert anscheinend nicht, sonst hätten wir das Problem nicht, wenn das so einfach auch wäre. (.) Eine kurzfristige Änderung ist in den meisten Fällen in irgendeiner Form zu erreichen, nur langfristig funktioniert es einfach nicht. Das heißt, es wäre das Gesündeste, es ist das Beste, es ist vor allem das Billigste, und trotzdem funktioniert es nicht. Das heißt, es muss andere Möglichkeiten geben." (RT1/2/14)

Q25:

L4m: „Es gibt auf der einen Seite sozusagen Ihr Argument, wo Sie sagen, also die höchste, also es ist die höchste Sterberate auf der Welt. Anderseits gibt's sozusagen Argumente, Leute und so, die sagen, es gibt also nichts Schlimmeres, als diesen Jugend-, Schlankheits-, Abnehmungswahn, also da entstehen sozusagen groß, also extreme Schuldzuweisungen, die sich natürlich nicht so in Ziffern festmachen lassen. Und es gibt ja das Sprichwort, wo man sagt immer, die Dicken sind gemütlich [...] Die wollen gar nicht abnehmen [...]" (RT1/2/379)

Q26:

S7m: ̎aber jetzt haben Sie genau den Fehler wieder gemacht, den ich am Anfang schon kritisiert habe. Sie verwechseln Grundlagenforschung mit der Anwendung. Doch, doch, genau das ist es. Es geht darum, dass ich, Grundlagenforschung heißt ja

nicht, dass irgendwas rauskommt. Wenn wir irgendein Gen finden, dann haben wir zuerst einmal wirklich nichts anderes, als irgendein Gen gefunden, und es ist noch ein ewig langer Weg bis irgendwo hin." (RT5/2/122)

Q27:

S6f: „ Das Problem ist, wer sagt, was richtig oder falsch ist. Gibt's Dinge, die immer gut sind oder schlecht? Ein Medikament wird immer Nebenwirkungen haben - ist es deswegen schlecht? Ist Auto fahren schlecht, weil man dabei sterben kann oder ist es gut, weil's mich von A nach B bringt [...]ich kann jemanden mit einer Schreibmaschine erschlagen, darf ich deswegen keine Schreibmaschinen mehr herstellen?" (RT5/2/15;45)

Q28:

L1m: „Na, aber ich glaube, ich meine, es geht ja darum, dass die - wie soll man sagen - die Erkenntnisse sind ja (.) da eigentlich, oder. Ich meine, sie sind ja, schweben ja dort alle herum, sind ja in uns und sie finden halt etwas, na. Insofern (.) kommen sie in ihren, oder würden sie sich wahrscheinlich selbst nicht vorwerfen können, dass sie irgendwas illegales oder irgendwas gemacht haben, dass jetzt besonders, ich weiß nicht, negativ ist oder irgendwie, weil es ja ohnehin in, da ist, und sie das einfach nur entdecken in der Hinsicht. (.)" (PI, 331)

Q29:

L9m: „Der Grundlagenforscher muss einmal sagen, was ist alles da, was gibt es, und wie schaut das aus? Wie kann man das verändern usw. Das ist in meinen Augen Grundlagenforschung. Und der kann sich nicht damit kümmern, [...] was, irgendein Ziel sein soll" (RT7/1/284)

Q30:

S7m: „Mein persönlicher Zugang zur Forschung ist einfach nur Neugier. Mir ist das im ersten Moment zuerst einmal vollkommen, wurscht, was das hinten rauskommt." (R1/3/373)

Q31:

S8m: „Forschung ist primär eine Kulturleistung, ähnlich wie eine künstlerische Leistung." (RT1/3/377)
„Das Ziel unserer Forschung ist nicht ein Produkt zu erzeugen, ich empfinde mich auch nicht von der Öffentlichkeit beauftragt ein Produkt zu erzeugen, sondern ich fühle mich beauftragt in der Kulturleistung Wissenschaft Erkenntnisse zu erzeugen. Und je größer und wichtiger diese Erkenntnisse sind, desto international sichtbar,

werden sie sichtbar werden, desto anerkannter werden sie werden, und desto mehr empfinde ich auch in meinem Auftrag als Kulturleistungsbringer erfüllt." (RT3/2/875)

