

DEMESCI

International Journal of
Deliberative Mechanisms in Science

Hipatia Press
www.hipatiapress.com



Instructions for authors, subscriptions and further details:

<http://demesci.hipatiapress.com>

Challenging Participation in Sustainability Research

Ulrike Felt, Judith Igelsböck, Andrea Schikowitz & Thomas Völker¹

1) Department of Social Studies of Science, University of Vienna

Date of publication: July 31st, 2012

To cite this article: Felt, U., Igelsböck, J., Schikowitz, A., & Völker, T. (2012). Challenging Participation in Sustainability Research. *International Journal of Deliberative Mechanisms in Science*, 1(1), 4-34. doi: 10.4471/demesci.2012.01

To link this article: <http://dx.doi.org/10.4471/demesci.2012.01>

PLEASE SCROLL DOWN FOR ARTICLE

The terms and conditions of use are related to the Open Journal System and to Creative Commons Non-Commercial and Non-Derivative License.

Challenging Participation in Sustainability Research¹

Ulrike Felt, Judith Igelsböck, Andrea Schikowitz & Thomas
Völker

Department of Social Studies of Science, University of Vienna

Abstract

If we take the rhetoric of recent academic and policy discourse at face value, crossing disciplinary and institutional boundaries and engaging extra-scientific actors in the production and distribution of knowledge has become a kind of ‘gold standard’. This is particularly true for fields like sustainability research, which is supposed to address the complexity of so-called ‘grand challenges’ of contemporary societies. Investigating the projects of a funding scheme for participatory sustainability research, this paper explores how researchers frame participatory research practices in their prospective narrations in research proposals and in their retrospective reflections in the framework of interviews. Thereby we focus on their stories about (1) the overall value of participation, (2) the roles allocated to different actors, (3) the temporal organization of participation as well as the (4) spatial dimension of collaboration. Building on this analysis, the paper concludes that even though participatory research programs create new possibilities, they remain limited in scope as they operate in an environment in which this kind of cross-boundary work does not fit the established standards. This strongly limits any form of “collective experimentation” and new ways of learning in sustainability research and beyond.

Keywords: participatory research, collective experimentation, transdisciplinarity, sustainability, researchers' perceptions, research practices

“The era we live in is marked by ecological and demographic challenges, increasing global competition and – as a result – a continuous change in the structure of society and the economy. [...] Austria is faced with the question of how to get the country ready for the future [...]. We are convinced that one decisive answer to this question must be: by reinforcing research, technological development and innovation.” (Austrian Federal Government, 2011)

This quotation from the most recent ‘Strategy for research, technology and innovation of the Austrian Federal Government’ (Austrian Federal Government, 2011) can be taken as representative of a broad range of policy statements published over the last decade in the European context. Wrapped in a language of challenge and competition, it points at the deep entanglement between technoscientific and soci(et)al development and at the need to actively shape, support and get prepared for the future. As part of this struggle for addressing what is often called the ‘grand challenges’ – climate change, global scarcities of energy and natural resources and environmental protection – sustainability research has moved high up on the policy agenda. With it come concerns about the kind of knowledge needed to meet these challenges and what this would mean in terms of research to be supported.

Some countries, and Austria is among them, have accordingly launched specific research programs to address a situation discursively constructed as exceptionally demanding. While the remedies of the core issues related to these challenges are still dominantly perceived to be found in further technological innovation², we can also discern the emergence of alternative approaches in the knowledge provision. The latter focus on changing the very practices of producing knowledge to better address the complexities of the issues at stake. Therefore under the label of ‘transdisciplinary research’ the Austrian government launched a research-funding program – proVISION³ – meant to foster projects that bring together researchers with extra-scientific actors. The basic idea was that through opening-up the process of knowledge production to actors outside academia, both problem framing and

development of solutions would be better suited to soci(et)al needs and thus lead to more stable and context-sensitive solutions.

While there seems to be agreement that these approaches might be valuable for working in such complex socio-scientific problem areas and while analysts have highlighted the growing need for opening-up research towards society (e.g. Gibbons et al., 1994; Funtowics and Ravetz, 1993; Nowotny, Scott, & Gibbons, 2001), the turning into practice of such participatory endeavors seems to be a rather cumbersome undertaking. These open knowledge production processes have to find their place in a field of tensions between a rather narrow and standardized manner of judging what excellent academic work means and a call for scientists to become more responsive towards societal needs; between what counts as high quality scientific output and what seems a societally valuable contribution of science to the public good; between time-intensive and often diffuse cross-boundary engagement and the ideal of research taking place in the protected and clearly structured spaces of laboratories and offices (Callon, Lascoumes, & Barthe, 2009).

It is exactly these complexities of working in this field of tensions that this article wants to address. The title ‘challenging participation’ tries to point at our twofold effort: On the one hand we aim at addressing how participatory research is challenging existing modes of ordering science and its relations to society when introduced into contemporary funding structures and research institutions. On the other hand we want to challenge the very label ‘participation’ and investigate the meanings of this notion in practice.

We will start by engaging with the relevant debates, reviewing some of the key-contributions to this rich field addressing changing ways of knowledge production as well as more open forms of innovation, often also labeled as ‘responsible innovation’. After presenting the field of research, our data and methodological considerations, the main part of the paper will be devoted to a detailed analysis of the participatory dynamics at work in a major Austrian program in sustainability research. We will focus mainly on scientists’ perceptions and narrative reconstructions of their participation practices. This approach to the issue seems promising since researchers explicitly embody the role of

‘architects of participation’ within the research program investigated. Researchers are meant to design the participatory research projects and to decide whom to include as extra-scientific actors, in which ways and at what moments of time in the process. Thus our analytic interest is focused on how scientists within participatory projects narrate their assumptions about the value of opening up the research process, but also on the overall choreography of such projects, including the different roles attributed to different actors, and the spatio-temporal arrangements performed. Building on this we develop conclusions on the possibilities and limits of this kind of participatory knowledge production. This should contribute to a better empirical grounding of the debates on participation of societal actors in research and on the new production of knowledge in the context of contemporary research realities.

A need for new forms of knowledge production!?

If we take the rhetoric of recent academic and policy discourse at face value, crossing disciplinary and institutional boundaries and engaging extra-scientific actors in the production and distribution of knowledge has become a kind of ‘gold standard’ (e.g. Hirsch Hadorn et al., 2008). Already in the 1980ies in the wake of growing environmental concerns, researchers started pointing to the fact that different kinds of knowledge production mechanisms would be needed in order to better address policy related choices. This was seen as particularly relevant in situations where "facts are uncertain, values in dispute, stakes high and decisions urgent" (Funtowics and Ravetz 199, p.744). Under the label of ‘post-normal science’ attention was attached to the fact that in many of the routinely existing situations, decisions have to be taken without any in-depth scientific knowledge of many of the problem’s perspectives. As a consequence, this approach suggests understanding the issues at stake as “total in [their] extent” (Ravetz, 1987, p.425), and calls for considering not only scientific facts, but also other forms of knowledge, interests and values. This means working with an ‘extended peer-community’ and moving away from a narrow concept of ‘sound science’ that builds knowledge of complex phenomena on a rather reductionist design of controlled experimentation. Instead, concerns for the quality of knowledge should be guided by a deep understanding of the contextual

properties of any kind of scientific knowledge (Funtowicz & Ravetz, 1990) and thus give more space and voice to concerns and experiences outside the academic field.

