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MASTERARBEIT

Titel der Masterarbeit

Computer scientists & their publics.

On constructions of 'participation' and 'publics' in participatory design and research.

Verfasserin

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Table of Contents

“

“Why is life short?” Connie asked. “Your old people are healthy, sure, they live with everybody else. But they age. And they die, not much later than we do. Why not live longer?”

“We decided not to try.”

“Who's 'we'?”

“The councils. The town meetings. That's how general questions of direction of science get decided.”

“You mean by people like me? How could I decide if they should build an atom bomb or something?”

“Of course you could decide. It affects you—how not? A rep from the base talks. On the local level for a small proj. But if it's a major proj—such as research on prolonging life would be—then everybody decides. What it would cost to begin. What it would use up in the way of resources and labor. All that would be set out. What would be consequences on the whole yin-and-yand of it, that we could foresee or guess.”

“But how could I know if you're a good scientist or not? I know nothing from nothing about genetics. By the time I figured it all out, I'd be an old woman.”

“You couldn't tell. But you could decide whether my base should stiff on breeding borer-resistant zucchini or scab-free potatoes or gorgeous and edible day lilies. As for results, whether experiments are valid, we researchers all put in time checking each other's work. Done by lot.”

“But it sounds like some kind of dictatorship. I mean in our time, science was kept … pure maybe. Only scientists could judge other scientists. All kinds of stories about how scientists got persecuted by the church or governments and all that because they were doing their science.”

“But Connie, in your day only huge corporations and the Pentagon had money enough to pay for big science. Don't you think that had an effect on what people worked on? Sweet petunias! And what we do comes down on everybody. We use up a confounded lot of resources. Scarce materials. Energy. We have to account. There's only one pool of air to breathe. You grasp neurologists made the aplysia extinct by using it up in experiments? Almost did the same to chimpanzees! What arrogance!”

”

A conversation between Connie (from past/present) and Luciente (from the/a future),

in:

Marge Piercy: *Woman on the Edge of Time* (1976, 271–272)

1. Introduction

What is science, what technology? And what do they actually do? Two rather simple questions, it seems. But yet they only seem simple as long as we do not try to answer them. The more we look into what exactly science and technology are and do, how they are made and what consequences they have for individuals and whole societies, we are facing more and more complexities. In the end we might even find, that we cannot give a conclusive answer to those seemingly simple questions – not without simplifying some aspects, taking shortcuts here and there, rating certain aspects as important, while diminishing other aspects in their relevancy.

While we have to necessarily apply such simplification in order to provide an answer to such basic questions, we have to be aware of the processes, by which we are coming to terms with these questions and how we form our answer. In a broader sense, we have to be aware of how we form knowledge. And we have to make that explicit, if we want to provide accurate accounts – that is, not accounts of "truth" but of what we encounter in the world, as well as the circumstances under which we do so and under which we present our insights to others.

We also might find some parts to an answer which are perceptible to many, if not all of us. Although, in science – like in politics or social life in general – there will always be at least one person somewhere in the world who will see all of it differently. What is counted as valid has a lot to do with the positions and powers one is able to tie together in neat networks of technoscientific artefacts – including our thoughts and produced knowledges.

One part of an answer to the above questions, which is nowadays rather uncontested, is that sciences and technologies are a central aspect of our diverse societies' organisation and that they often yield vast consequences for our daily lives – to the better or worse.

This is one reason why science and technology studies (STS) are a growing field of scientific engagement, which has already put a lot of effort into answering our opening questions. It is also one reason why I myself, coming from technical computer science (and always inclined to tinker around with digital and material artefacts to make here and there something a bit better or more convenient for some people), have started to take a deeper look into STS and to critically reflect on scientific and technological developments. Because when I want to develop technologies, I want them to make life for many – or all – people better, not worse. So now I find myself in this hybrid position, writing about sciences and technologies somewhat from an outside or observing position and, at the same time, never being able to fully detach from meddling around with/in technoscientific practices, material-discourse productions and interventionist engagements with the "real" world.

However it is not only a thing about the here and now, but about how our technoscientific practices are shaping the future(s) and how we are accountable and responsible for what follows. As the preceding quote from Marge Piercy's 1976 novel *Woman on the Edge of Time* reminds us, future generations might look back to our scientific practices and establishments with laughter, if not disgust. Although, this is very much depending on which futures we are actually shaping in the here and now, as they still are unwritten.

When speaking about responsibility, I have to mention that I am certainly not the only one to do so. Much to the contrary, responsible research seems to be a major topic in politics and science policy landscapes today. Several of the recent EU Framework Programmes tried to implement a framework of Responsible Research and Innovation (RRI). With the ResAGorA project, the EU aims at building a "Governance framework for Responsible Research and Innovation"[1] and the IPPA project even maintains a "Public Participation Toolbox"[2], which assembles diverse tools and methods of public engagement and citizen participation in technosciences. And just this year's June, on the 19th, another research project hit its "final event": the UK-based EPSRC-funded FRRIICT project – a project building a Framework for Responsible Research & Innovation in ICT[3]. All of these projects and initiatives allocate public participation in science a key role for responsible research.

While these developments of RRI have started and intensified only from the first decade of this century, there is at least one scientific movement/field that is applying such principles since its early formation: Participatory Design or, initially, the Scandinavian approach to systems design/development. A field in which since the 1970ies research and development (or innovation) processes are established, applied, and reflected. A field, in which the engagement of users (and in a broader sense: publics) is a key component of the technoscientific practices.

With this work, I want to address this gap, which STS research seems to have overlooked so far. By applying small-scaled situational analysis (as appropriate to a master thesis project), I provide some first exploratory insights into the field of Participatory Design as well as participatory approaches to ICT development more generally.

Within this work I am drawing on three strands of theoretical background information, which allows me to formulate a research approach that engages with new situations to analyse. First of all, I am drawing on STS research about public engagements, to provide a frame within which I try to understand participatory approaches to technoscience. I also draw on reports and theoretical considerations of the historical development of Participatory Design as technoscientific discipline – taking a curious detour to Free/Libre and Open Source Software development. And finally I consider feminist technoscience studies and work on feminist epistemologies as a crucial linkage: both, between theoretical reflections of science and technology with methodological approaches on doing science, and between science policy considerations on public engagement and public engagement in concrete technoscientific practices. Furthermore, these insights from feminist technoscience might provide links to/between STS and Participatory Design.

As a qualitative analytical research approach (in the context of a master thesis) this work is certainly limited to providing preliminary and guiding insights. These then could feed further research in this area, which could provide fruitful synergies between STS, Participatory Design and Feminst Technoscience Studies as well as new innovations in context of public engagement with/in technosciences and responsible research and innovation in general.

1 http://res-agora.eu/ (last accessed: 2014-10-20)

2 http://toolbox.ippaproject.eu/index (last accessed: 2014-10-20)

3 http://responsible-innovation.org.uk/frriict/ (last accessed: 2014-10-20)

For the remainder of this introduction I will briefly guide you through the following chapters of this work. Chapters 2, 3 and 4 will provide further introductions to concepts and theoretical frameworks within which participation in technoscience happens, as well as to how my research is embedded within these spaces of technoscientific engagement. With these chapters I will also introduce my theoretical framework, which guided me in forming my research questions and approach. The distinction between "theory" and the following "empirical" part is of course to some extent arbitrary – I am using theoretical texts from the field of Participatory Design to generate a preliminary understanding of the phenomena of interest, which I later will be analysing, based on other texts and interview data from the field of Participatory Design. In general we cannot draw clear boundaries between theory and practice, or between theoretic and empirical research, as it always depends on the definition of our materials and our relation to the world, as well as our situatedness in scientific communities. Nevertheless, these chapters mirror my conceptual wandering[4] around the research field and the thought processes and styles that I am applying in the later interpretation and analysis of participatory processes in technoscientific practices.

First, in *chapter 2*, forming the main theoretical part of this work, I will go into the details of publics and their participation in (techno)science. This includes an historical overview of how forms of public participation in (techno)science have emerged/changed over time. Then I also present some remarks on the general theme of 'democratisation' of (techno)sciences and finally elaborate on the notions of *publics* and *participation*, as well as the consequences that our understanding of such notions have for concrete participatory engagements.

Second, in *chapter 3*, I present a first introduction into (and my initial framing of) the field of Participatory Design, its historical development as well as its intentions and approaches. This section is closely interlinked with chapter 6 and the current developments in and around Participatory Design.

Third, as a preliminary closing of my theoretical framework, in *chapter 4*, I highlight important influences and general conditions for engaged, participatory research/development. These are derived from a body of feminist technoscience studies research, which, through its epistemological focus and foundation, links theory to practice: it does not only provide an analytic focus for the interpretation of participatory engagements but also situates me and my research in a hybrid position with a hybrid approach. A position between STS, computer science and feminist technoscience studies. With an approach, taking a theoretical interest in participatory technoscientific practices, to shift discourses and provide arguments for taking the empirical world serious – that is, in its situatedness, with all the theoretical and societal (power) relations at work, in forming the framework for empirically observed situations/phenomena.

These theoretical-methodological considerations then lead to *chapter 5*, in which I will introduce

4 I am using the term "wandering" in favour of "exploration", because it does not preclude such a rigid, goal-driven nature and leaves room for irritations, pleasurable detours as well as moments of pause while wondering about the phenomena encountered. A light-weighed scientific wandering reflects my material situation and also seems to fit my approach much better than a scientific exploration, with its amassing of socio-technical and techno-material infrastructures to interpret the unknown from a relatively safe (and this is often translated to objective) position.

my empirical research approach. Besides a description of my set of research questions and the methodical approach to conduct and analyse qualitative interviews with researchers from/around the field of Participatory Design, I will also thoroughly situate myself and report on limitations of my research approach. This is strongly connected with the ethico-onto-epistemological considerations brought up in the preceding chapter on feminist epistemologies – through this one of the linkages becomes visible, which is provided by this theoretical perspective.

Chapter 6 then presents the results of my exploratory wanderings[5] by first providing more contextual insights into Participatory Design as a field and its practices, followed by the analysis and interpretation of interviews with four Viennese researcher who are either engaged in Participatory Design themselves, or who use or aspire participatory approaches in technoscientific developments.

With *chapter 7*, I come to a preliminary closure of this work, in the hope that I myself or somebody else will continue work in this area. A part of this conclusion addresses the applied research approach and the joys and problems in doing such a research within a master thesis. But the major part of the conclusion addresses (at least) the three areas of STS, Feminist Technoscience Studies and Participatory Design with slight critiques and suggestions for cooperation and further entangled engagements with/in and around the technosciences – always remembering that we are part of them too.

Now let us start our wanderings by taking a plunge into the history and development of public engagements in the (techno)sciences.