Q32:

L6m: Naja, (..) wenn mich mein Kind fragen würde, ob ich morgen daheim bin, und dann stehen gleichzeitig fünf Freunde dahinter und feixen, und ich sage nein, und sie sind dann irgendwie wahnsinnig erleichtert und froh und ich frage dann, warum: Nur so, ich wollte es nur wissen! Dann täte ich mir schwer, zu glauben, dass sie es nur wissen wollten. (beide lachen). Wer jetzt dahinter steht und feixt und auf ein Patent hofft oder nicht hofft, das kann ich nicht sagen. Ob es jetzt der Forscher selber ist, der sich freuen würde, ob es der Projektleiter ist, dem es ein Ziel ist, um sein Projekt oder auch seine Gruppe am Leben halten zu können, ob es der Forschungsfonds ist, der das ganze trägt, ob es Pharmafirmen sind, [...], das kann ich nicht sagen. Aber es ist so auf der Hand liegend, in einem Bereich zu forschen, der nur in der westlichen Welt ein Problem darstellt, der medikamentös einen wahnsinnigen Umsatz gemacht hat. Und dann zu sagen: Ich wollte es nur wissen. Kann ich mir ganz schwer vorstellen.(PI, 108)

Q33:

S7m „weil ich halt einfach als Forscher ganz stark trenne zwischen dem, was ich im Labor mache, wo ich vom Gesetz her gezwungen bin, das abzuschotten, nichts rauszulassen, dafür zu sorgen, dass meine Mutanten, dass alles, was damit ist, wirklich im Labor ist, und erst dann, wenn's zerstört ist und mir kein Unheil anrichten kann, nach außen kommt, ich in einem ganz einem anderem, in einer ganz einer anderen Position bin, als ein Pflanzenphysiologe, der seinen Mais auspflanzt, als ein, irgendeine Firma, was auch immer, die die gentechnisch manipulierten Kartoffeln, Tomaten oder was auch immer rausbringt, aufs freie Feld [...] Aber ich als Natur..., als Laborwissenschaftler [...] bin in einer ganz einer anderen Position". (RT5/2/263)

Q34:

S6f: „Bei unseren Forschungszielen haben wir das so unterteilt, und zwar wir haben die unmittelbaren Ziele, die unsere sind im Labor. Unsere unmittelbaren Ziele sind Gene finden und Stoffwechselwege aufklären. [...] Dann gibt's die mittelbaren Ziele und die langfristigen Ziele. [...] Und die langfristigen Ziele wären dann eben die Reduzierung der Fettleibigkeit, Reduzierung von Arteriosklerose, Herzinfarkt, Krebserkrankungen, etc. Nur, diese mittel- und langfristigen Ziele sind nicht die Ziele von GOLD. Die sind die gesellschaftlichen Ziele, die andere dann auch machen, die machen wir nicht selber. Wir könnten es nicht einmal machen." (RT5/2/314)

Q35:

S6f: Und das zweite, was mir aufgefallen ist, ist dass [die Laien behauptet haben, M.F.] man kann sich dann quasi nicht aus der Verantwortung stehlen, weil man muss vorher abschätzen, was dann passieren kann. Das wird dann funktionieren, wenn ich eine Steinschleuder erfinde, dann ist es absehbar, dass jemand dann einen Stein gegen den Kopf kriegt, und der wird dann sterben oder was auch immer. Schwieriger wird es, wenn ich natürlich, wie in unserem Fall, Stoffwechselwege aufkläre, [...] Der Herr Pasteur hat, wo er das Penicillin entdeckt hat, durch Zufall entdeckt hat, nicht gewusst, dass dadurch Multiresistenzen entstehen und irgendwann habe ich damit ein Problem im Krankenhaus, und trotzdem ist es immer noch besser, ich habe ein Antibiotikum mit Resistenten als gar kein Antibiotikum. (RT5/2/25)