This conceptualization of post-normal science has attracted considerable attention, particularly in many of the policy related debates on environment and risk. There have been regular debates scrutinizing the way the concept is used and what consequences such an approach would have on policy decisions.⁴ This line of debate was complemented in the mid-1990ies by the quite influential yet also contested (Pestre, 2003; Shinn, 2002; Hessels & Lente, 2008) account of a transformation in contemporary scientific practice labeled ‘mode 2 research’ (Gibbons et al., 1994). The authors highlight that next to the classical disciplinary ordered knowledge production structures a new mode has emerged which is described as being deeply intertwined with the context of application; as demanding transdisciplinary co-operations, thus involving actors from outside the classical academic institutions; as mobilizing a range of theoretical perspectives and practical methodologies to solve problems; as showing a higher degree of heterogeneity and organizational diversity thus moving beyond the confined boundaries of scientific institutions; as being more socially accountable and reflexive; and finally, as relying on more open mechanisms of quality control. Thus knowledge production would become more ‘socially distributed’, embracing wider constituencies of society in the process of both problem definition and finding of solutions. Ever since this first outline of the concept of ‘mode 2 research’, it has been debated critically in the scientific community, while simultaneously being embraced by policy makers and undergoing gradual reformulations (Nowotny, Scott, & Gibbons, 2003). In this context Nowotny (2007) also draws our attention to the fact that the need for changing modes of knowledge production has become a regularly resurfacing theme, which seems to both “respond to an underlying need and an inherent belief. The former is the loss of what is felt to have been a former unity of knowledge. The latter is the expectation that transdisciplinarity contributes to a joint problem solving that it is more than juxtaposition; more than laying one discipline along side another” (Nowotny, 2007, p.1).

These debates also resonate with a more recent call for “reinventing innovation” (Felt & Wynne, 2007, p. 18) which has to be understood as an analysis of contemporary handling of innovation combined with a normative call for changing these very practices in order to make them more responsive to broader societal values and needs. Here critique is expressed towards the fact that contemporary policy making has in a somewhat unquestioned manner increasingly engaged in what could be labeled “economies of technoscientific promises” (ibid., p. 21). Thinking innovation in such a frame comes along with a lively set of fictions about a better future society to be realized through investing into particular trajectories and not in others, it draws its strength from a dense and rather broad promissory discourse and ties into a ‘the winner takes it all’ ideology. As a consequence it hinders broader societal reflection of innovation through highlighting the global competition and stressing that we have to act quickly before it is too late.

To counter this rather linear and centralized model of innovation, debates around notions such as “open innovation” (Chesbrough, 2003), distributed or responsible innovation⁵, “technologies of humility” (Jasanoff, 2003) and “collective experimentation” (Felt & Wynne, 2007) have emerged and attracted some attention both in segments of the policy and the research communities (see e.g. Nordmann et al., 2011). They all point to the need to involve more heterogeneous sets of actors in producing innovation, giving space to their concerns, their knowledge, experiences and practices. Furthermore, introducing the notion of experimentation draws our attention not only to the openness and uncontrollability of the potential outcome of any kind of experiment, to the increasing complexities of technoscientific innovations and the speed with which they occur, but also to the fact that these kinds of experiments are no longer confined to the lab, but have been extended into society: Nowadays ‘society is the laboratory’ as Krohn and Weyer (1989) put it so clearly more than two decades ago. Yet it remains largely unacknowledged that citizens are “routinely [...] enrolled without negotiation as experimental subjects, in experiments which are not called by name” (Felt & Wynne, 2007, p. 68). Turning to “collective experimentation” as a form of democratic governance of innovation would thus mean including societal actors throughout the

process of knowledge generation, develop sensitivities to interests and values of broader societal constituencies as well as demonstrating readiness to learn beyond the lab context.

While there is this strong agreement over the need to change certain aspects of the processes of knowledge production when it comes to solving complex socio-scientific problems, there is little empirical research that investigates the concrete possibilities and limits of this kind of epistemic work. Reflecting the degree to which more open forms of knowledge production can be realized in contemporary research systems and gaining an empirically grounded understanding what this means in terms of practices and processes will thus be at the core of the following analysis.

Data and methods

For analyzing participatory research and reflecting on the room for maneuver this opens up for new ways of knowledge production within the current research system we draw upon data gathered in the course of the three year research project ‘Transdisciplinarity as Culture and Practice’⁶. Moving beyond broader claims of changing modes of knowledge production, we aim at offering an in-depth understanding of such open innovation contexts. To do so, we look at a broad range of projects in the context of an Austrian funding program on transdisciplinary sustainability research, which explicitly requires funded projects to integrate extra-scientific partners into the research process. Using a multi-method approach, we analyzed program- and project-documents, conducted 27 interviews with scientific and extra-scientific project participants from different projects, observed 13 project meetings and events and conducted a feedback focus group. As already pointed out in the introduction, for this paper, we focus on scientists’ narrative reconstructions of participatory research and more concretely on the participatory practices in the framework of their respective project.

We want to stress that the aim is not to assess the extent or quality of participation. Instead, we want to grasp participatory practices in their diversity, producing insights into the possibilities and limits for this kind of research within the current science system. This explains why we strictly aim at anonymity when referring to projects or interviewees.

To analyze the researchers' imaginations and practices of participation as reconstructed in their narratives, we mainly look at two discursive arenas: their prospective conceptualizations of participation as laid out in the project proposals (where available) and their retrospective reflections about their participatory practices. For both cases we are interested in the storytelling aspect (Norrick, 2000) with regard to participatory research. This seems essential as we are aiming at understanding transdisciplinarity not as a unique event, but much more as research culture, and thus need to capture the stories that are told – both funding stories as well as practice stories – and the epistemic and moral values (Daston, 1995) they want to instill. We thus analyze the general plot, i.e. how they more broadly think about participatory research and the more fine-grained choreographies researchers develop, i.e. the characters they describe, and how their stories on transdisciplinarity unfold in time and space. In both materials – proposals and interviews – we will consider that the story is told for different audiences which differ substantially. While project proposals build an arena in which special emphasis needs to be placed on demonstrating the significance of the participatory approach for investigating a certain research problem and on complying with the requests of the funding program (Felt et al., 2012), the interviews are also directed at us in our roles as peers (Denzin, 2001) leaving the possibility to more broadly and personally discuss the experiences, difficulties and unease with regard to 'opening up' research towards societal actors.