5 "exploratory wanderings" signifies a compromise between my wish to freely wander around the grounds of participatory technoscience and the confession that I, too, am imposing my own perspectives and my prearranged analytic and discursive tools onto what I experience while wandering these grounds.

2. Publics and public participation in (techno)sciences

Before I start with the historical shifts in patterns of participation in (techno)sciences, let me briefly explain my use of the terms science, technoscience and (techno)science:

The main difference regarding the use of these terms is the historic context. While I will usually speak of sciences when I talk about the period before the 1980s, I usually refer to technosciences from the 1980ies onwards, as the term itself was only coined in the late 1970s. I sometimes also use (techno)sciences, to highlight the more abstract use of the term, as well as the ambiguity of the socio-technical constructs we try to describe by the terms science and technoscience. However, in most cases I will be using these terms synonymously.

Technoscience itself is used differently among diverse research fields and researchers, often only referring to contexts of natural and (bio)medical sciences and technology, or what is often called STEM fields (Science, Technology, Engineering, Mathematics – sometimes substituting the Mathematics by Medicine) or MINT fields (Mathematics, Information sciences, Natural sciences, Technology). But this use is too restrictive. Generally I am inclined to use technoscience in a way Donna Haraway proposed, here summarized by Judy Wajcman:

> *"technoscience is a cultural activity that invents Nature, and constructs the nature-culture axis as a classificatory process."* (Wajcman 2004, 88)

Of course the classical STEM areas are at the core of these processes and also very influential, but then also social sciences (or STS in particular), or the humanities too, are constructing dichotomies not only between nature and culture but also between STEM and other sciences. And they, too, are (meanwhile) heavily dependent on techno-material infrastructures to conduct research – another notion that resonates in the term technoscience: that the forms of science and research, as well as the knowledges coming from it, are shaped by the technologies (or techno-material infrastructures) in use, when doing science/research.

So, this is something we should keep in mind, because it implicitly imposes questions of whether or not social scientists, and in particular researchers doing science and technology studies, have certain stakes in the technologies produced by STEM, in particular by information sciences: Maybe "we"[6] are one public of information and computer science and should demand our participation in developments that impinge on our abilities and infrastructures to do research? I want to use the insights taken from the investigation of participatory approaches in the STEM areas not only as a guide for critical change of these processes within the STEM areas, but also as insights to apply participatory approaches to STS themselves.

But of course my concrete interest is a certain field of technoscience, namely the computer sciences and particularly so: Participatory Design. This, too, might resonate in my specific uses of the term technoscience.

That said, let us take a look on how forms of public engagement in the (techno)sciences have

6 Throughout this work I will use "we" in different ways to speak to and from different positions, which also signifies my own hybrid position between the disciplines, neither fully being social scientists, nor fully being computer scientists, and always applying an action/change oriented approach based on a critical emancipatory political stance.

changed throughout the past one-and-a-half centuries.

2.1. History of public participation in (techno)sciences

Questions of public participation in science increasingly came up in the 1970s and 1980s, which is precisely when Participatory Design took off. Yet, throughout sciences' histories we can find different configurations of science-to-public relations. Tracing historic changes in such relations reminds us to not forget the open and contingent character of scientific governance and public's participation in scientific projects and debates. This is especially important, if we not want to fall for simplifying linearised models of the development of public participation. Yet, such models will come up in our investigation of participatory approaches, sometimes they may even help us to focus on certain aspects. Nevertheless, we should beware of relying solely on such models and taking part in the game of using one determinism against another. In this subsection we will therefore review some historical accounts of public participation in (techno)science.

Martin Lengwiler (2008) presented a recent overview of the historical development of questions of participation in (techno)science, summarized in the following paragraphs with accompanying remarks.

Back in the 19th century we find a hybrid model of public-to-science relations. At that time civic participation usually was not an issue, since scientists mostly acted as engaged citizens themselves, as policy advisers or even as politicians. Only in the first half of the 20th century a differentiation took place between science, politics and the public. This correlates with what Bernadette Bensaude-Vincent has shown in a genealogy of an alleged gap between the sciences and the public (Bensaude-Vincent 2001). She highlighted how this gap seemed to increase over the last 3 centuries. While in the 18th century we have found the enlightened public opinion, the vision of the public was transformed to that of a consuming mass in the 19th century. Besides distribution of scientific knowledge to those consuming masses there was still a notion of popular science, as an alternative to science proper. Although such popular science was clearly separated from academic science, it was, nevertheless, a form of publics' participation in a larger scientific endeavour. With the 20th century and the rise of physics and relativity theory – as a cut to more commonsensical mechanistic world views – the picture of the public as ignorant masses was introduced. With that

> *"science came to occupy the place of the sacred in our culture [... which] was defined precisely by its separation from the profane, from the sphere of ordinary life."* This *"sacramentalism of science"* meant that *"the ideal of enlightened opinion had become obsolete. [...] The public was no longer responsible for either knowing or not knowing. Public opinion would necessarily be inadequate when faced with scientific and technological choices."* (Bensaude-Vincent 2001, 108)

Nevertheless recent developments and the decline of physics' prestige (contrasted to the increasing prestige of bio- and environmental sciences) may revive this enlightened notion of public opinion, as Bensaude-Vincent concludes.

Also in the period between the First & Second World War an increase of politicised debates within science can be recognised. Several activist science movements emerged, demanding a

democratisation of science. Yet, they diminished rather quickly again, as Lengwiler writes:

> *"These activist awakenings had their heyday in the latter 1930s but suffered under the political consequences of the Second World War. Suffering from internal splits between Soviet-friendly pacifists and an antifascist camp opposed to the Soviet appeasement policy, the movement lost its influence completely after 1945."* (Lengwiler 2008, 192)

What Lengwiler forgets to mention is that, especially for the german speaking countries, the Nazi regime and the Shoah brought an incredible cut[7], not only to debates on democratisation of science but also to personal research careers and whole research trajectories. Also in other European regions the influence of fascist regimes might have marked a turning point in debates of democratisation of science. Heinz-Jürgen Voß shows this for research on sexual differentiation in biology and medicine. While there was research on complex, non-deterministic models of (not necessarily binary) sexes in the 1930s, this research stalled with the rise of the german fascism. Several proponents where even murdered. Those who emigrated, like the zoologist Richard Goldschmidt, then could not find sufficient research environments any more, which would have been necessary to participate in central debates. After the Second World War a former Nazi was rather influential in the field and simple models of a binary sex prevailed. Goldschmidt was seldom received in scientific circles, until the 1980s. (Voß 2010) This way it took more than 50 years to establish definitions of intersexuality which have already been anticipated in the 1930s. This would be an interesting field in itself, for an investigation of science-to-public relations, because today there are several very actively engaged public groups working against discrimination of intersex persons, therefore also strongly interacting with scientific bodies of knowledge.

After the Second World War a basic research model became dominant, in which science acted rather autonomously – the following analysis is yet strongly focused on the US-American context. A sort of "social contract" dominated science policy, under the assumption that basic research inevitably leads to an increased standard of living, which then is in the end the 'payment' society gets back for its funding of science. This model was not significantly contested until the 1970s. A shift, then, was initiated by upcoming social movements in the late 1960s, like feminist, 'antinuclear' and ecological movements. Lengwiler does not mention it, but it stands to reason that the African-American Civil Rights Movement was also influential in these processes. The Tuskegee Syphilis Experiments are only one commonly known example of sciences' racial bias (cf. Washington 2008), which at some point have to lead to resistance.

From the 1970s onwards, more and more participatory approaches emerged in different fields, and of course in different frameworks. At the same time, science policy increasingly adopted towards what Gibbons et al. (2001) framed as a mode-2 of knowledge production. This development may have started in the USA, but soon different European countries adopted participatory engagement exercises in diverse fields (medicine, ICT, climate change research, nanotechnology, biosciences, etc.).

All those emerging approaches then subjected to extensive STS research. Meanwhile we find

7 I don't know which other, better, word to use here, because the singularity of the Shoah and its implications cannot be grasped in two words, a sentence, a paragraph or even a whole book.

ourselves already after a "participatory turn", as Sheila Jasanoff has argued (Jasanoff 2003). We will come to more in-depth insights of current STS research on this issue in the section 2.1.1.

What can we take with us from this review of the development of participatory approaches in the technosciences? Regarding the general landscape of STS research on public participation, Lengwiler states:

> *"Participatory approaches in science and technology studies usually deal with the involvement of nonscientists, laypeople, or citizens in science and technology. In most cases, the involvement refers to decisions on a science policy level—participation at deciding actual research practices is rarely observed or argued for"*[8]. (Lengwiler 2008, 187)

This is a gap, that I want to address with my work. What is interesting here, is that different research fields or "scientific cultures" are engaged in different levels of participation: in engineering and natural sciences participation is usually enacted in "'end-of-pipe' stages in the research process, resulting in a lower degree of participation", whereas "in medical and biomedical sciences, participation also concerns earlier research stages, such as the development and design of therapeutic treatments " (ibid, 188). What puzzles here is that, besides never being mentioned, Participatory Design (which we might count more to the engineering sciences) enacts exactly this latter form of participation, concerning the design and development stages of the technoscientific process.

What might be an important remark, which we should bear in mind when approaching Participatory Design, is articulated by Lengwiler, in line with the other articles of the same special section of *Science, Technology & Human Values*:

> *"As important as the study of micro policies is, the articles also point at the need for enhancing the analysis of macro policies of participatory practices. Even a seemingly egalitarian participation of nonscientific actors on the micro level (for example, within single research projects) will be futile as long as the political and economic conditions under which research is performed are not reflected."* (ibid, 197)

This issue will come back to us, when we analyze Participatory Design. There we find public participation at the micro level, not only in form of micro policies (that is, participants discussing and suggesting what the technoscientists should do and not do) but also in form of transdisciplinary engagement (that is, participants actively shaping technoscientific artefacts). Yet, all this participation stops when it comes to questions about what should be researched in the first place. In general, policy discussions in computer science are rarely happening. But we will come back to that at a later stage this thesis.

2.1.1. Recent STS work on public participation

In this section I focus on recent works in STS, regarding public participation in technosciences.

In his paper on constructions of the "scientific citizen", Alan Irwin highlights the 1990ies as an

8 Lengwiler refers to Daniel Kleinman (Kleinman 2000a, 6) at the end of this sentence. This reference is somewhat flawed, because especially page 6 of Kleinman 2000a does not address this issue directly. Nevertheless the argument is still valid, as the rest of the book (including other authors) and other papers confirm. I took this quote to make clear how my research interest is formed and to highlight that this is so far largely missing in STS research.

important turning point for relations between science-policy and public engagement, at least for the UK context. In analysing public engagement exercises in the biosciences, Irwin highlights how publics are pre-framed and constructed as "scientific citizen[s]", who have to be able to participate in these engagements (Irwin 2001). So, questions of who should participate in such engagement exercises are shifting to questions of who is able to participate. Of course, this has a lot to do with the framing of the whole mode of scientific governance and its understandings of sciences and publics.