Q36:

S6f: „Wo muss man aufhören, also Niels Bohr, das Atommodell ist der schon, weil er hätte ja das nicht entwickeln dürfen? {gleichzeitig DÜ} Oder beginnt's erst mit dem Manhattan- Projekt selber, wo die Anwendung dasteht, weil das, die haben ja das Ziel gehabt, die Atombombe zu bauen, das war Ziel. Ist dann erst diese Anwendung das vorläufige, wo Stop ist oder schon davor?" (RT5/2/192)

Q37:

S4m: „Wenn man all die Kriterien seinerzeit angewandt hätte, bei der Entwicklung des Automobils, ja, dann wären, würden wir zu Fuß gehen oder sonst irgendwelche Fortbewegungen, aber nicht mit einem Automobil, weil so viele Leute wie durch's Auto ums Leben gekommen ist, dieser Impact auf die Umweltverschmutzung, all diese Dinge, und wir wissen das, und trotzdem wird das akzeptiert, weil's eben notwendig ist, sich fortzubewegen." (RT2/2/352)

Q38:

S6f: „Dann muss ich sagen, wir behalten den Stand der Technik, der ist, jetzt bei und wir verbieten Forschung und Weiterentwicklung generell, dann kann ich sicher gehen, es wird nirgends aus irgendeinem Forschungsergebnis ein negativer Effekt rauskommen. [...]. Das ist die einzige Möglichkeit, wie ich sicher gehen kann, dass nichts Schlechtes entsteht. Ich gehe auch, es kommt auch nichts Gutes raus, aber es wird nichts neues Schlechtes entstehen." (RT5/2/29)

Q39:

L10f: „Jemand, der Forschung betreibt mit Fördergeldgebern, der muss ja sagen, was er machen will. [...] Also, ist das alles, meiner Meinung nach, ein bisschen illusorisch, so wie's gebracht wurde, dass das alles so frei ist, die Wissenschaft, und wir wissen ja

nicht, was hinten herauskommt. Das ist alles sehr, sehr illusorisch. So hätten wir's gerne, aber so ist es nicht." (RT7/1/208)

Q40:

L9m: „Na, wir haben als Negativargument gehabt die Atombombe. Wie die angefangen haben Atom zu forschen, hat doch keiner gedacht, da werden wir eine Bombe daraus machen, ned. Und dann irgendwann ist doch eine Bombe daraus entstanden. Und da hat niemand gesagt, so, jetzt ist eigentlich der Break-In-Point, wie das so schön heißt, da ist es aus. Und das ist es nicht, und das wird auch bei der Genforschung unter Umständen nicht sein, dass man irgendwann aufhört, bevor man irgendwelche Sachen macht, die man nicht mehr machen sollte, die ethisch nicht mehr vertretbar sind." (RT5/2/65)

Q41:

L3f: „Und das stimmt auch. Sie sind ja nicht die von der Pharmaindustrie, die dann das Präparat erzeugen, da ist dann vielleicht, würde man von denen dann erwarten, dass sich die dann darüber Gedanken machen. Nur ist es halt dann - mehr oder weniger - zu spät, da-, wenn das Produkt in der Entwicklung ist und dann macht man sich Gedanken, wie man das einsetzen wird. Dann ist es ja schon mehr oder weniger im Einsatz und dann ist es nicht mehr regulierbar. [...]Wenn es zu spät ist, weiß man erst, wenn es zu spät ist und dann ist der Punkt, der gerade davor ist, schon vorüber." (PI 217;267)

Q42:

S6f: Das dürfen Sie nicht, also, es gibt ja Vorschriften, [...] Sie kriegen nicht den Persilschein, dass Sie alle Tierversuche machen können. Jedes Mal, wenn wir z.B. eine bestimmte Knock-out-Maus machen wollen, mit einem bestimmten Gen, müssen wir einen Antrag stellen, darlegen, was wir, was dieses Gen für eine Funktion hat, und was wir vermuten, und wieso wir das brauchen.