Concretely, we analyzed in detail proposals and interviews from five ongoing and six terminated projects. The interviewees comprised project leaders, experienced researchers as well as early stage researchers. They were employed at universities and private research institutions and came from natural, technical as well as social sciences and humanities.

In order to understand the tensions inherent in participatory research we analyzed the material using a grounded theory approach with storytelling as the broader conceptual framing. In doing so, we drew on longstanding grounded theory features, such as coding, memo writing, etc. (e.g. Strauss & Corbin, 1998) but aimed at going beyond and

embracing a constructivist approach as introduced by Clarke (2005) in her situational analysis.

Participatory research imagined and practiced

As outlined above, in order to capture the narratives on transdisciplinary, participatory research in the framework of the research program proVISION, the analysis will be structured along four lines. In a first step we will investigate the broader plot of participatory research, i.e. the very values researchers attach to including extra-scientific partners into their projects. In the three steps that follow, we will then take a closer look at different aspects of the projects' choreographies, investigating (1) the roles that researchers attribute to their extra-scientific partners and to themselves respectively, (2) the temporal organization of participation and (3) the spaces and places in which these collaborations are supposed to happen.

Valuing participation

To start with, researchers frequently describe participation of extra-scientific actors as a more adequate way of dealing with the complexity of contemporary challenges they are supposed to address in their research on sustainability. This is much in line with the program's basic "script"⁷ (Felt et al., 2012b) which defines the potential participating actors and their framework of action and shapes the space in which they are supposed to meet (Begusch-Pfefferkorn, 2005). Yet it also matches with broader societal narratives on the complexity of problem solving in these areas and the need 'to get society on board' (see the debate around 'post-normal science'). In the project proposals, contemporary developments like globalization and environmental hazards are often referred to as the new translocal challenges, thus calling for innovations in the way of developing solutions. In doing so they discursively question both the current development of science, but also the relationship between science and society: the rather 'disciplined' path of scientific development has largely excluded society – this is the standard critique expressed. Thus cooperation across disciplines – interdisciplinarity – and cooperation of scientific and extra-scientific actors – transdisciplinarity – are deemed necessary for producing knowledge that is capable of meeting these seemingly new challenges.

They thus clearly buy into the idea of extending the peer-community.

Closely intertwined with the first, the second line of argumentation gravitates around ‘fostering diversity’. Narratives such as the one of the ‘ivory tower’ researchers would do better to leave, reference to the fact that researchers are cooking too much “in [their] own juice”⁸ (P08_m01: 1620)⁹ or the diagnosis of a strong preference of researchers to remain on their own “playground” (P04_m04: 228) all point at a disconnectedness of research from society that is becoming increasingly less acceptable. Opening up to a greater diversity of knowledge and value structures is thus meant to compensate the limitations of classical knowledge production structures and along with this, also to create a more “innovation friendly environment” (P04_m04: 306). Researchers produce a narrative that very much follows the one offered by Nowotny and co-authors (2001), framing current developments as a move from a high degree of segregation to more integration.

Increased transferability of knowledge is the third value that should be realized through participatory research. Although science produces a lot of knowledge, it is staged as not communicated or communicable in an adequate way and thus as not ‘arriving’ in specific societal arenas. Put differently, ‘the public’ is constructed as largely under- or misinformed and thus as unable to act according to scientific insights available. Following more of a deficit model (Wynne, 1991), the arguments then plead for educating and supporting people with more adequately presented scientific expertise. Participation of extra-scientific actors all along the process is thus seen as a way to make scientific knowledge easier transferable and thus raise the impact of scientific knowledge on societal action.

Accountability is the fourth value to be promoted through this kind of research. Arguing for a more inclusive mode of research thus gets tied to a strong moral argument and to narratives about the responsibility scientists have towards the general public or society at large. Transdisciplinary research is thus staged as a way of not only making knowledge publicly available but also of actively giving “impulses” (P04_m05: 864) to society, e.g. for behavioral change to achieve the sustainability target. This responsibility is then performed as being part

and parcel of the broader “scientific ethos” (P02_m01: 617). In doing so, science and scientists are contributing to the public good. At the same time as research is funded by public money some of our interviewees perceive it as a basic right of ‘the public’ to have a say in defining research directions. Paying science’s debts towards society and giving something back that is of “immediate use for the tax payers” (P02_m01: 591) are two of the more frequent expressions in this context. This line of argumentation points to an interesting switch in the accountability logic of research. For a long time getting public funding had not been considered as a reason for allowing societal demands to enter research choices. Quite on the contrary, public money was seen to allow for purely curiosity-driven research which did not need to have any direct relevance to society (see e.g. Calvert, 2006).

While all these narratives on participation hold a strong positive connotation, we simultaneously encountered a latent ambivalence often expressed in side-remarks. For example when it comes to the integration of knowledge/data stemming from extra-scientific actors, doubts are expressed about the quality standards of the production process and concerns voiced about their validity. Or researchers struggle with the question how far extra-scientific considerations (should) influence ‘their research’ or research more generally. Furthermore worries were palpable that admitting different value systems into science could deeply affect their ideals of scientific knowledge. For example, it is discussed that scientifically relevant but “inconvenient questions” (P07_f01: 1217) would probably not be posed in such mixed groups or scientifically innovative approaches could be neglected as societal actors’ interests were narrated as largely divergent from the ones of researchers.

What is important to retain, however, is that even though researchers have ambivalent feelings concerning the concrete practice of participatory research they never question the abstract ideal. Rather, they tend to assume that their extra-scientific partners quasi automatically also embrace this model of more open knowledge production. This explains researchers’ astonishment and disconcertment when extra-scientific partners insist on a work-sharing model instead of an integration model and show considerable interest in more or less directly applicable results but not so much in the production process.

Role allocation in participatory research

Having pointed at the broader imaginaries of participatory research, we now turn to investigating the choreographies of participatory research and start by looking into the role allocation performed by researchers in both the proposals as well as within the ex-post narratives on their research practices.