In a later paper, Irwin further reflects on concrete public engagement exercises in the EU, and specifically the UK. Drawing on policy discourses and communications by research policy and funding institutions, Irwin highlights emerging patterns of a 'new' approach to scientific governance, which nominally provides public participation a central place in science policy deliberations (Irwin 2006). In his analysis he contests the notion of a 'new scientific governance', as new approaches are only very cautiously applied and old interests and power investments do not just vanish by talking about the importance of public participation. In reference to other critical STS research on recent public engagement exercises, he reminds us to "be cautious in the face of institutional claims to have embraced a new social contract of dialogue, transparency and consultation." (ibid, 302) At the core of the public engagements within these new modes of scientific governance in the EU, is a commitment to *"social consensus through engagement"* (ibid, 303). This already conceptually points towards a flawed (or better: hegemonic – and therefore partial) understanding of publics, if we take later considerations about the notion of publics into account (see section on *Publics and the Public Sphere*). Irwin too attests, that "the commitment to consensus building can suggest a decidedly homogeneous model of wider society." (ibid)

But not only are publics shaped and pre-framed by dominant scientific (or science-policy) actors – also studies of public understanding of science and public engagement with science are shaping publics within scientific governance regimes, as Mike Michael reflects in a theoretical paper (Michael 2009). Therefore such studies are "events of political import" (ibid, 617), as they are (re)configuring/constructing and shifting understandings of the public(s). But, with Michael's reflections, also publics and participants in public engagement exercises are themselves *performing* the public(s). They are performing in certain ways (which are again shaped by the surrounding frameworks of participation) to gain legitimization for 'being a public' and to raise their stakes in technoscientific deliberations.

We have already established that, so far, most research on public engagement in (techno)science deals with policy debates and public deliberation about policy issues. Since classical science and technology assessment has opened up to public participation, we find manifold methods and practices that are used to facilitate such an assessment. Additionally, beyond specific assessment exercises, there is also a broader realm of social appraisal of technology, that influences the *governance of technoscience*[9] in several, not always clearly delineated, ways. In this shift to

9 I use the term *governance of technoscience* analogously to Andy Stirling's definition in context of the social appraisal of technology: *"The starting point for this analysis is a distinction between parallel, interlinked, and mutually coconstituting processes of commitment and appraisal in technology governance. Here, "governance" is taken to encompass the diverse totality of actors, discourses, structures, and processes implicated in guiding and shaping technological configurations […]. In these terms, appraisal is about informing, and commitment is about forming tangible social choices in the governance of science and technology […]."* (Stirling 2008, 265, inline

participatory modes of technoscience-policy deliberation, different factors and interests become contrasted in complex ways. To make sense of these new modes of governance of technoscience, we have to investigate what are the aims of these models and practices?

But while we try to answer such questions we also find ourselves in a peculiar situation: at the same time as participation and the talk about participation in technoscience are flourishing, there seems to be a persistence or even increase of "unitary deterministic notions of technological progress" (Stirling 2008, 264). And while "participation" becomes more and more integrated into technoscience governance, the different actors (concerned publics, involved technoscientists, observing science studies scholars) hold on to different frameworks and understandings of "participation" and "public engagement". This will be highlighted in the next section.

2.1.2. On the making of publics

Based on four public engagement exercises in Austria, Felt & Fochler (2010) highlight the specificities of different forms and settings of public engagement and how they result in specific constructions of publics. They show how publics are co-produced with certain engagement exercises, issues and political frameworks. To make those insights usable for our own investigation of public participation in the computer sciences, I want to summarize the concrete public engagement exercises, on which those insights are based.

The examples Felt & Fochler draw on are as follows: 1) A 'discourse day' in context of the Austrian genome research program. It had a quasi-conference character, although it was open to everybody interested. The event was specifically organised to initiate public debate on genetic diagnosis. The data on this example was collected by participant observation and qualitative interviews with participants of the event. 2) A citizen conference on genetic data, which was part of a larger campaign by the Austrian council for scientific and technological development, to foster public debate. The data was gathered by participant observations (the authors where invited to the event as social science experts) and the event evaluation (Bogner 2004). 3) A series of round table discussions on lipid-associated disorders, which was funded by the first ELSA-call within the Austrian genome research program. Through six Saturdays a group of nationwide recruited citizens and researchers of a specific project consortium met, to discuss ethical and social implications of the genomic research at hand. A seventh meeting consisted of citizens only to discuss limits and possibilities of public engagement exercises in this context. The data consists of transcriptions of all the round table discussions. 4) Three focus groups on genetic testing and two focus groups on organ transplantation. The groups consisted either of affected people (self-reported) or 'lay' participants. They discussed social implications, limits and possibilities of public engagement.

Given this spectrum of public engagement settings, I suggest that those observations, despite their importance for the debate within STS and policy circles, still are very much tied to the policy level. So, here too, we find public engagement only in the context of debates about what (techno)science and respectively (techno)scientists should do, or what they should not do. This

references left out)

points to a gap between participation on the policy level and participation in concrete technoscientific practices. Although Felt & Fochler, in contrast to other authors, also observe micro-processes of public participation, we are still somewhat clueless when it comes to questions of participatory technoscientific practices. Nevertheless the insights of such STS research are valuable for other contexts, especially for processes of constructing specific publics. So, let me present three important insights Felt & Fochler gathered from their observations.

1) We have to bear in mind processes of self-selection. In all observed settings the participating publics reflected "a very strong bias towards people with high formal education and belonging to the cultural Austrian majority " (Felt and Fochler 2010, 227). Besides that, the participants projected a 'disinterestedness' on the general public, in contrast to their own exceptional 'interest' in the issues at hand. Although the general picture then might be different, the question arises how to deal with the "disinterested" or those who do not fulfil "basic discursive competences" (ibid). This is an issue that will arise very similarly in context of Participatory Design.

2) Another issue arises around situating the engagement exercises. In all cases participants were frequently unsure about the intents and the specific (political) contexts of the engagements. They assumed a hidden agenda and portrayed the general public "as likely to be instrumentalised by powerful but opaque corporate or political interests" (ibid, 228). Felt & Fochler point to the broader political vision of the participants, hence, the techno-political context. In this case there was no public debate going on beforehand and "generally there is little critical public discussion on issues of science and technology in Austria" (ibid, 229). This leads to a setting where the participating citizens much more try to comprehend their expert counterparts' framings instead of starting to dispute, negotiate and shape the issue. Based on this, I would argue that the entanglement of certain publics, issues and political frameworks in these configurations of public engagement re-inscribe common expert-lay-discourses, which are especially prevalent in the Austrian cultural context, which is shaped by a mostly unaccounted authoritarian history (cf. Karlhofer and Pelinka 2008).

3) A less institutionalized aspect of public engagement are issues of temporality. What Felt & Fochler describe for policy level engagement exercises will be very relevant to participatory technoscientific practices in computer science too: "Its overall length influences the degree of reflexive deliberation possible, as well as if and how participants constitute and see themselves as a collective." (Felt and Fochler 2010, 230) And further it is very important "whether the available time is seen as scarce resource and thus to be devoted to working towards a clearly defined output, or whether it is seen as time available for reflection without having to close down issues to arrive at a product." (ibid, 231)

From their conclusions we can take the following questions that will have to be applied also to the investigation of Participatory Design practices:

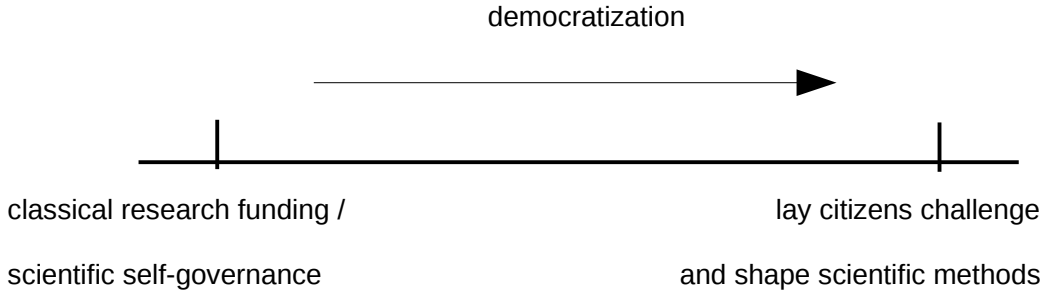
- How much space and time do participants have to define their own roles? Or to which extent are they enabled/invited to shape the applied framework itself? Because: "Citizens partially comply to but also resist the framing that participatory designs give to them." (ibid, 234)

- What does successful participation actually mean in the concrete engagement practices? Is this tied to the technoscientific development at hand – in computer science often concrete artefacts or products – or can completely different outcomes still be framed as success?
- (How) Does a "non-culture of public dispute" (ibid, 235) translate into concrete hands-on engagements as we often find them in Participatory Design projects?
- What are the promises of Participatory Design practices? Are these practices more democratic? How much power do participants hold in those processes?
- If we use deliberation and participation processes "as broader learning exercises in the policy realm" (ibid, 236), what then can we learn from such processes at the level of concrete technoscientific practices, as we find them in Participatory Design?

These questions can guide us in our assessments of participatory engagements in technoscience. A further analytical tool can be derived from questions of democratisation in context of science governance and scientific practice. This will be the focus of the next chapter.

2.2. Policy meets practice? Themes of democratization

Reflecting on changes in relations between science, society and public engagement that happened in the last quarter of the 20th century, Daniel Lee Kleinman works out a model to classify participatory processes in technoscience (2000b). It is important to note that a linear model does not suffice to describe these relations, as they are constructed through multi-layered aspects. Nevertheless his model draws a continuum from scientific self-governance on one side to a state where lay citizens challenge and shape scientific method. This model can only work as a guiding line to assess the level of democratization of technoscientific research endeavours, where the processes on the latter side are classified more democratic than those on the former. The following diagram should visualize this model, which I will explain in more detail below:



Note that this is my interpretation of Kleinman's text. He did not support any diagrams or other sort of drawn models. Still I think such visualizations may be helpful for thinking through our issues of public participation also at a later stage in this work. Further, such visualizations make us aware of conceptual simplifications. This of course holds some ambivalence, as it enables us to work through certain aspects more efficiently. But on the other side it also might lead us astray from the many significant and peculiar aspects of those rich experiences, which we aim to analyse. So we have to bear in mind that this visual linearity is just one specific perspective on a

multi-layered phenomenon, that may guide us in our own sense-making practices of technoscience.