L13m: Und an welchen Kriterien wird das dann gemessen, ob das jetzt okay ist oder nicht?

S6f: Ist eine gute Frage, ich habe keine Ahnung. Müssen Sie den Herrn vom Ministerium fragen, der weiß das. Ich weiß nicht. (Q42, R5/4/315-319)

Q43:

S8m „... wenn jemand so reagiert, wie sie das plakativ in den Raum gestellt haben: wann kann ich endlich meine erste Maus da [umbringen, M.F.]; der braucht einen Arzt. Der hat in einem Labor nichts verloren. Ich kenne keine Person, die mit großer Lust

und Liebe sich freut, wenn sie das erste Mal in den Tierstall geht um eine Maus zu töten. Das ist in jedem Fall ein gewöhnungsbedürftiger, wenn auch notwendiger Schritt." (RT1/2/103).

Q44:

L5f: Schon, also, kann ich mich schon irgendwie anschließen, dass es eben, ja, schon einen Schritt weiter ist, die Grundlagenforschung, dass aber eben oft dann damit argumentiert wurde, wir machen ja nur Grundlagenforschung, gerade, wenn eben die Fragen nach den Folgen und den Konsequenzen gestellt worden ist, dann hat man sich relativ schnell auf diese Fluchtebene zurückgezogen. {lacht}

L11m: Ja, ich würde sagen, dass gerade diese Aussage, die war also sehr zentral und fast schockierend, jedenfalls äußerst befremdlich.

Moderator: Welche Aussage?

L11m: Na, dass man sich darauf zurückzieht, zu sagen, also wir sind Grundlagenforscher, die Folgen interessieren uns nicht. Lateinischer Vers: quidquid agis, prudenta agas et respice finem.

L2f: Auf Deutsch? {lachen}

L11m: Was du auch immer tust, mach's klug und schaue auf die, und bedenke die Konsequenzen, sagen wir. Und wenn man sich da rausklinkt, das widerspricht also irgendwie, eigentlich einem allgemein ethischen Prinzip.

L5f: Sie können's zwar nicht wirklich beeinflussen, aber nachdenken könnten sie schon drüber. Das ist vielleicht der Punkt. (RT7/1/316-320)

Q45:

L5f: „Ich halte nicht so wahnsinnig viel, dass jetzt einer - ich weiß nicht - in Brüssel oder so sagt: Ihr dürft das oder nicht. Weil erstens kann er es eh nicht kontrollieren und, und die, die Kontrolle hinkt sowieso immer hinten nach. Ich meine, das, man sollte den Leuten Unterstützung geben, dass sie das beurteilen können, was sie machen." (PI, 371)

Q46:

L9m: „Jetzt ist er so einen Schritt vor dem Durchbruch! Hält er da wirklich inne? Oder denkt er sich: Naja, hmhm, den einen Versuch mache ich noch, ned. Das ist menschlich, der Mensch strebt, und auch wenn er nicht unbedingt i-, irgendwo in der Geschichte eingehen will, aber trotzdem schon allein das Wissen. [...]Den Wissenschaftler allein kann man mit dem Gesetz nicht zurückhalten." (PI, 19-23)

Q47:

L13m: „dass die Gesetzgebung der Realität immer hinterherhinkt. [...]Gesetze zu machen ist eine Sache, ob es die Leute dann einhalten, ist ein anderer. Aber, ja, da, da hat man sowieso keine Handhabe, ja. Man kann ja Mörder auch nicht verbieten, dass er irgendwen umbringt, obwohl es, obwohl es gesetzeswidrig ist, ja" (PI, 247)