Imagined collectives such as ‘society’ or ‘the public’ are probably the most often referred to category of ‘actors’, described as the primary beneficiaries of transdisciplinary research, especially within the proposals. As a common narrative, researchers stress that *their* research questions have developed out of prevailing societal problems or needs of a particular group, thus constructing ‘society’ or specific publics as the obvious addressees of the projects’ outcomes. Beyond such broader discursive references, the so-called *Praxispartner* is the central actor in researchers’ narratives. This term originates from the conceptual and methodological literature about transdisciplinarity (e.g. Muhar & Kinsperger, 2006; Loibl, 2005) and was explicitly introduced as the central innovative element by the funding scheme. This term describes actors who are either (1) closely related to the context in which the knowledge produced in the project is imagined to be turned into practice; or (2) holding context-specific knowledge of the field in which ‘the problem’ is located and solutions need to be integrated. The term *Praxis*, as used in the program script, is thus rather open, referring to areas as different as industry, politics or education, but also to persons living in a specific region or having a particular occupation (e.g. farmer). As ‘partners’ they are expected to become ‘part’ of knowledge production processes. How is this rather vague definition turned into role allocations in the choreographies of the projects?

Given this rather broad outline it is not surprising that scientists do not talk about participation as a single, coherent phenomenon, or about the extra-scientific participant as a clear-cut figure. Much more we observed a spectrum of ascriptions and expectations that were projected onto extra-scientific partners. The ascribed roles partly overlap and any single actor can actually hold multiple ones in the course of one project. Yet, not every actor can take any of these roles: they vary in the degree of agency attributed and depend very much on the overall project

choreography.

We would like to distinguish four major roles attributed to extra-scientific participants and reflect upon the science-society (power-)relations inscribed in them.

The first is the *gatekeeper*. Particularly in the beginning of projects and when fieldwork is starting gatekeepers are meant to provide or facilitate access for the researchers (access to information, data, etc.) as they are part of a particular ‘field’ and hold strategic knowledge about it (e.g. whom to contact for specific information, who would be a key opinion leader, etc.). Gatekeepers can, at least in the early phase of the project, control to a certain extent the interaction of the scientists with ‘the field’ and thus hold quite a powerful position. They can express conditions for providing access to actors and information as well as give shape to specific kinds of access. The relation is thus on the one hand described as supportive as such actors can motivate others to participate in the projects. On the other hand picking the right gatekeeper becomes crucial, as this actor and how s/he is perceived by ‘the field’ shapes the potential interactions in important ways.

The second role could best be labeled *data-suppliers*. Scientists actually describe representatives of NGOs or public administrations as holders of information comparable to their own: sets of data, which they have collected and can share or exchange. Researchers therefore hope to be able to integrate these datasets directly into their research. Participation thus is frequently constructed as taking place on a well-delimited territory on which scientists and extra-scientific participants can share and exchange data (see Felt et al., 2012b). However, this does not necessarily mean that knowledge production takes place in a collective manner. Instead, the collection and production of data gets separated from knowledge generation. Extra-scientific participants are mainly admitted to the first part, while scientists take over the data processing and production of outcomes – a fact clearly reflected in the publication records which only rarely give space (e.g. through being co-author, or getting explicitly acknowledged) to the extra-scientific partners. Data are thus imagined as ‘speaking for themselves’ the only worry concerning partners’ data being – as already mentioned – that their collection might not have followed a protocol compatible with the

research standards.

The *assessment-agent* who performs “reality-checks” (P05_f01: 132) is the third role attributed. Giving feedback on the knowledge produced, which in turn would allow gradually adapting the project outcomes to contexts of application, is the general task of the actors or actor collectives carrying this label. Assessment-agents hold specific kinds of local and experiential expertise, and they are seen as thinking in broader and more practical terms (P05_f02: 972-74). They thus are meant to witness the relevance of the problem or testify the practical applicability of the knowledge produced. This happens at specific points along the project trajectory, where either outcomes are reflected upon ex-post or questions are considered collectively ex-ante. Concretely, interaction with this kind of actor often happens in the form of interview-type interactions (‘ask your partner’), or in the framework of project meetings and workshops. As in the case of the data-supplier, we also observe an epistemic divide at work: scientists would produce knowledge while assessment-agents would solely judge if this knowledge is useful in policy and every-day contexts. Thus, a rather clear distinction between facts and values emerges: to produce facts is definitely seen as the task of researchers, valuation of research is seen as partly the work of extra-scientific participants. This does not mean that feedback does not get integrated in the knowledge process, yet the choice what to integrate and what to leave out is largely left to the researchers.

Finally, extra-scientific partners are also conceptualized as *multipliers* and *communicators*. They do not take part in the knowledge production activities, but are expected to disseminate the results. Given their different experiences and know-how, they are seen as capable of reframing the knowledge produced in a way that is understandable for non-scientists. Participating thus means in this case to “translate” (P05_f01: 1403) or to “break down” (P02_f05: 140) scientific knowledge in the sense of simplifying it. The beneficiaries of knowledge are then entities like ‘the public’, ‘interested people’ or ‘affected groups’ who should be “reached” (P08_m01: 1693) or even more, “enthralled” (P02_f06: 648). Being part of the project would have the advantage of not only being able to communicate the results, but

also of having some insights into the knowledge production process.

Reflecting on roles attributed to extra-scientific partners however also invites a closer look at scientists' own role ascriptions in such participatory research contexts and to see how that differs from 'normal research'. Given the strong discourse on opening up research towards societal actors, researchers actually quite frequently felt the need to reclaim their role as *experts of knowledge production*. They describe themselves as holding the "technical expertise" (P06_m01: 441), but above all as being the choreographers, having designed the project and the interplay of diverse actors. This role is strongly supported by the funding scheme as it only admits researchers as project leaders, and they then have to get other actors on board depending on their imagination of what could be a potential problem and a way to find an adequate solution.

Simultaneously, and much more than in more classical research contexts, researchers perceive themselves as *service providers* for their partners. Such 'services' could be particular calculations or models, which enable their partners to make decisions about the future development of a region's tourism, to take one example. Yet there seems concern, that this collaboration could be misinterpreted: "It is not consultancy", one of our interviewees was careful to stress, "because it is rather hardcore-research. It is not something a consultancy could do." (P07_f01: 1127)

Finally, researchers understand themselves as being particular kinds of mediators, bringing evidence-based support to the table. They would describe this for example as producing a "solid basis" (P06_m01: 1150) for more rational debates with decision makers. "Sticking to facts" is thus understood as a preferred mode of getting "one step closer [to the solution]." (P08_m01: 672) Researchers thus frequently mobilized the separation between 'value-free scientific knowledge' produced on the one hand and 'value-laden or interest-driven practice/experiential knowledge' on the other and partly tied into a rather classical argument that once the facts were on the table rational decisions would flow from them quasi automatically.

Looking back at the role attributions and the knowledge related agency attached to them we can see a clear epistemic divide at work. While

extra-scientific partners were formally integrated into the projects in diverse and to some extent quite central roles, they only in rare moments – if at all – became epistemic partners or were conceptualized as knowledge agents. Quite the contrary, researchers feel the necessity – given the tangible absence of obvious epistemic orders in more participatory research settings – to clearly reaffirm their expert authority when it comes to knowledge production.