An important distinction, Kleinman makes, is between democratizing science policy and democratizing knowledge production. The first addresses scientific governance processes, e.g. research funding organisations and schemes. In this area there are potentials for improving democratization. In the past decades many STS cases and research on public participation in this area were brought about. Yet, what we still are mostly missing is the democratization of knowledge production. This area addresses concrete technoscientific practices and how "lay" citizen may form an integral part of research processes, not only in sketching rough outlines for research environments, as it is the case with the policy area. As this too will be a crucial point throughout my work, let me separate those spheres visually:

democratizing science policy ↔ democratizing knowledge production

This we could correlate accordingly with the following two spheres:

participation in policy debates ↔ participatory design/development/research

Of course, to establish a more inclusive technoscience landscape, we need to work on both these areas. Yet, the latter seems to be more extensive, as there we touch upon the diverse core practices of technoscience. This is another reason why I am specifically interested in participatory design practices.

To further differentiate participatory practice we then also need a more fine grained model than Kleinman presents us. In this regard Sherry Arnstein's 'ladder of citizen participation' may be a helpful analytical tool to asses the character of a participatory setting. In her model she presents 8 modes of (alleged) participatory citizen engagements, which fall in three broader categories: "Citizen Power", "Tokenism" and "Nonparticipation", only the first of which representing actually participatory approaches (Arnstein 1969). The important notion we can take from this model is, that there are forms of public engagement which can be read as nonparticipation. This sharpens our analytic senses when looking onto public engagement exercises in the technosciences.

But now, let me introduce you to my understanding of the notions of *publics* and *participation*.

2.3. "Publics" and "Participation"

What I mean when I speak of publics in a technoscientific context is, in its most general sense, groups of people who are in some kind understood or who understand themselves as related to a certain technoscientific development. Yet they are not the driving factor in this development. They are distinct from the specific technoscientists who deploy the research/development. So, who the publics are, depends on the technoscientific development. At least the following three factors are significant:

- Who is intended to use the developed artefact and who actually uses it in the end? The

artefact may either be a tool, a program, a technique, an organisational principle, or some kind of specific knowledge.

- Who is affected despite not using the artefact, or at least not using it directly? Depending on the technoscientific development, these groups may be rather big or nearly non-existent. Think about GMO technologies, nuclear energy, nanotechnology or the implementation of specific algorithms, e.g. for popular search engines (on algorithmic responsibility cf. Simon 2010). In all these cases we might not use or be in favour of the developed artefacts (deliberately or not). Nevertheless, we somehow have to cope with it, because there seems no way around it.
- To whom is ascribed an expert status and who is seen as only casually informed about the technoscientific development at hand? This question is relevant to our investigation, as we are focusing on the computer scientists' perspective. In general I would not regard this aspect as constitutive for the definition of publics. We might differentiate between informed and uninformed or expert and lay publics. I think a crucial point for the construction of publics is how much knowledge about the issue at hand is ascribed to them. This relates to a constant boundary work in negotiating of who the developing technoscientists actually are, who the cooperating technoscientific partners and who the specific publics, which have to be engaged explicitly.

Of course there are more things to bear in mind when speaking about *publics*. Before going on, let me present you an overview of some macro level perspectives and analyses and how the notion of *publics* developed historically throughout the 20th century. From this point we can retrieve some important analytical concepts and questions for our own research agenda.

2.3.1. Publics and the Public Sphere[10]

A recent reader, put together by Jostein Gripsrud et al., assembles some of the most significant theoretical and historical texts on concepts of *public(s)* and *public sphere*, as well as their relevancy for democratic societies (Gripsrud et al. 2010). I will summarize some of them to contextualize my own understanding of publics. To some extent these (historical) debates also influenced participatory approaches in the computer sciences – to which I will come back in chapter 6.1.

A first significant debate about the public's status in an increasingly complex – or we could say: scientific – world is the so-called "Lippmann-Dewey Debate". It was again widely discussed in media and communication studies in the USA throughout the 1980ies and '90ies (Schudson 2008). According to Michael Schudson this so-called debate was neither a debate nor was it adequate enough to critically engage with points made by Walter Lippmann, who was blatantly disregarded as anti-democrat. But whether he really was an anti-democrat or not, his thoughts point to crucial aspects that are also very vivid when we talk about science and public engagement. So let us briefly go through this 'debate'.

10 A preview version of this chapter was made available at my research blog on 16th August 2012, as a means of documenting my research progress:
http://jackie.noblogs.org/post/2012/08/16/whose-participation-on-framing-publics-and-the-public-sphere

For Walter Lippmann, when he wrote *The Phantom Public* in 1925, the main problem seemed to be how an increasingly complex society could be organized and how issues of expertise and individual participation can be accounted for in a representative democracy. While standard textbooks for teaching citizenship in schools and colleges, at his time, drew a picture of democratic citizens who can, and indeed have to inform themselves about all public issues in order to partake in the democratic processes of society, for Lippmann there is an obvious omission:

> *"But nowhere in this well-meant book is the sovereign citizen of the future given a hint as to how, while he is earning a living, rearing children and enjoying his life, he is to keep himself informed about the progress of this swarming confusion of problems."* (Lippmann 2010, 28)

Just to the contrary, Lippmann states that "the citizen gives but a little of his time to public affairs, has but a casual interest in facts and but a poor appetite for theory." (ibid) Even today this might indeed be just a fact, as Lippmann termed it. But the crucial point that opens the debate perhaps then is: why is this so? As Lippmann does not question this, his 'democratic realist' stance of course has to become elitist – which means anti-democratic only in terms of participatory democracy, not so much in terms of representative democracy. But in fact, most of us in the globally hegemonic sphere are (still/again) living in some form or representative democracy. So, while Lippmann's account may be elitist, it still provides some crucial questions of relevance, when it comes to public engagement in science. One of those is, that there is not just a single public that has to be addressed. The public is not "a fixed body of individuals" but "is merely those persons who are interested in an affair" (ibid, 41). In some sense Lippmann's view of publics forestalls an agonistic model which will be discussed later.

In response to Lippmann's works, John Dewey wrote his book *The Public and Its Problems* in 1927. Whileas Lippmann focused on representation, Dewey much more focused on participation. Both could, nevertheless, come to common terms on many issues. To say that Dewey's "conclusions are diametrically opposite" to Lippmann's (Gripsrud et al. 2010, 43) might be a bit misleading. In the end, both argue in a framework of late capitalist industrialized democracies and its (material) possibilities. Lippmann gives an adequate analysis of increasingly complex socio-political entanglements, followed by a rather unimaginative solution. Dewey just provides different solutions for the same problem. He puts emphasis on different aspects of the problem: While Lippmann's concern are decisions, Dewey's focus much more lies on the processes of how to come to those decisions. Consequently he is not at all opposed to the concept or use of experts. He just ascribes a different function to them and, respectively, to the publics:

> *"But their expertness is not shown in framing and executing policies, but in discovering and making known the facts upon which the former depend. They are experts in the sense that scientific investigators and artists manifest expertise. It is not necessary that the many should have the knowledge and skill to carry on the needed investigations; what is required is that they have the ability to judge of the bearing of the knowledge supplied by others upon common concerns."* (Dewey 2010, 50)

So while for Lippmann it is much more the issue of who has to decide, for Dewey it is the question of how decisions are made. The former tries to find a model of how to find (representative) experts and to assess what their competences are. The latter also accounts for constantly

changing circumstances, which are inevitable in a complex and contingent techno-socio-political environment: "The essential need, in other words, is the improvement of the methods and conditions of debate, discussion and persuasion. That is *the* problem of the public." (ibid)

Both, Dewey and Lippmann, seemed to take certain democratic standards as granted. Their aim was just how to refine them to better fit an increasingly (scientifically) complex society. Both did so in the 1920ies in the USA. The situation in Europe was different. Especially with the rise of fascism and ultimately national-socialism, retrospectively, a certain intellectual reservation about public opinion was understandable, especially in Germany and Austria. After the Second World War and the experience of the Shoah it seemed rather obvious to rethink concepts and agencies of "the public".

An important framework here was provided by Hannah Arendt in her 1958 book on *The Human Condition*. There, she defines the "public realm" as the "common", the sum of common interests, issues and interactions. According to Arendt the term *public* signifies two things: 1) those that "can be seen and heard by everybody and [get] the widest possible publicity" (Arendt 2010, 104) and 2) "the world itself, in so far as it is common to all of us and distinguished from our privately owned place in it." (ibid, 105) This second meaning then refers to the artefactual and fabricated nature of the public realm, and how our public interactions are mediated by our (often scientific) inventions:

> *"It is related, rather, to the human artifact, the fabrication of human hands, as well as to affairs which go on among those who inhabit the man-made world together. To live together in the world means essentially that a world of things is between those who have it in common […]. The public realm, as the common world, gathers us together and yet prevents our falling over each other, so to speak. What makes mass society so difficult to bear is not the number of people involved, or at least not primarily, but the fact that the world between them has lost its power to gather them together, to relate and to separate them."* (ibid)

I think this passage might very well speak to debates about public engagement in technosciences. While the technosciences are a major contributor to the world of things between us that make possible our public interaction, we[11] only very reluctantly design our inventions (whether material, symbolic, social or cognitive) to mediate our own immediate public realms, that is, the technosciences themselves. As long as we do not acknowledge this, we might keep falling over each other – which results in personal and political quarrel at its best and social and environmental catastrophe at its worst. To keep things together, and to make specific enterprises, like scientific endeavours, (socially) sustainable, we have to facilitate a public realm. Or as Arendt further writes:

> *"Only the existence of a public realm and the world's subsequent transformation into a community of things which gathers men [sic] together and relates them to each other depends entirely on permanence. If the world is to contain a public sphere, it cannot be erected for one generation and planned for the living only; it must transcend the life-span of mortal men."* (ibid, 106)

11 The self-referential "we" is not only due to my former background in technical computer science, but also signifies that we, as social scientists, and especially STSers, should not exclude ourselves from the realm of technoscience. Meanwhile, we too, are rather dependent on a range of complex technologies to do our work and to convey our findings. And we too design socio-technical settings and sometimes even devise certain artifacts to enable people to gather around an issue.

It might seem a bit tautological when we use “the publicity of the public realm” to ascertain the thriving of human endeavours, like scientific ones. But this is rooted in the specific definition of the public as something common to us all. The question then, if these considerations can be applied to technoscience, depends on our understanding of technoscience as something that should benefit society as a whole. In the end Arendt's conception points towards the fact, that there is not just a single public, or a single harmonious interest, but having a common realm means having differences and disputes. Therefore the goal should not be about trying to come to some ahistorical consensus, but to enable constructive dispute that enriches our human public experiences. This might be a lesson especially learned from Arendt's analysis of totalitarian features in society, as is reflected in her following sentence: “The end of the common world has come when it is seen only under one aspect and is permitted to present in only one perspective.” (ibid, 108) This is another aspect that might be important to think about in scientific endeavours, especially when scientific objectivity might lead to moral objectivism and purportedly objective/logical research trajectories.