Q48:

S7m: Ich kann einmal, wenn ich einen Wissensprozess in Gang gesetzt habe, den kann ich nicht wirklich aufhalten und kann sagen, okay, jetzt bin ich an einem Zeitpunkt, da verdonnere ich alle Menschen dazu, es darf keiner mehr in die Richtung irgendwas weiterdenken. Das werde ich nicht können." (RT5/2/108)

Q49:

L10f: „Das ist wie wenn man halt irgendeine Maschine zum Laufen bringt, und da rennen irrsinnig viele Zahnräder mit. Das wieder zu stoppen, das ist ziemlich schwierig oder unmöglich. [...] Weil man nicht weiß, wie die, wer an das Wissen kommt, wie die Leute damit umgehen, was da weiter passieren wird damit. Das kann man nicht verhindern. Außer durch gesetzliche Auflagen. Nur, die werden halt dann möglicherweise gebrochen werden. (PI, 271)".

Q50:

L4m: „Also, wenn ich mich auch, z.B. gegen so was entscheiden würde, wenn ich dann schaue, also wie bestimmen sozusagen Wirtschaftsmärkte, wie bestimmt Amerika, wie bestimmt z.B. China, also diese großen Bereiche oder Dimensionen, wie bestimmen die einfach das, und wir können möglicherweise gar nichts dagegen machen, weil uns die das einfach diktieren. Also, die biometrischen Daten von Amerika in den Pässen müssen wir von ihnen übernehmen zwangsweise." (RT7/1/112)

Q51:

L10f: „Und wenn ich eben zuviel regle oder so, dann hemme ich die Wissenschaft. Das erinnert mich an das eine Beispiel mit diesen Enzymen von den Igeln, die da erforscht werden sollten, das in Österreich unmöglich war, weil's ein Wildtier ist. Okay. Dann

geht man halt nach China. Und wenn ich das zu sehr regle in Österreich, wird mehr im Ausland passieren. Die Gefahr besteht." (PI, 367)

Q52:

W8m: „Deswegen muss man sich, glaube ich, verabschieden von der, von dieser Dichotomie. Auf der einen Seite gibt's die bösen Wissenschaftler, die also alles versuchen wollen hier, um irgendwelche Regelungen zu umgehen und grausliche Dinge zu machen, und auf der anderen Seite [hast] einen guten Gesetzgeber, der ein bisschen aufpassen muss, und am besten ein paar Polizisten noch hinter jedem Forscher stellt, dass er das ja alles nicht macht. Das Faktum ist, das Gegenteil ist der Fall. Der Gesetzgeber kommt erst dann drauf auf die Problematiken, wenn eben wie z.B. bei Asilomar schon zuerst über die Forscher." (RT6/2/127)

Q53:

S3m: „Ja, dem chinesischen Forscher, der nach unseren Standards sein unerlaubtes Tierexperiment macht, bleibt theoretisch wirklich nur ein Schlupfloch – er publiziert's in einem chinesischen Journal ‚[.]' oder wie immer die heißen. Nur in der Praxis hat's heutzutage keine Bedeutung, denn die Journale, diese Journale liest niemand." RT6/3/188)

Q54:

S3m: „Wann kann man denn wirklich realistischerweise einen Schlussstrich ziehen? - Einfach nur dadurch, indem möglichst viele oder die Wichtigsten an einem Strang ziehen. Und das kann nur dadurch passieren, dass die Welt immer näher zusammenrückt, und gerade dazu leisten wir Wissenschaftler einen großen Beitrag, ja, wir sind international. Und dadurch, dass die Welt näher zusammenrückt, wird einmal geredet und dann kommt's auch zu übernationalen Zusammenschlüssen und hoffentlich zu einer Situation, wo dann alle um einen Konsens bemüht sind." (RT2/2/368)