Temporalities of participation

Similar to role allocations, the way (project-)time is structured provides a powerful means of dissolving but also retaining boundaries between science and society – and thus plays a crucial role in attempts to open up research towards society (Bister et al., 2008; Ylijoki & Mäntylä, 2003). Our analysis of temporal narratives will start by focusing on the ways time is structured within, parallel to and beyond participatory research projects and how that impacts on the possibilities and limits of participation. But we will also more broadly point at the complex handling of time as a resource within research.

What characterizes the participatory experiments we observed is their necessary project format and all the consequences such a “projectification” (Torka, 2006) brings with it: (1) fairly stereotypical linear project structures – a starting phase, a data collection and analysis phase, a developing or testing phase, and a final dissemination/publication phase – also expressed through notions such as ‘road map’; (2) a dense rhetoric of justification of both time and related resources. While project practices – as has been pointed out in early laboratory studies (Knorr-Cetina, 1981) – are always far from being straightforward and linear, these structures nevertheless define to a certain degree how participation gets inscribed into a highly normalized imagination of a project-trajectory, i.e. how a project is made into a participatory project.

Within the starting phase, reaching consensus about research questions and research goals as well as defining different roles to be taken within the projects are core issues. While this does in essence not differ much from the starting phase of a ‘normal’ project, the significance lies in the fact that for some of the projects, participation of extra-scientific

partners during this stage of the project is not regarded as important. “The transdisciplinary partners didn’t do anything in that sense [participate in the problem framing]. Yes? They were simply supplied [with ideas] by us in the initial phase.” (P11_f01: 311), as one of our interviewees narrated. Alternatively, other projects describe the starting phase as the moment in which scientific and extra-scientific partners negotiate the very meaning of participation within a particular project. Researchers recall for example their kick-off meeting where they “negotiated how the further process would look like, which sorts of workshops should take place, which interviews, ...” (P10_f01: 199). This quote, even though a sign of rather early integration of extra-scientific participants, nicely shows which elements of the project are taken for granted (e.g. workshops, interviews) and what remains open for discussion.

The second phase is considered as the actual research phase in scientists’ narratives. In this phase ‘participatory activities’ are most clearly separated from ‘epistemic work’. They are confined to delimited moments of interaction and knowledge sharing, often with very specific tasks to be accomplished. The introduction of shared moments during the production of data and the development of tools for later use by the extra-scientific partners, for example, is frequently framed in terms of dissemination and not knowledge production. These moments are more or less meant “to assure that all people keep being informed about the project” (P02_m01: 104) and thus remain on board. This separation becomes even more evident when proposals confine the cooperation with extra-scientific partners to so-called “transdisciplinary building blocks” (proposal_Y)¹⁰ thus allocating to the interaction between researchers and their extra-scientific partners a space apart. Such activities are then often carried out in parallel, separated from other activities and handled by a specific subgroup of the project. “These workshops remained quite tied to the sub-teams”, one interviewee explained, “only some of them overlapping, in the sense that someone from one sub-team took part in another [sub-team’s workshop].” (P09_m01: 660)

During the final phase of various projects the outcomes developed were prepared for transfer to the societal context where they should be

used – beyond the duration of the project – to guide decision-making and/or to invoke behavioral change. In the project proposals this is frequently described as an ideal moment for engaging with extra-scientific actors, as they should embrace the outcomes while the scientists can retreat from the societal arena and concentrate on publishing for their own communities. In the interviews scientists actually point at the difficulties encountered during the implementation or the communication of their findings. These activities are described as utterly time-consuming and not easily compatible with the other expectations expressed towards them, such as publishing in good journals and getting money for new projects. Thus more continuous transfer and maintenance of knowledge is not necessarily considered as researchers' responsibility, which they see as ending once they have provided 'applicable outputs'. This also explains why the distribution of knowledge to different societal communities and the implementation of knowledge is quite frequently outsourced to knowledge brokers.

One fairly obvious question remains: What happens to the cooperation after the end of the project? Actually many projects perceive their knowledge or the tool they have developed as the symbolic tie with their former partners beyond the duration of the project. Yet they are also aware that using tools and knowledge is often tied to social relations and it was reflected on as being rather challenging for extra-scientific partners to actually work with a decision-making tool in absence of the scientists who had produced it and beyond the project. At the same time, researchers are also quite outspoken about the fact that it is neither their task nor do they have the resources to continue interaction beyond the defined realms of the cooperation. In many ways the project therefore sets clear limits to this relationship, although this might not apply to those projects in which scientists and their extra-scientific partners have already cooperated with each other on different occasions and for whom the project is simply another encounter.

While we have so far considered the temporal limitation of participation within the project, we would also like to point out some interesting observations concerning broader time-related considerations. The interviews brim over with narrations about compromising and balancing acts required due to time-constraints, which are perceived

as particularly important for this kind of research. “If you could use the time you spend there in the region for method development, two or three additional publications would have been possible.” (P10_f01: 686) one interviewee argues, stressing that in the prevailing value system of research, spending time with extra-scientific partners is not really validated. Or as another interviewee expresses concerns: “We need a structured procedure, otherwise the project-leaders and the project-people from the transdisciplinary domain are driven by the extra-scientific actor and just orient themselves towards the extra-scientific actor.” (P05_f02: 538) By referring to time-constraints, scientists thus narrate the need for a clear delimitation of the output produced for project partners and the frequency of participatory encounters from their other scientific output to be produced – implicitly often stressing the need for sufficient time for the latter. Simultaneously they underline their awareness that “if one is tied to three years [the length of a project], one can possibly only bring things back to [the contexts of the extra-scientific partners] in an exemplary manner” (P04_f02: 1574). Temporal structures in the end indirectly become a legitimate way of keeping extra-scientific participants out of certain phases, and of prioritizing inner-scientific contributions.

Places and spaces of encounters

In this last part, our attention will be focused on how our interviewees talk about the places and spaces of encounters between researchers and extra-scientific actors. We hereby share Livingstone’s (2003) attention to a geography of science and his careful argument of how deeply concrete sites, *places* and spaces matter when it comes to the production and distribution of knowledge. By using the notion place we address the physicality of the location where people encounter each other, it being imbued with a specific identity and meaning often expressed through its name. Whether it is a university seminar room, a lab, a table in a pub or a town hall matters when it comes to exchanging and creating knowledge. Places always also express the (power) relations of people inhabiting them, they are symbolically open to certain people while difficult to access for others. They bring people together in co-presence, allowing for both direct engagement but also distancing. They shape

shape which kinds of (knowledge related) actions we judge as adequate and which ones as "displaced" (Gieryn, 2000). When employing the notion of space we particularly address the fine-grained practices giving shape to, providing structure for and bringing to life the places we encounter. But space also draws our attention to the transgression of the physical limitations of a specific place, pointing at relations and networks going beyond any material encounter. Creating space thus always also means opening-up or closing-down participation in research.