A very influential work then comes from Jürgen Habermas, who published his habilitation thesis *Strukturwandel der Öffentlichkeit* in 1962. In 1974 an encyclopaedic article, that provided a condensed version of it, was translated to English and published in *New German Critique*. Until his habilitation thesis was translated into English in 1989 (*The Structural Transformation of the Public Sphere: An Inquiry into a Category of Bourgeois Society*), it was the only English text by Habermas regarding the public sphere. Although it was very influential and inspired new debates about public participation, also in the technosciences, Habermas' conception of the public sphere is in some important aspects flawed – at least in its aim to facilitate emancipatory and integrative democratic processes. But before highlighting aspects of such a critique, let me present you the major points of his concept of the public sphere. By *public sphere* Habermas describes a realm of social life that is constituted by our social interactions – although in his concept it is restricted to only certain social interactions, namely those of citizens. But here I already forestall major critiques on Habermas' concept. So, let me quote just a short passage from the introductory definition, because it seems that most of the debate and critique is assembled around what is hidden between those lines:

> *“Access is guaranteed to all citizens. A portion of the public sphere comes into being in every conversation in which private individuals assemble to form a public body. They then behave neither like business or professional people transacting private affairs, nor like members of a constitutional order subject to the legal constraints of a state bureaucracy. Citizens behave as a public body when they confer in an unrestricted fashion—that is, with the guarantee of freedom of assembly and association and the freedom to express and publish their opinions—about matters of general interest.” (Habermas 1974, 49)*

From a critical perspective we just could take the first sentence and contest that there never was a public sphere. But this would be too blunt. So it has to do with our understanding of *citizens*. Who are the citizens who are granted access to the public sphere? For a long time only white male middle-to-upper-class members fitted into this category. And indeed, as more disenfranchised groups gained citizen rights, more special interests where brought into the public sphere. This seems to contradict the dictum of the “general interest”. Although Habermas

tries to provide a critical analysis of the bourgeois public sphere, he does not move beyond the picture of a single and uniting public sphere in which consensual processes of deliberation around some general public interest take place. He does not unmask the ideology of a public/private dichotomy. Analogous, his emphasis on access and publicity, only on a level of information and knowledge, leads to a concept of a public sphere that is necessarily a hegemonic one, in which certain voices are never heard while others are widely distributed. The public sphere then is just another market place which is supplied by those with the means to produce and distribute relevant public information and knowledge, while all others might just consume the knowledge and information that is circulated.

These points are also reflected by Oskar Negt and Alexander Kluge in their 1972 work on *Public Sphere and Experience*. What they aim for is, besides their critique of Habermas' conception, to highlight examples of *counterpublic spheres*, or more specifically of a *proletarian public sphere*, which is in its basic features more process oriented than institutionally shaped. Their starting point is the observation that "real social experiences of human beings, produced in everyday life and work, cut across such divisions" of private and public (Negt and Kluge 2010, 121). But despite their critical stance and their sensibility for the ambiguity of the concept *proletarian*, they do not see other issues of structural discrimination. Their proletarian public sphere is still a heterosexual, white, male establishment – as Suzanne Vromen confirms in a 1995 review:

> *"Confined fantasy, identified for the proletariat, is not connected to women's emancipation. Heterosexual and ethnocentric assumptions, furthermore, are taken for granted and remain unexamined. By privileging the material relations of production in defining the proletarian public sphere, the authors miss the equal possibility of resistance within the consumption of cultural goods."* (Vromen 1995, 119)

Although the process orientation of their concept opens up other questions and the enactment of a proletarian public sphere could change its conception, from today's perspective, it seems rather absurd that they did not reflect issues of heterogeneity, especially with their analysis at hand. But this might unite them with most of the other authors, all arguing from a socially privileged perspective[12].

A crucial critique then, that guides our focus onto small and diverse publics that might be addressed in Participatory Design projects, is provided by Nancy Fraser. The point of departure in her 1990 paper "*Rethinking the Public Sphere: A Contribution to the Critique of Actually Existing Democracy*" is Habermas's conception of the public sphere. Fraser acknowledges it as an important, even indispensable conceptual resource, if we want to investigate the limits of democracy in our late-capitalist society. This is her basic premise:

> *"[S]omething like Habermas's idea of the public sphere is indispensable to critical social theory and democratic political practice. I assume that no attempt to understand the limits of actually existing late-capitalist democracy can succeed without in some way or another making use of it. I assume that the same goes for urgently needed constructive efforts to project alternative models of democracy."* (Fraser 1990, 57)

12 That does neither mean that they could not do otherwise, just because of being white males, nor that people in socially less privileged positions necessarily come to better conclusions. They could engage with other, less privileged standpoints, but it seems they simply have not done so. But we will come to issues of epistemological privilege in the section on feminist epistemologies.

But her interest then lies in the reframing of this concept of a public sphere, in order to make a basis for alternative models of democracy available. She perceives in Habermas's account an accurate analytical description of the rise and demise of the bourgeois public sphere. But although he himself highlighted that a new form of public sphere is needed, he did stop at that point, instead of "developing a new, post-bourgeois model of the public sphere." (ibid, 58) So Fraser sets out to juxtapose Habermas's account on the structural transformation of the public sphere by an alternative one, for which she draws on historical research revealing several flaws in Habermas's analysis. First and foremost there is the claim of openness of the public sphere, which – as I have mentioned before – was never fully realized. Habermas fully missed the irony of "[a] discourse of publicity touting accessibility, rationality, and the suspension of status hierarchies [that] is itself deployed as a strategy of distinction." (ibid, 60) The bourgeois publics celebrated their public debates as a gathering of equals, where status hierarchies were left aside. But this was only possible at the cost of the exclusion of women and other marginalized groups – just as in ancient Greek city states the public debates excluded women and slaves. Hannah Arendt also pointed to this when she wrote that

> *"[t]he polis* was distinguished from the household in that it knew only 'equals', whereas the household was the center of the strictest inequality. […] To be sure, this equality of the political realm has very little in common with our concept of equality: it meant to live among and to have to deal only with one's peers, and it presupposed the existence of 'unequals' who, as a matter of fact, were always the majority of the population in a city-state." (Arendt 2010, 95, formatted as in the source)

This certainly is not so different from the bourgeois public sphere, with sexism and racism institutionalized in the newly formed western democracies. We just have to ask for the material conditions, which permit so-called equals to meet and confer about their common agendas. To enable such productive meetings there is always a significant part of reproductive work to do. While we could think about modes of distributing the latter in a manner appropriate for a democratic society, historically reproductive work was always fulfilled by marginalized groups, especially by women. So the emphasis on a constant *openness* of the public sphere for all *equals* may help to "explain the exacerbation of sexism characteristic of the liberal public sphere" accompanied by norms of feminine domesticity and a strict distinction between private and public spheres (Fraser 1990, 60). What Fraser also criticizes is that although Habermas acknowledges the (temporal) existence of other, competing public spheres, e.g. the "plebeian public sphere", he disregards them in his analysis. Therefore he misses on the liberal public sphere's relation to those other spheres and necessarily misses the hegemonic functioning of the liberal public sphere. Fraser points to Mary Ryan, who made visible examples of such other public spheres in her historical work on women in the US-american public, in the period from 1825 to 1880 (Ryan 1992). Ryan also addressed Habermas's work explicitly in a chapter of an edited volume on *Habermas and the Public Sphere*. Therein she gives a condensed account of those historical situations, to draw "a counternarrative to Habermas's depiction of the chronological decline from an idealized bourgeois public sphere." (ibid, 262) What she concludes from her historical investigation is of special importance to my research interest:

> *"Because everyday politics inevitably falls short of standards of perfect rational discourse, a*

> *chimera even in the heydey of the bourgeois public sphere, the goal of publicness might best be allowed to navigate through wider and wilder territory. That is, public life can be cultivated in many democratic spaces where obstinate differences in power, material status, and hence interest can find expression."* (ibid, 286)

To rework the concept of the public sphere in a way that also accounts for those many democratic spaces and the differences in power is, what Nancy Fraser further aims at. Because, even if the public sphere itself is the vehicle for its reformulation and Habermas's work was a vital impulse to do so, "[t]he official public sphere [...] was—indeed, is—the prime institutional site for the construction of the consent that defines the new, hegemonic mode of domination." (Fraser 1990, 62) She continues with addressing the four central assumptions in the model of a bourgeois public sphere that have to be rethought. Those, respectively, fall into the following issues, which I will try to summarize briefly, because they are crucial for our later observations of participation in technoscientific processes:

- open access, participatory parity, and social equality
- equality, diversity, and multiple publics
- public spheres, common concerns, and private interests
- strong publics and weak publics

First, regarding the open access, we already know that this normative demand was never fully realized, as women where excluded on basis of their sex and plebeian men were excluded by property qualifications and additionally many women and men where excluded on racist grounds. This still is the case today, in industrialized democracies, although usually on a more subtle basis. Although formal exclusions were eliminated over time, social and economic inequalities prevail. If such inequalities are just bracketed out (to fulfil the demand for a gathering of freely deliberating equals), then "deliberation can serve as a mask for domination [that also does] extend beyond gender to other kinds of unequal relations, like those based on class or ethnicity."[13] (ibid, 64) While bracketing of social inequalities does not foster participatory parity (just contrary to its naive or liberal intention), "it would be more appropriate to *unbracket* inequalities in the sense of explicitly thematizing them" (ibid). This of course is just one aspect to be aware of and that has to be addressed when facilitating participatory processes. In the end "a necessary condition for participatory parity is that systemic social inequalities be eliminated" (ibid, 65) – something we

13 Very illustrative on a concrete interactional level is the following passage: "*Feminist research has documented a syndrome that many of us have observed in faculty meetings and other mixed-sex deliberative bodies: men tend to interrupt women more than women interrupt men; men also tend to speak more than women, taking more turns and longer turns; and women's interventions are more often ignored or not responded to than men's. In response to the sorts of experiences documented in this research, an important strand of feminist political theory has claimed that deliberation can serve as a mask for domination.*" (Fraser 1990, 63-64) This illustrates the importance of a micro-level analysis of public deliberations. It will be of importance for the construction of publics in technoscientific contexts. By quoting Jane Mansbridge, as an example for the mentioned feminist political theory, it is obvious that this is not only a specific gender issue but a general phenomenon in political deliberation: "*the transformation of 'I' into 'we' brought about through political deliberation can easily mask subtle forms of control. Even the language people use as they reason together usually favors one way of seeing things and discourages others. Subordinate groups sometimes cannot find the right voice or words to express their thoughts, and when they do, they discover they are not heard. [They] are silenced, encouraged to keep their wants inchoate, and heard to say 'yes' when what they have said is 'no'.*" (Jane Mansbridge. 1990. Feminism and Democracy. *The American Prospect*. no.1, Spring.; quoted by Fraser 1990, 65) These phenomena we regularly encounter in science studies, e.g. when we conduct workshops, focus groups or other methods aiming at engaging different actors in discussion about technoscientific issues.

cannot encompass in our technoscientific research projects alone. However, while on a general public policy level we might be to some extent able to work towards substantive social equality, this situation has to be addressed in (participatory) research projects in a way that partially counteracts unequal distributions of power in the research context.