Q55:

L10f: „Aber ich denke mir, es sollte wirklich ein jeder Wissenschaftler für sich selbst Verantwortung übernehmen, wobei das dann auch wieder schwierig ist, [...] ein jeder hat sein Ziel.[...] Der, der weniger Verantwortung bereit ist zu übernehmen, ist vielleicht der bessere Wissenschaftler, der hat dann vielleicht die besseren Ergebnisse. Und nur das zählt, leider, in unserer Gesellschaft.[...] Und ein Konkurrenzdruck ist da." (PI, 359-363)

Q56:

L6m: „[es gab niemand], der sich für verantwortlich dafür gefühlt hat, zu entscheiden, was wird gemacht oder was nicht [...], die Verantwortung dafür zu tragen, dass die Folgen irgendwie mehr oder minder eng mit ihm zusammenhängen. Noch haben wir in irgendeiner Form eine Struktur gefunden, die als letztendlich reglementierende Einheit fungiert - sei es ein Plebiszit, dass das Volk sagt, das wollen wir oder wollen wir nicht, haben wir gesehen, das geht nicht, weil wirtschaftliche Interessen da sind, sei es, dass Wissenschaftler sich zusammensetzen und Moratorien machen, und auch die werden sozusagen durchbrochen, sei es, dass Politiker, wie auch immer, zu irgendwelchen Entscheidungen kommen. Es gab irgendwo keinen, der gesagt hätte, und wir sind schuld, dass das gemacht wird, oder wir sind diejenigen, die verhindern, dass es gemacht wird. Sondern jeder hat auf irgendwen anderen gedeutet. Und das ist für mich sozusagen die Antwort, dass wir im Grunde genommen, nicht in der Lage sind, so eine Entwicklung, sagen wir mal, zu verhindern." (RT7/1/202)

Q57:

L13m: „Also der, der Wissenschaftler versucht irgendwie sehr originäre Fragen zu beantworten, zu publizieren in möglichst angesehenen Journals. Journalisten versuchen, Einschaltquoten hoch zu haben oder Auflagen hoch zu haben. Politiker wollen Stimmen gewinnen. Unternehmen wollen Geld verdienen. Und so hat jeder einen bestimmten Maßstab, an dem er seine Tätigkeit orientiert. Und irgendwo schließt sich dann dieser Kreis. Also er hat nicht irgendwo einen Anfang und ein Ende, wo man sagt: Wenn der das macht, muss der das machen. Sondern das ist irgendwie, ja, ein geschlossener Kreis, der funktioniert. Und sich halt irgendwie dynamisch aufgrund von verschiedenster Umwelteinflüsse verändert. Aber jeder bewegt sich im Prinzip in seinem Territorium und richtet seine Tätigkeit nach ganz bestimmten Messgrößen, anhand derer er seinen Erfolg misst. Und alles, was er macht, ist eigentlich konsequent davon abgeleitet, wie er zu dem Erfolg kommt und eben seinen individuellen Indikator möglichst hoch zu haben." (PI, 175)

Q58:

S6f: Na, ich glaube, die Öffentlichkeit ist intelligenter besonders als die Medien glauben. [...] Also, ich glaube, die wenigsten Leute sind wirklich informiert. Viele Leute haben Angst, weil sie sich nicht, besonders weil sie sich nicht auskennen, und (.) man braucht, glaube ich, eine gewisse Auseinandersetzung, bevor man sich einbringen kann. (.) Es gibt sicher einige, die genug informiert sind, und die sich sehr gerne einbringen würden - das hat man auch gesehen daran, dass sich ja Leute gemeldet

haben z.B. um an dieser Diskussion beizutragen - aber ich aber ich glaube einfach, dass die Diskussionskultur bei uns einfach viel zu gering ist. [...] (PI, 277; 285)

Q59:

L6m: „Na, ich stelle mich mal anders herum. Wenn diese Gruppe jetzt mal Gesellschaft wäre, mal angenommen, wir repräsentieren tatsächlich Gesellschaft, ist doch die Frage für mich, kann in dieser kleinen Gruppe der Gesellschaft den Prozess der Meinungsbildung abgebildet werden? [...] Wenn wir uns jetzt auf was einigen würden, kann das nicht irgendwo, sage ich mal, ein Abbild sein, was in der Gesellschaft da ist?"