When talking about places, researchers quite clearly differentiate between ‘their place’ – the research institution, seminar room or lab – and the place where their extra-scientific actors are located. As a consequence much of the reflections concerning place refer to physically transgressing the imagined boundary of science and society. For example “coming into a region” (P10_f01: 734) which is related to the project – an activity explicitly encouraged by the program – is one such moment. These regions are thus examples for how specific geographic locations encounter and handle a particular problem such as e.g. climate change or sustainability issues. Within the regions participation happens mostly at places familiar to the extra-scientific actors such as taverns or community centers. This leaving of their labs and “going out” (P07_f01: 1307) into society to meet their partners – as it is often described – is staged as proof of the openness of their epistemic approaches and as an explicit sign of inclusion and closeness to their extra-scientific partners. They thereby emphasize their leaving the ‘labsapes’ and moving into the societal ‘landscapes’, to use a distinction developed by Kohler (2002).

Yet on closer observation, this “going into the field” (P04_m01: 726) does not necessarily mean that researchers comply with the interactive practices of the field and that the extra-scientific partners necessarily define the rules of the game and are in control of the situation. Here it is interesting to observe that these places, remote from offices or labs, are quite frequently transformed into spaces that become proxies for scientific spaces and can thus be better navigated by researchers. Powerpoint presentations, workshop-type settings, focus groups, podium-discussions, etc. they all are somehow modes of ordering interaction

which researchers are well acquainted with and enhance their feeling of being on familiar ground. Thus they can deploy their experiences, while extra-scientific actors not necessarily perceive this as being ‘their territory’. Here, again, our observations on the role of place are in tune with those of Kohler (2002), when he describes the move of ecological research from the field to the lab. Once laboratory work, its routines and values had managed to get established as the gold standard, even those researchers who continued doing field work could no longer do so as they had been accustomed before. They were living in an environment “in which they felt bound to use lab methods and understood that their own practices and achievements would be judged by lab standards. [...] All lived to some degree in the shadow of laboratory science, and their successors still do.” (Kohler 2002, p.4). In our case, it is specific methods/formats of interaction that have managed to become dominant in research have also started to structure many of the encounters in societal contexts and subsequently imported specific kinds of values and modes of agency.

Yet we also encountered the ‘bringing-in’ of extra-scientific actors, which meant inviting them into academic territory. Depending on the specific roles extra-scientific partners were to embody – be it data provider, member of an advisory board or tester of a tool –, there were specific locales where they met with researchers. Many encounters actually happened in formats like project meetings or workshops taking place at universities or research institutes. Here it seems important to stress that extra-scientific partners generally only have access to ‘neutral territories’, e.g. seminar rooms, and explicitly not to the sites where “actual research-work” (P01_m01: 243) like data and tool-production happens, as one of the interviewees made explicit. The actual work place of the scientist largely remains ‘their own space’, a ‘no-entry zone’ for extra-scientific participants. Knowledge production, namely the aggregation and analysis of data, happens in the ‘science-space’ with clear rules and rituals. It is there where researchers translate and transform what they have gathered during different moments of interaction with extra-scientific partners. This was described by one of our interviewees as follows: “ ... we picked up the key points of the stakeholders, we made them plausible for us, [...] broke them down to

what [...] is investigable”. (P06_m01: 397) This would then allow building upon the data collected and observations made and further elaborate on certain research findings.

Beyond these concrete encounters it seems also interesting to reflect on the broader imagination deployed when talking about science and society as spaces which should interact. Actually, speaking about this relation is mostly wrapped in a language of transfer or transport of, for example, knowledge, information, data, models, toolkits or prototypes ‘across the border’ from science to society. Findings and results are “brought back into the Praxis” (FG02: 670) to be presented and discussed, sometimes including feedback loops. Models or knowledge created in the scientific realm should then – in a second step – be “realized” (P05_f02: 548), i.e. implemented in real-life contexts.

To sum up, we could argue that shared places and spaces of participation only rarely became epistemic ones where co-investigation takes place. They are much rather spaces of representation, of exchanging data and information, of feedback, of elaborating the form of public presentation of results, and also of social encounter.

Discussion and conclusion

We have outlined that the program on participatory research we investigated is one case where both the political salience as well as the societal relevance of sustainability issues have been perceived as sufficiently pressing to foster experimentation with new models of knowledge production and search for different arrangements along the imagined and practiced boundaries of science and society. Through following the stories researchers told, both in proposals as well as in their interviews with us, we aimed at gaining a better understanding of what was perceived as a new more participatory research culture.

What are our central observations?

We witnessed that there is no single, coherent entity that could be labeled ‘participatory research’, but instead, a multitude of constellations and practices became visible in the different project choreographies and even in narratives of different researchers within one project. This resonates with the debates around the ‘disunity of

science' (Galison & Stump, 1996), in which Hacking (1996) draws our attention to the fact that we should not simply take the notion of *unity* for granted but need to pay close attention to the *different unities* which can/should be reached. Using his distinction between a "metaphysical sentiment", a "practical precept" and a mode of "scientific reasoning" (*ibid*: p. 43) we will reflect what this means for our case of participatory research. We could argue that the researchers in our sample are quite committed to a metaphysical sentiment of participatory research, as shown in their rich and partly stereotypical discourse valuing of this type of research. However their practical precepts, i.e. the methods of performing participation in research, vary considerably and so do their modes of reasoning, which remain deeply engrained in the respective epistemic cultures they are part of outside this temporary project constellation. Consequently, on this level a plethora of meanings associated with the very idea of participatory research becomes visible.

Indeed, the momentum created through the idea that 'opening-up research towards society' is imperative due to the perceived limitations of conventional disciplinary science, is actually counter-acted by the relentless efforts of researchers to keep 'their research' under 'their control'. This 'control' was exerted – as we have shown – through specific role attribution, through deciding when, what kind of and for how long extra-scientific actors would enter the scene and through choosing the places and creating the spaces where the collaboration would happen. This is closely linked to the tensions addressed by researchers between the ideal of more open forms of knowledge production and the realities of contemporary research systems. At the end of the day, the disciplinary values counted most such as classical publications and other more normative units of research production. 'Engagement' as demanded in these projects, was a time-consuming investment which had no clear value that could be transformed into a unit of accounting and thereby integrated into the assessment systems of contemporary research (Felt et al., 2012; Power, 1997).

This leads to a number of questions: In how far can the challenge of participatory research be met in contemporary research systems? Can this kind of research be regarded as a new 'mode' or as a 'transitory

fashion’? And, what kind of change could it trigger in the relationship between science and society?