Second, regarding equality, diversity, and multiple publics, Fraser addresses Habermas's normative assumption of a single public sphere as an ideal democratic situation, while a multiplicity of publics would signify a departure from democracy. Fraser therefore juxtaposes the potentials of a "single, comprehensible public versus multiple publics in two kinds of modern societies: stratified societies and egalitarian societies" (ibid, 66). By stratified societies she refers to all "societies whose basic institutional framework generates unequal social groups in structural relations of dominance and subordination" (ibid), while by "egalitarian, multicultural societies" she refers to such societies whose basic frameworks do not produce the mentioned inequalities. This are, of course, hypothetical societies "without classes and without gender or racial division of labor" which nonetheless do not have to be culturally homogeneous (ibid, 68). While in the former, that is in our actually existing democracies, participatory parity can never be fully achieved, we can at least try to find arrangements that approximate this situation. At this point Fraser suggests that "in stratified societies, arrangements that accommodate contestation among a plurality of competing publics better promote the ideal of participatory parity than does a single, comprehensible, overarching public", because in the latter case "members of subordinated groups would have no arenas for deliberation among themselves about their needs, objectives, and strategies." (ibid, 66)[14]

Critical historiography shows that such groups repeatedly constituted alternative publics, which Fraser then calls "*subaltern counterpublics* in order to signal that they are parallel discursive arenas where members of subordinated social groups invent and circulate counterdiscourses to formulate oppositional interpretations of their identities, interests, and needs." (ibid, 67)[15] This means that, in stratified societies, subaltern counterpublics provide on the one hand a space for "withdrawal and regroupment" and on the other hand function as "training grounds for agitational activities directed toward wider publics". And it is exactly this dialectic that "enables subaltern counterpublics partially to offset, although not wholly to eradicate, the unjust participatory privileges enjoyed by members of dominant social groups in stratified societies" (ibid, 68). For our own investigation into the context of participatory technosciences this is of

14 This argument directly follows from Fraser's previous section on "Open Access, Participatory Parity, and Social Equality". The crux of the matter is the ability to mobilize a prospective "we", under which all members of a public are then subsumed and through which patterns of domination are masked. In single, comprehensible publics there is always an advantage for dominant groups to establish consensus in their own interest, because not coming to a decision would mean the proliferation of the actual circumstances, under which the dominant groups became dominant in the first place. Of course then subordinate groups may use different modes of conflict resolution, but at that point we leave the deliberative sphere.

15 Here, Fraser points to issues of separatism and that some subaltern counterpublics are also *"explicitly anti-democratic and antiegalitarian, and even those with democratic and egalitarian intentions are not always above practicing their own modes of informal exclusion and marginalization. Still, insofar as these counterpublics emerge in response to exclusions within dominant publics, they help expand discursive space. In principle, assumptions that were previously exempt from contestation will now have to be publicly argued out. In general, the proliferation of subaltern counterpublics means a widening of discursive contestation"* (67). Because the concept of a counterpublic assumes a "*publicist* orientation" it also works against rigid separatism in the long run. Although subaltern counterpublics often are "involuntarily enclave*d*", they are by definition not enclaves but public arenas in which its members aim to disseminate their discourses to wider publics.

analytical importance, when we look at specific frameworks of participation and at who is actually participating in it. Because, even if in egalitarian societies there would be just one ideal public sphere, this is clearly not the case in our contexts. Apart from that, Nancy Fraser also argues that a "socially egalitarian, multicultural society that is also a participatory democracy […] will necessarily be a society with many different publics, including at least one public in which participants can deliberate as peers across lines of difference about policy that concerns them all." (ibid, 70)[16]

Third, regarding public spheres, common concerns, and private interests, Nancy Fraser addresses what we have found just at the beginning of Habermas' definition of the public sphere, as already quoted above: "A portion of the public sphere comes into being in every conversation in which private individuals assemble to form a public body." (Habermas 1974, 49) This part of the definition already contains an important aspect: that the public comes into being around certain issues. In context of our research interest we can say that the public is constructed through issues and forms of engagement. This construction may be facilitated initially by external agents, as well as largely self-organized. The important objection Fraser makes here pertains the relation between *private individuals* and *public interests* (which are deliberated upon in public bodies). Both notions, as part of the definition, are problematic. Because "there are no naturally given, a priori boundaries here. What will count as a matter of common concern will be decided precisely through discursive contestation." (ibid, 71) There are many examples of issues that were deemed as private matters until a significant counterpublic formed and made it to a public matter through ongoing discursive contestation. Prominent examples can be found in feminist movements, e.g. issues of domestic violence, sexual harassment and sexism in general.

The crucial point is, that there are certain issues which are deemed as private by a the majority of (influential) agents in the hegemonic public sphere(s). As long as only individuals contest, either because of their immediate experience or because the experience of others, these issues are easily dismissed by the larger public as (perhaps tragic) individual exceptions, which nevertheless leave the larger societal arrangement uncontested. Only after a significant number of individuals cooperate to publicly contest the problem at hand, the issue may be acknowledged as an important public issue and the solution of the problem then is framed as *of public interest*. To do

16 This is just to debunk the myth of an idealized liberal public sphere, of "an unrealized utopian ideal" worthy of working towards its implementation. Critically seen it is just a "masculinist ideological notion that functioned to legitimate an emergent form of class rule." (Fraser 1990, 62) As I have said, this might not be relevant for the analysis of actually happening participatory (technoscientific) processes in our stratified society. Nevertheless, I think it is important to understand this argument, because it might often happen in deliberative bodies that the people who are aware of the problems of stratification, try to establish an environment in which the inequalities would not impinge on the participatory process. This of course happens with a good intention to foster participation, but it does in fact only mask the inequalities, and we have to be aware of that when observing and analyzing participatory processes. Therefore I am quoting the core of Fraser's argument regarding single versus multiple publics in an egalitarian society, because it is also instructive for our interpretative lenses on deliberative and participatory processes: *"[P]ublic life in egalitarian, multicultural societies cannot consist exclusively in a single, comprehensible public sphere. That would be tantamount to filtering diverse rhetorical and stylistic norms through a single, overarching lens. Moreover, since there can be no such lens that is genuinely culturally neutral, it would effectively privilege the expressive norms of one cultural group over others and thereby make discursive assimilation a condition for participation in public debate. The result would be the demise of multiculturalism (and the likely demise of social equality). In general, then, we can conclude that the idea of an egalitarian, multicultural society only makes sense if we suppose a plurality of public arenas in which groups with diverse values and rhetorics participate. By definition, such a society must contain a multiplicity of publics."* (ibid, 69)

so, the contestants create their own counterpublic sphere, which they can withdraw to, where they can regroup and coordinate and prepare their agitational strategies to shift the wider public discourse. Therefore, to insist on the distinction of (a priori) private and public interests would mean to work against "one of the principal aims of deliberation, namely, to help participants clarify their interests, even when those interests turn out to conflict." (ibid, 72)

Also to assume a *common good* that is the sole subject of public deliberation would mean to mystify the relations between those groups who gain systematic profit in a stratified society and those groups to who are deprived of it. So we should be suspicious about "any consensus that purports to represent the common good in this social context […], since this consensus will have been reached through deliberative processes tainted by the effects of dominance and subordination." (ibid, 73) This certainly can be experienced in prominent public engagement exercises in technoscience too. Here we have to be aware of rhetorics of privacy that function in support of dominant interests to delegitimize interests of marginalized groups, e.g. that of lay participants in context of public engagement in science.

For the fourth and last part of Fraser's critique of Habermas's concept, we have to focus on the other part of the definition above, on the *private individuals*. In Habermas's conception there is the strong assumption that civil society has to be sharply separated from the state, and civil society in this case refers to an assemblage of associations that are nongovernmental and neither of economic nor administrative nature. These publics, then, do not themselves participate in decision-making, but only formulate critical commentaries on decisions actually taken elsewhere. Fraser calls such publics *weak publics*, which are "publics whose deliberative practice consists exclusively in opinion formation and does not also encompass decision making." (ibid, 75) But while for the classical bourgeois public sphere this delimitation might have proven feasible, at least since the formation of sovereign parliaments new publics emerged, which function as a "public sphere *within* the state". In this case Fraser then speaks of *strong publics*, which are "publics whose discourse encompasses both opinion formation and decision making." (ibid) Fraser did choose these terms also to suggest an improvement of the public's status: strong publics strengthen public opinion, because such publics are empowered to "translate" public opinion into "authoritative decisions". Strong publics of course don't have to consist only of such central democratic institutions like sovereign parliaments. We can envision – and already observe – diverse self-managed institutions that have significant authority in specific areas, especially because they are able to marshal and distribute material resources. For our purposes we only need to think of quasi-autonomous scientific funding bodies. Interesting questions then arise around issues of accountability: "What institutional arrangements best ensure the accountability of democratic decision-making bodies (strong publics) to *their* (external, weak, or, given the possibility of hybrid cases, weak*er*) publics?" (ibid, 76) These questions then let us focus on global and local interdependencies and different forms of "self-management, inter-public coordination, and political accountability that are essential to a democratic and egalitarian society." (ibid) This would not be possible with the bourgeois conception of the public sphere and its demand to sharply separate civil society from the state.

Those four cornerstones of Nancy Fraser's critique point us to the importance of developing a

new *postbourgeois* conception of the public sphere. For our own investigations of participatory approaches in technoscience, then, we can take those considerations to evaluate the diverse interpublic relations that are enacted through such participatory approaches. We even could interpret those approaches as specific examples of attempts to develop such new conceptions at different levels of societal interaction. In any case, those points of critique actually provide us with valuable concepts, through which we can make sense of those experientially rich new entanglements of sciences and publics.