L12m: „Ist das nicht der Prozess, der in einer parlamentarischen Debatte eigentlich passieren sollte [...]Darum haben wir das Parlament, drum debattieren ja die großen Politiker, da soll das eigentlich passieren. [...] Ich meine, ist schon was anderes im Parlament sind, es öffentliche Debatten. Jeder kann zuhören, kann sich denken, na [...], die haben, ein Eigeninteresse. Dann sagen wir wieder in der Gruppe, was im stillen Kämmerlein irgendwie was vordebattiert und haben eine fertige Lösung, die man dann im Parlament präsentieren würde. Das ist doch, also, von meinem demokratischen Grundverständnis, (.) danke, also, möchte ich nicht haben. Ich meine, auch diese Bioethikkommission,. [...] Ich finde das gefährlich, wie seht's denn ihr das? Da wird dann immer geschlossen irgendwas diskutiert, dann heißt's ja, und, weil sie gesagt haben, das ist gut, machen wir das. Das ist doch, wie hängt das mit Demokratie zusammen?"
(RT7/2/198-204)

Q60:

L8f: Ich denke, was über den Horizont des Normalbürgers hinausgeht, das, darüber sollte ihnen dann auch keine Entscheidung zuzu-, zukommen. [...] Wobei sich die Leute ja meistens viel gescheiter wähnen, als sie sind, ned. (PI, 275)

Q61:

L1m: „je mehr, wie transparent irgendetwas ist in unterschiedlichen Gesellschaftskreisen - also damit meine ich Wissenschaft, Politik, Bevölkerung, Geldgeber usw. - um so, wie soll ich sagen, um so (.) mehr reguliert sich das vielleicht von selber einfach." (PI, 559)

Q62:

L5f: „Weil nicht so viele Eigeninteressen vielleicht dahinter stehen, irgendwie eine gewisse Unabhängigkeit vielleicht, keinen Vorteil oder Nachteil jetzt aus unmittelbar

aus unserer geäußerten Meinung. Der Lobbyist hat ja meistens das Interesse z.B. irgendwas zu bewirken." {gleichzeitig BRU}

L2f: „Ja, genau. Wir haben keine wirtschaftlichen Interessen. [...] Wir sind unabhängig." (RT7/2/168-170)

L1m: „Und wenn es keine Partizipation der Öffentlichkeit gibt, dann schaffen es einige wenige mächtige Meinungsbilder sozusagen, die Gesellschaft in irgendeine Richtung zu lenken. Ja, aber wenn man jetzt die Gesellschaft in Themen mehr einbindet, [...], dann glaube ich, entsteht ein viel ein ausgeglicheneres Bild." (PI, 419).

Q63:

L8f: „Weil [man] kann nicht bei jedem dabeistehen und schauen, ob der irgendwo einen Fehler macht oder irgendwo – was weiß ich - ein Bakterium verliert. Ned. Wie will er das machen, das ist völlig ausgeschlossen. Also muss es wohl darin liegen, Leute, junge Menschen, Kinder, junge Menschen, Erwachsene zu verantwortungsvollen Leuten zu erziehen." (PI, 231)

Q64:

L7f: „Ja, ich glaube, dass einfach die Wissenschaftler oft in dem Gebiet schon so drinnen sind, dass sie das gar nicht mehr irgendwie objektiver beurteilen können, oder. Ja, dass, dass einfach viele Fragen von der Öffentlichkeit aufgeworfen werden und auch viele, ja Meinungen, die sie überhaupt nicht kennen, oder sich überhaupt nicht vorstellen können, dass da jetzt jemand irgendwie Bedenken hat. (PI, 275)