Based on our empirical material, we would argue that there were temporary arrangements through which the boundaries between science and society became less prominent and visible. However, we simultaneously observed that these boundaries were reconstructed. Therefore, we would argue with reference to Gieryn (1995) that what we observed was “boundary work”, i.e. a “contest over distributions of [knowledge] authority” (*ibid.*: p. 406), a struggle over where to draw the boundary between science and other knowledge related activities. And “what ends up inside of science or out is a local and episodic accomplishment” (*ibid.*: p. 406) and thus looked quite different within each of the projects observed.

Going beyond the focus on researchers’ accounts, we also want to stress that the strategy of upholding the boundaries between science and society was not only pursued by the researchers. In fact, for some of the extra-scientific partners these boundaries had quite important functions: boundaries allowed clear attribution of the responsibility for knowledge production to science. At the same time, said boundaries allowed their positioning in the role of knowledge-consumers as opposed to that of co-producers. This in turn offered the opportunity to pick and chose the kinds of knowledge they judge suitable for a specific purpose, to retreat to their own territory at any moment in time, to take decisions concerning actions to be taken (or not) on their own grounds and thus to follow their own agenda beyond this temporary encounter within the bounds of the project.

In conclusion we thus want to challenge the very meaning of participation in the projects we investigated. To do so, we return to the notion of ‘collective experimentation’ and the strong idea of inclusiveness towards societal actors embedded in it and ask whether or not this notion is adequate to describe the stories told about participatory research in the interviews and the proposals. The first question to ask would be: Was it an experiment and if so, what kind? In a certain way it was a sort of ‘laboratory experiment’, planned with a clear set up, well distributed roles and a protocol to follow. Yet most of the time, it turned out to be much more complex and closer to what Schwarz & Krohn

(2011) call the ‘field ideal of experimentation’, thus acknowledging the “blurred boundaries, and the unpredictable response to intervention” (ibid.: p. 120). This did create concerns in an academic world where things seem to be measured in well-defined units and where work is valued accordingly. Even though, admittedly, it was a more messy form of experimentation, ‘Was it collective?’ would be the second question. Against the background of our analysis, we could say that participatory research as encountered in this program was much more similar to a “temporary harmonious adjacency” (Galison & Stump, 1996) of science and society than a more profound reordering or opening-up of research. Actually, while participatory research programs requiring inclusion of extra-scientific partners might create potential alternative spaces of knowledge production, they also have their clear limits, since they are part of a much larger research system that does not necessarily share these values. Taking seriously the need for different forms of knowledge to address the complex sustainability issues would mean breaking with traditional dichotomies such as fact/value or knowledge/experience, creating more long-term spaces of encounters between different knowledge actors, but above all also attributing inner-scientific value to this kind of investment into cross-boundary work. This might then lead to forms of ‘collective experimentation’ and new ways of learning in sustainability research and beyond.

Notes

¹ The authors would like to thank the editors and the anonymous referees for helpful comments on the draft of this article, as well as Elizabeth Rosenbaum for her support with final language issues. This paper is based on work done in the project ‘Transdisciplinarity as culture and practice’ funded in the framework of the program *proVISION* by the Austrian Ministry for Science and Research. In particular we would like to thank our interview partners who took the time for engaging with our questions and for sharing their experiences and concerns with us.

² See <http://www.nachhaltigwirtschaften.at/english/index.html>, 12.3.2012

³ <http://www.provision-research.at/>, 12.03.2012

⁴ For extensive discussion of this concept see the special issue of *Science, Technology, and Human Values* 26 (3) 2011 und of *Futures* 31 (7) 1999.

⁵ See a recent participatory workshop organized by the European Commission DG discussing the meaning of “Responsible research and innovation“.
http://ec.europa.eu/research/science-society/document_library/pdf_06/responsible-research-and-innovation-workshop-newsletter_en.pdf

⁶ <http://sciencestudies.univie.ac.at/forschung/transdisciplinarity-as-culture-and-practice/>

⁷ We understand the funding scheme as a technology shaped by macro-political trends in research as well as a broader sociotechnical imaginary. Using Akrich’s frame for analyzing technologies, such an understanding of funding structures makes us aware that any such program contains a script which defines „a framework of action together with the actors and the space in which they are supposed to act“ (Akrich 1992: 208).

⁸ The interviews were conducted in German, which is the native language of our interviewees. All translations were made by the authors.

⁹ Quotes taken from the interviews are anonymised and labeled as ‘project-number_project-collaborator-number_line’.

¹⁰ Project proposals are labeled as ‘proposal_proposal-character’.

References

- Akrich, M. (1992). The De-Description of Technical Objects. In W. E. Bijker and J. Law (Eds.) *Shaping Technology / Building Society*. Cambridge: MIT Press, 205-24.
- Austrian Federal Government (2011). *Strategy for Research, Technology and Innovation of the Austrian Federal Government. Becoming an Innovation Leader - Realising Potentials, Increasing Dynamics, Creating the Future*. Vienna.
- Begusch-Pfefferkorn, K. (2005). *proVISION: Forschungsprinzipien*. Ministerium für Bildung, Wissenschaft und Kunst.
- Bister, M., Felt, U., Strassnig, M., & Wagner, U. (2008). Zeit und Partizipation im transdisziplinären Forschungsprozess. In E. Reitingner (Ed.), *Transdisziplinäre Praxis. Forschen im Sozial- und Gesundheitswesen*. Heidelberg: Carl-Auer-Systeme Verlag. 35-46.
- Callon, M., Lascoumes, P., & Barthe, Y. (2009). *Acting in an Uncertain World: An Essay on Technical Democracy*. Cambridge: The MIT Press.
- Calvert, J. (2006). What's Special about Basic Research? *Science*,

- Technology, & Human Values, 31(2), 199-220.
- Chesbrough, H. W. (2003). *Open Innovation: The New Imperative for Creating and Profiting from Technology*. Cambridge: Harvard Business Press.
- Clarke, A. E. (2005). *Situational Analysis. Grounded Theory After the Postmodern Turn*. Thousand Oaks: Sage.
- Daston, L. (1995). The Moral Economy of Science. *Osiris*, 10, 3-24.
- Denzin, N. K. (2001). The Reflexive Interview and a Performative Social Science. *Qualitative Research*, 1(1), 23-46.
- Felt, U., Igelsböck, J., Schikowitz, A., & Völker, T. (2012). *Growing Into What? On the (Un-)Disciplined Socialisation of Early Stage Researchers in Transdisciplinary Research*. Higher Education, forthcoming.
- Felt, U., Igelsböck, J., Schikowitz, A., & Völker, T. (2012b). *Research (un-)limited: Entanglement and Purification in Transdisciplinary Knowledge Production*. Manuscript to be submitted to *Science, Technology and Human Values*.
- Felt, U., & Wynne, B. (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.
- Funtowics, S. O., & Ravetz, J. (1993). Science for the Post-Normal Age. *Futures*, 25(7), 739-757.
- Funtowicz, S. O., & Ravetz, J. R. (1990). *Uncertainty and Quality in Science for Policy*. Dordrecht: Springer.
- Galison, P., & Stump, D. J. (Eds.). (1996). *The Disunity of Science. Boundaries, Contexts, and Power*. Stanford: Stanford University Press.
- Gibbons, M., Limoges, C., Nowotny, H., Schwartzman, S., Scott, P., & Trow, M. (1994). *New Production of Knowledge: Dynamics of Science and Research in Contemporary Societies*. London, Thousand Oaks, New Delhi: Sage.
- Gieryn, T.F. (1995). Boundaries of Science. In: Jasanoff S. et al. (Eds.): *Handbook of science and technology studies*. Thousand Oaks: Sage, 393-443