Another critique on Habermas' concept of the public sphere comes from Chantal Mouffe. In an article of a 1999 issue of *Social Research* she provided us with a condensed version of her critiques and, beyond this critique, with an alternative to models of deliberative democracy (Mouffe 1999). Her critique focuses on similar issues like Nancy Fraser's and we might interpret Mouffe's own model as such an alternative conception that Fraser requested. Yet, in Mouffe's view, we have to give up the idea of deliberative democracy at all, because it is an idealized myth that is fundamentally flawed by its neglect of "dimensions of power and their ineradicable character." (Mouffe 2010, 274–275) This is also because "discourse itself in its fundamental structure is authoritarian since out of the free-floating dispersion of signifiers, it is only through the intervention of a master signifier that a consistent field of meaning can merge." (ibid, 274) This points to the fact that dominated actors always have to adopt to the practices of the dominant, at least if they want to be acknowledged (paradoxically enough) as equal participants in processes of discursive deliberation. As a consequence, Mouffe proposes her model of *agonistic pluralism*, over that of *deliberative democracy* and she calls this a project of *radical and plural democracy*. A key distinction here is one between "the political" and "politics", where the latter is the "ensemble of practices, discourses and institutions that seek to establish a certain order and to organize human coexistence in conditions that are always potentially conflictual because they are affected by the dimensions of 'the political'" (ibid, 276) – which points to the inherent antagonism of human societies. To accept an adversary's position in such a context means to shift ones own identity, which Mouffe describes analogously to Thomas Kuhn's concept of the *paradigm shift* in technoscientific theories and practices (Kuhn 1996). Therefore her model urges us to focus much more on conflict and dissent than on rational deliberation:

> *"Contrary to the model of 'deliberative democracy', the model of 'agonistic pluralism' that I am advocating asserts that the prime task of democratic politics is not to eliminate passions nor to relegate them to the private sphere in order to render rational consensus possible, but to mobilise those passions towards the promotion of democratic designs. Far from jeopardizing democracy, agonistic confrontation is in fact its very condition of existence."* (Mouffe 2010, 277)

With a model of agonistic pluralism we then might be more receptive to "the multiplicity of voices that a pluralist society encompasses, and to the complexity of the power structure that this network of differences implies." (ibid, 278)

While Mouffe proposes this model, that in her view radically breaks with models of deliberative democracy, Seyla Benhabib again makes a strong statement for revised versions of a deliberative democracy model – versions that also reflect the critiques brought forth so far. Benhabib refers to Nancy Fraser's work as one that aims at a reformulation but not a break with deliberative

democracy (Benhabib 2002). When we look back to Fraser's critique, we see its main focus not on the idea of deliberative democracy itself but much more on the concept of the public sphere as it was brought forth by Habermas. But it is not my intention here to answer questions like "Deliberative Democracy or Agonistic Pluralism?", as posed by Chantal Mouffe. What is important in Mouffe's critique is the focus on power and conflict. Especially when we use a framework of deliberative democracy, we might inadvertently neglect such issues in favour of discourse. Of course discourse always also means power, but the strong assumptions of free and morally equal participants, that are at the core of deliberative democratic models, tends to disregard certain (material) power relations, especially if we, as researchers, are speaking from socially privileged positions.

Depending on which of the above understandings a researcher applies to the notion of publics, different strategies arise in engaging these publics and different forms of participation will emerge. With these notions in mind, we can move on to look upon concrete practices of participation in technoscience. This will be especially relevant in the later findings chapter, when we look upon framings of publics in Participatory Design.

2.3.2. Public Participation in Technoscience

The past sub-chapters have shown what role public participation plays in technoscience, or at least, what STS research has found out about these processes of participation. What is mostly missing from these accounts is how participation does or could work in context of concrete technoscientific practices. But before we look into a field where such participatory processes are enacted, I want to provide some further considerations which are of importance, when we want to explore how publics are constructed in context of participatory technoscientific practices.

First we have to bear in mind that there are publics who are seldom framed as such, like the funding organisations or intra-organizational actors in universities, faculties, companies and such – wherever the research is situated. Also, it might be much easier to make out formal publics than to find informal publics. The latter then will not only be constructed by the computer scientists, but in some sense necessarily by my own research too, as I am only analysing and interpreting what computer scientists tell or write about their publics.

Second, especially in context of computer science, with a strong focus on users, we have to think of assessments of relevancy and how they impinge on the inclusion/exclusion, or even the formation of publics. While it is necessary to think about who the diverse users of a certain technoscientific product are, or will be, and how they might participate in the products development, it is also necessary to think about potential non-users and how they are affected by such developments (Wyatt 2003).

Not least, nor last, but a third important aspect we then have to think about, is the issue how *publics* are tied to *participation*, and how certain forms of participation are pre-configuring sets of (non)relevant publics. A central question here is: who participates and when do they participate? Beneath this question lies of course some definition of what participation means. Are cooperating project partners or contracting actors also participants? What does it mean when we

speak of public participation, or better put: the participation of certain publics? It seems to me, that participation is much more defined through its activities than through the actors engaged in it. Further, to proclaim that several actors participate in a project does not at all mean that it is participatory (cf. Arnstein 1969). So the definitions of participation, publics and participatory design are interlinked, or maybe we could say co-produced. As with the other notions I use, they certainly have to be reframed throughout the iterative analytic process. As a means of initial focusing, I want to use the following points as defining anchor points for the concept of *participation* (cf. Arnstein 1969; Arnstein 1975; Sengers et al. 2005):

- At it's core is an activity which is facilitated by a group of people
- Throughout the process of this activity other people are engaged or engage in the shaping of the activity
- The same may apply to a range of coordinated activities and even to the coordination of these activities

When we take those three points, it is clear that throughout the process of participation, depending on its spacio-temporal extension, the boundaries between those facilitating the process and the non-facilitating participants may blur and/or might be re-negotiated. Here, maybe, lies a crucial difference between "just participation" and "participatory". The latter might signify an active impetus or commitment to facilitate these processes and to engage formerly non-engaged groups of people. Another interesting question then arises: where do the facilitators of participatory design draw the line? Where are different publics allowed to participate and where not? And why is that?

Arriving at these questions, let us take a first look at Participatory Design, as a technoscientific field that facilitates participation processes throughout its research and development.

3. Participatory Design

To supplement existing studies about public engagement/participation in technosciences by a practical approach of participation in concrete technoscientific practices, I want to take a look into the field of Participatory Design. In this field the approach to participation of publics (often framed as users or stakeholders) is one that tries to enact different forms and phases of participation, aiming at public participation early on and with concrete, material consequences, reflected in the produced technoscientific artefacts.

To provide some overview of this field, in the following sections I want to present the history and motivations of Participatory Design (PD) and participatory approaches to technoscientific practices in computer science and beyond.

3.1. History of Participatory Design

Participatory approaches in computer science and software development were first applied in the 1970ies in Scandinavia. Since then, participatory design and participatory methodologies were further developed and established as valued and accepted research and development methodologies, at least in some parts of computer science. They are rather common in the fields of Computer Supported Cooperative Work (CSCW) and Human-Computer-Interaction (HCI), not so much in other areas of computer science. Of course this development is not a standalone development, as it is influenced by other societal themes on democratization, participation and public involvement in science and technology[17]. And besides participatory approaches in ICT we find also participatory approaches in other sciences, although they usually are much more policy driven (e.g. Irwin 2001). Whereas those approaches facilitate citizen and consensus conferences, focus groups and other formats, trying to engage citizens as members of the general public in policy debates, the participatory approaches in ICT are much more tied to concrete outputs in form of technological artefacts and products. Here the aim of facilitating participation is not so much that of legitimizing certain research endeavours but to 'optimize' technology development on the basis of specific products/artefacts.

According to Susanne Bødker (1996), the first participatory ICT research approaches in Scandinavia focused on resources for local action and to help people influence their everyday experiences with (computer) technologies. It was mainly directed at worker unions and facilitated educational activities along traditional design and research practices. Then, throughout the 1980ies those projects increasingly switched focus to generating alternatives to established technical and organizational settings, by using participatory and experience-based methodologies. Through increasing computerization in the 1990ies, the focus switched further towards not only helping individuals in coping with and influencing their technological environment but also empowering organizations for local action. Through this, the addressees of

17 Here we should evaluate influences of debates of pragmatism inspired by John Dewey, or concepts of deliberative democracy as brought forward by Jürgen Habermas. Especially in the Scandinavian context other strands of similar discussions might by influential. Susanne Bødker, for example, draws on Ejvind Larsen's reworking of Frederik Severin Grundtvig's (1783-1872) educational-philosophical concept of “growing” or on activity theory, coined by Lev Vygotsky and Alexei Leont'ev, as an argumentative basis for participatory approaches in technology development (Bensaude-Vincent 2001, 230–231).

participatory research and development where not only the workers any more, but managers too, or different user and stakeholder groups in general. With that, and the assumption that certain fundamental conflicts cannot be dissolved (in context of the economic-capitalist framework), also new methods and participation approaches had to be developed. Yet, conflicts can be seen as starting points for participatory design practices. Another important insight gained from this development is the active engagement of researchers and the co-production of research, organization and development, as "the design process as such creates new conflicts, because it opens new possibilities and "threatens" existing structures, procedures, and so forth." (ibid, 225) But not only the researched organizations and the individual experiences with technology change, also participatory research processes are changed by those engagements:

> *"At the same time, the contingency meant that we were less able to determine what we considered interesting research questions to pursue than we would have been without the commitment to take the actual problems of the organization seriously. The same applies for the research and design methods. When we started, we wanted to try out certain research and design methods, some of which were abandoned later because there was no need for them. At the same time, this forced us to try out other methods that we did not initially intend to use."* (ibid, 229-230)

In reflection of those later participatory design and research processes, Susanne Bødker summarizes several concerns which should be addressed:

- At several stages the researchers ended up talking and prototyping (or designing) only with certain groups, namely those actively interested in the ongoing processes. And these were only a certain part of the people later affected by technological changes. As one reason she gives: "Partly this is because of our own blindness and partly it is because we have found it hard to turn down those who volunteer." (ibid, 226) As a result the "collective experiences of participation are often only for those directly involved in the project, and only while the process is running." (ibid, 217)
- Into this ties the problem of existing organizational and economic barriers, especially when it comes to the time budget which different actors have at their hand and the compensation which they might get or not get for their extra work. As this is a crucial point in those participatory processes she even closes with a reminder to integrate reflections of power issues into our research approaches: "Perhaps these last observations illustrate more than anything how easily we can all be seduced by a friendly atmosphere until the real power issues show up." (ibid, 234)
- Besides the issue of (power differentiated) access to resources another issue is organizational hierarchy itself, which is seldom considered. "In the end, management has the power to decide what to do, in which case the enrolled users are trapped" (ibid, 217).