Q65:

L2f: „Man ist eher so das Gewissen, dass man hinweist: Hilfe, Leute aufpassen, da gibt es ja auch negative Entwicklungen. [...]. Vielleicht ist dann die Forschung einfach menschenfreundlich - unter Anführungszeichen – vielleicht nicht sofort so erfolgreich [...], sondern das entwickelt sich langsamer vielleicht mit den Menschen zusammen." (PI, 239)

Q66:

S2f: „Was was bringt sind eben Diskussionsrunden so wie dieses Projekt, ne. Solche Sachen bringen was. Wo vielleicht zuerst eine Information stattfindet, und mit anschließender Diskussion. Und wo man sozusagen, wo der Wissenschaftler dann indirekt beeinflusst wird, weil er eben dort ist und sich die Ansichtspunkte der Teilnehmer anhört." (PI, 375)

Curriculum Vitae Maximilian Fochler

1997	Matura, with distinction
1998-2003	Studies of Sociology and Political Sciences at the University of Vienna Completed with distinction 12/2003
2003	Erasmus Term, Maastricht University, Faculty for Arts and Culture
from 2002	Contract Researcher at the Department of Social Studies of Science, Univ. Vienna
from 03/04	Doctoral Student for Dr.phil. (Sociology) at the University of Vienna

Teaching

from 2004	Lecturer at the University of Vienna, Department of Social Studies of Science
from 2005	Lecturer at the University of Natural Resources and Applied Life-Sciences

Collaboration in Research Projects (selection)

12/2002 – 07/2003	Expertise „Sozial robuste Wissenspolitik. Analyse des Wandels von dialogisch orientierten Interaktion zwischen Wissenschaft, Politik und Öffentlichkeit" (Büro für Technikfolgenabschätzung beim Deutschen Bundestag)
02/2004 – 01/2007	Let's talk about GOLD. Analysing the interactions between genome-research(ers) and the public as a learning process (bm:bwk; GEN-AU)
04/2004 – 09/2007	Challenges of Biomedicine: Socio-Cultural Contexts, European Governance and Bioethics (EU)

Publications (selection)

Fochler, Maximilian: Magic Bullets with Butterfly Wings: The Cooperation between Experts and Lay People in the Patients' Association Debra Austria and its Research Initiatives, Wien November 2003 (Diplomarbeit)

Fochler, Maximilian, Annina Müller (2006): Vom Defizit zum Dialog? Zum Verhältnis von Wissenschaft und Öffentlichkeit in der europäischen und österreichischen Forschungspolitik. ITA manu:script, ITA-06-04 ISSN 1681-9187, http://epub.oeaw.ac.at/ita/ita-manuscript/ita_06_04.pdf

Felt, Ulrike, Maximilian Fochler, Annina Müller (2006): Sozial robuste Wissenspolitik? Analyse partizipativ orientierter Interaktionen zwischen Wissenschaft, Politik und Öffentlihckeit im österreichischen Kontext. In: Buchinger, Eva, Ulrike Felt (Hg.): Technik- und Wissenschaftssoziologie in Österreich. Stand und Perspektiven. Sonderband der Österreichischen Zeitschrift für Soziologie, VS, Wiesbaden S. 103 – 130

Felt Ulrike, Maximilian Fochler, Astrid Mager, Peter Winkler (in press): Visions and Versions of Governing Biomedicine: Narratives on Power Structures, Decision-Making, and Public Participation in the Field of Biomedical Technologies in the Austrian Context. *Social Studies of Science*

Felt, Ulrike, Maximilian Fochler, Annina Müller, Michael Strassnig (in press): Unruly ethics. On the difficulties of a bottom-up approach to ethics in the field of genomics. *Public Understanding of Science*