- Hacking, I. (1996). The Disunities of the Sciences. In P. Galison & D. J. Stump (Eds.), *The Disunity of Science - Boundaries, Contexts and Power*: Stanford: Stanford University Press, 37-74.
- Hessels, L. K., & Lente, H. v. (2008). Re-Thinking New Knowledge Production: A Literature Review and a Research Agenda. *Research Policy*, 37, 740-760.
- Hirsch Hadorn, G., Hoffmann-Riem, H., Biber-Klemm, S., Grossenbacher-Mansuy, W., Joye, D., Pohl, C., et al. (Eds.). (2008). *Handbook of Transdisciplinary Research*. Bern: Springer.
- Jasanoff, S. (2003). Technologies of Humility: Citizens Participation in Governing Science. *Minerva*, 41, 223-244.
- Knorr Cetina, K. (1981). *The Manufacture of Knowledge. An Essay on the Constructivist and contextual Nature of Science*. Oxford: Pergamon Press.
- Kohler, R. E. (2002). *Landscapes and Labscapes. Exploring the Lab-Field Border in Biology*. Chicago: University of Chicago Press.
- Krohn, W., & Weyer, J. (1989). Gesellschaft als Labor. Die Erzeugung sozialer Risiken durch experimentelle Forschung. *Soziale Welt*, 40, 349-373.
- Livingstone, D. N. (2003). *Putting Science in its Place. Geographies of Scientific Knowledge*. Chicago: University of Chicago Press.
- Loibl, M. (2005). DGH: Empfehlungen zur Evaluation transdisziplinärer Forschung. *GAIA-Ecological Perspectives for Science and Society*, 14(4), 351-353.
- Muhar, A., & Kinsperger, A. (2006). Implementierung inter- und transdisziplinärer Forschungsansätze in Graduiertenkollegs: Handlungsoptionen seitens der Universitäten. *Zeitschrift für Hochschulentwicklung*, 1(1), 93-109.
- Nordmann, A., Radder, H and G. Schieman (Ed.) (2011). *Science Transformed?: Debating Claims of an Epochal Break*. Pittsburgh: University of Pittsburgh Press.
- Norricks, N. R. (2000). *Conversational Narrative: Storytelling in Everyday Talk*. Amsterdam: John Benjamins Publishing.
- Nowotny, H. (2007). *The Potential of Transdisciplinarity*. <http://www.interdisciplines.org/interdisciplinarity/papers/5>. Retrieved from:

http://helganowotny.eu/downloads/helga_nowotny_b59.pdf,
12.03.2012

- Nowotny, H., Scott, P., & Gibbons, M. (2001). *Re-thinking Science. Knowledge and the Public in an Age of Uncertainty*. Cambridge: Polity Press.
- Nowotny, H., Scott, P., & Gibbons, M. (2003). Introduction: Mode 2 Revisited: The New Production of Knowledge. *Minerva*, 41(3), 179-194.
- Pestre, D. (2003). Regimes of Knowledge Production in Society: Towards a More Political and Social Reading. *Minerva*, 41(3), 245-261.
- Power, M. (1997). From Risk Society to Audit Society. *Soziale Systeme*, 3, 3-21.
- Ravetz, J. R. (1987). Usable Knowledge, Usable Ignorance. *Science Communication*, 9(1), 87-116.
- Schwarz, A., & Krohn, W. (2011). Experimenting with the Concept of Experiment: Probing the Epochal Break. In A. Nordmann, H. Radder, and G. Schiemann (Ed.), *Science Transformed?: Debating Claims of an Epochal Break*. Pittsburgh: University of Pittsburgh Press, 119-34.
- Shinn, T. (2002). The Triple Helix and New Production of Knowledge: Prepackaged Thinking on Science and Technology. *Social Studies of Science*, 32(4), 599-614.
- Strauss, A. L., & Corbin, J. M. (1998). *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory*. Thousand Oaks: Sage.
- Torka, M. (2006). Die Projektförmigkeit der Forschung. *Die Hochschule*, 1, 63-83.
- Wynne, B. (1991). Knowledges in Context. *Science, Technology, & Human Values*, 16(1), 111-121.
- Ylijoki, O.-H., & Mäntylä, H. (2003). Conflicting Time Perspectives in Academic Work. *Time & Society*, 12(1), 55-78.

Ulrike Felt is professor for social studies of science and head of the department for social studies of science at the University of Vienna. Her research focuses on changing knowledge cultures and their institutional dimensions; science communication and public engagement; temporal dimensions in research with special focus on the role of future; science, democracy and governance. Her work is often comparative between national context and technological or scientific fields (especially life sciences, ecology, biomedicine and nanotechnologies). From 2002 to 2007, she has been the editor of the *Journal Science, Technology, & Human Values*.

Judith Igelsboeck has a background in sociology. Her research interests involve changing science-society-relations within new modes of knowledge production, ways of collaboration amongst heterogeneous actors, as well as ‘knowing’ in the age of digitalization. She is writing her PhD thesis on the performance and transformation of evidence within participatory sustainability research.

Andrea Schikowitz has a background in sociology and political sciences. Her research interests are in the area of epistemic cultures and communities, and relations of science and diverse forms of publics. In her dissertation she deals with “Choreographies of Togetherness” researchers develop within temporary and heterogeneous research contexts.

Thomas Voelker has a background in sociology and his research interests include: changing modes of knowledge production, the manufacturing and use of anticipatory knowledge and expectation dynamics in the governance of science and technology. In his PhD-thesis he focuses on ‘futuring’-practices in transdisciplinary sustainability research.

All authors are working at the Department of Social Studies of Science at the University of Vienna in a research project called 'Transdisciplinarity as Culture and Practice'.

Contact Address: Department of Social Studies of Science,
University of Vienna, Universitätsstraße 7, Staircase II/6th floor
(NIG), A-1010 Vienna (Austria) - ulrike.felt@univie.ac.at