In all those examples we recognize the organization- or product-centred approach of participatory ICT research and design. A rather different issue would be participation in ICT research policy, where even more diverse groups of users and/or other publics may be encountered – a topic still rarely debated. Yet, even in this organization-focused frame, given all those issues and concerns, Bødker writes: "From this perspective, the term *user* may be a

mistake." (ibid) The term is nevertheless facilitated due to a "lack of a term that covers all the different kinds of workers" (ibid). This (in)adequacy of the concept of "users" is a central point where feminist theorizing might help to differentiate between different kinds of not only users, but also other (non-using but nevertheless affected) publics.

A debate that points to issues more related to policy, is taken up in the same PD-focused issue of the HCI journal, in which Susanne Bødker's before mentioned paper was published. Karlheinz Kautz in his paper focuses on computing education and the status PD gets (or does not get) therein. Drawing on a short historical account which highlights the beginnings of PD in the early 1970ies, where PD basically consisted of projects trying to incorporate employees perspectives, Kautz attests an increasing attention towards PD as a relevant topic in computing since then. Yet, despite intensive curriculum debates in the early 1990ies, no influence of PD could be found in computing education. The different programmes were dominated basically by three strands: mathematical based, engineering based and system-development based approaches. So, in 1989, the ACM[18] started a *Task Force on the Core of Computer Science* in cooperation with the IEEE Computer Society[19]. In it's report (Comer et al. 1989) we already can find HCI, or respectively "Human-Computer Communication" as a core issue in computing. In an 1991 Joint Curriculum Task Force some structure was added, and we also find a "social and professional context" as a relevant issue. Yet, participatory approaches, especially PD are not mentioned. According to Kautz, only in the German context a single proposal could be mentioned that put forth at least some aspects of PD. So, while issues of user-centred design are to some extent acknowledged by taking HCI into the core of computer science, participatory approaches are not discussed in policy debates on computer science education.

This situation did not significantly change in the following decade. As Corinna Bath highlighted in a 2006 paper, despite shifts in computer science towards an interaction paradigm the socio-technical divide, which puts computer scientists apart from their users and publics, is still strong in the traditional strands of computer science. Along with the above mentioned curricular debates, the rhetoric of a "core of the discipline" put critical and socially oriented strands in computer science at the margins of the discipline (Bath 2006, 307). Bound to these hegemonic delineations of the field, then, "participatory approaches formed a basis for feminist intervention in systems design." (ibid, 309) But, while taking up certain exploitable aspects, the critical assumptions of participatory and feminist approaches where usually kept out of the discipline, or at least at the very margin. This was in part accomplished by using the rhetoric of the "core" and devaluing participatory and feminist approaches and engagements in computer science as being inherently political, while claiming a neutral or apolitical point of view for the core itself. This position/perception has been highly problematised by STS scholars over the past decades.

Another recent summary on participatory, critical and reflective ICT design approaches is given by Phoebe Sengers et al. (Sengers et al. 2005). By drawing on different approaches like participatory

18 ACM is the acronym of the *Association for Computing Machinery*, one of the most influential computing societies (on a global scale).

19 IEEE is the *Institute of Electrical and Electronics Engineers*, also very influential in computing, especially with its Computer Society.

design, value-sensitive design, critical technical practice, critical design, ludic design and reflection-in-action they synthesize a set of common principles and strategies for (reflective) technology design. They bind these together in their proposed framework of *reflective design*. It opens the question of how reflection may "become a not only desirable but also useful part of technology design" (ibid, 50). Reflection therefore should be used "to uncover and alter the limitations of design practice" as well as "to re-understand [the designers] own role in the technology design process". Further, technology should "support skepticism about and reinterpretation of its own working". Designers and their products should actively support "users in reflecting on their lives." (ibid, 55) Reflection should be built explicitly into the designs/technologies/products.

However the framework does not resolve issues whether "one intervention will be better than another" or even "settle issues of competing designs that do both in radically different ways." (ibid, 57) Here we might find some rethinking of concerns mentioned by Bødker, as outlined above, especially in the reflection of designers'/technologists' own power and participation in ICT design/development processes. Nevertheless not only the dichotomy between designers and users is held up, but also the user-centred approach – again only those are addressed for whom the products are made in a broader sense, leaving out the non-users. Perhaps this issue is not resolvable on this concrete level of design and development. Hence a switch of focus to a policy level might help to address these issues. This might be another blind spot in participatory ICT research, pointing towards issues of democratization, which cannot happen on one level alone, that is, on the level of concrete product design. Here a focus on oppressed (non-)user groups and the building of translations between publics, differentiated by situated knowledges, might enable further critical reflection/diffraction and might provide opportunities to integrate policy debates within concrete design practices and vice versa.

What we have not touched so far are identity constructions, which seem to build an important aspect of how dichotomies between developers and users are enacted and which groups of people are identified as relevant to/within participatory processes. Here it would seem appropriate to look into studies of masculinity (Connell 1996) (Lohan 2001), as male identity constructions seem to be co-constructive of the mentioned dichotomies between technoscientists and their publics.

A special case of male identity construction and (ir)relevancies of users/publics might be encountered when we start to look at Free Software, which we will do in the following section.

3.2. Free Software culture as an illustrative case

An interesting realm between computer science, software development and ICT dissemination is Free Software and its surrounding cultures. Free Software is, very broadly put, software that may be used in unrestricted ways. There are different understandings of Free Software and different movements, diffracting along pragmatic and ideological considerations. There also is Open Source software, which basically is software, where the user (or consumer) is granted access to the source codes. This does not necessarily grant the rights to change this code or to provide it to

others. But often Open Source is used synonymously with Free Software. So, for our considerations, I will use the term Free/Libre and Open Source Software (FLOSS), as it most broadly describes a realm of technology production (mostly software, but not exclusively, as it is also applied to hardware or other digital artefacts). This further resolves the ambiguity of the English term “free”, which in this case means not only free of costs but also free to reconfigure, remix and redistribute the technological artefacts.

FLOSS designates an area of technology production that sets a strong focus on transparency, which makes it particularly interesting for my work. We could even say that FLOSS operates 'in the public': Most FLOSS projects are conceptualised as open to anyone who either wants to contribute or participate in the development of the specific technology produced. Even the single steps in developing and coordinating communication (e.g. through mailing lists) are often designed to be publicly accessible.

However, when FLOSS is put into practice, one usually encounters a variety of obstacles towards participation: While FLOSS is surrounded with mantras like “software by the people for the people”, those who really are producing, those who really are participating and those whose demands and requirements are met in the FLOSS products, are usually not as diverse as in other technoscientific developments. While in FLOSS there nominally lies the potential for public participation in technoscience, practically none of the core approaches used e.g. in Participatory Design are applied within FLOSS circles, as further insights in this section and later on in section 6.1. will show.

One of the most obvious exclusions in FLOSS cultures is one based on gender representations. There is not much research available yet on how FLOSS culture reproduces male technoscience identities, while excluding marginalized groups like women or generally non-white-male-middle-class-people. There is also not much research on how free software development addresses its users or wider publics. Only recently we see more and more interest in Free Software that spurs research also in the social sciences and economics. This is especially enforced by the EU Framework Programmes and an increasing economic interest in developing a leading role in FLOSS development throughout the world. Yet, before around 2005, we could only extrapolate from research into computer science and the ICT sector in general. Especially since the 1980ies much research was conducted on topics like hacker and other techno-centred identities (e.g. Rasmussen and Håpnes 1991; Kleif and Faulkner 2003; Gansmo, Lagesen, and Sørensen 2003), gendered school eduction (e.g. Funken, Hammerich, and Schinzel 1996; Wächter 2003) and women's working conditions in ICT and computer science (e.g. Waibel 1992; Diegelmann 1996; Wajcman 2007). The hacker culture and a techno-centred attitude is a main factor, holding or driving many women (and other non-techno-centred identities) away from computer science. This is also confirmed by Ellen Spertus' report on *Why Are There So Few Female Computer Scientists?* (Spertus 1991, 33–35). Beyond this (sub)cultural aspect, the report lists many other aspects which lead to women's staying away from computer science. Within Free Software movements we find hacker cultures and a general meritocracy in neglect of physical and social needs as core values (cf. Grassmuck 2004). This is not only a part of hacker cultures, but also widely spread throughout computer science.

Furthermore, in the widespread eulogy of hacker counter-culture as a driving factor for the development of the Internet, Linux and of Free Software, many mainstream analyses miss out on the specific western white maleness of this culture. It is a culture which is not so much concerned with the needs of diverging groups of potential users but much more with self-centred fantasies of omnipotence – an issue on which Joseph Weizenbaum commented already in the 1970ies regarding computer programmers and scientists (Weizenbaum 1976). It is the ICT version of the *god-trick,* performed by technosciences, which was extensively described by Donna Haraway (1985), (1988). Judy Wajcman gives another interpretation:

> *"The masculine workplace culture of passionate virtuosity, typified by hacker-style work, epitomizes a world of mastery, individualism and non-sensuality. Being in an intimate relationship with a computer is both a substitute for, and a refuge from, the much more uncertain and complex relationships that characterize social life."* (Wajcman 2004, 111–112)

This is certainly not an advantageous position for implementing participatory approaches in ICT design and development. Participatory approaches are therefore still marginalized in computer science and in FLOSS particularly. This will only change if computing culture changes not only quantitatively (who becomes a computer scientist?) but also qualitatively regarding the chosen methods and the fundamental theoretical approaches.

Despite efforts to highlight and tackle exclusion patterns in computer science, most of these patterns are still at work 20 to 30 years after first studies on these issues came out. Nevertheless much effort was put into initiatives for change, especially for an increased numerical inclusion of women in computer science. This often brought qualitative shifts too, regarding the content of computer science curricula and organisational re-arrangements (Margolis and Fisher 2002). Whereas inclusive strategies, similar to those pointed out by Margolis and Fisher, are important in empowering women and other technology-remote groups, Vivian Anette Lagesen points to critical ambiguities of quantitative efforts on inclusion of women (Lagesen 2008). Yet, especially in the context of Free Software communities, efforts to (quantitatively) encourage more women to participate might be a first crucial barrier to break self-centred cultures and methodologies in those communities. Several initiatives try to tackle male bias in this context, as for example the Ada Initiative, which aims at supporting women in open technology and culture[20]. One of this initiative's main actors, Linux kernel developer Valerie Aurora, with help of others, put together discussions by many women technologists in the Linux community into a *HOWTO Encourage Women in Linux (Henson 2002).* This report presents not only strategies to cope with male-dominated and sexist Linux communities, but it also highlights techno-cultural specificities found in most Free Software communities.

Besides the meanwhile countless studies on hacker-culture and male techno-identities, only since 2006 we can draw on comprehensive studies of gender in relation to free software. In a 2-year project from 2004 to 2006 the FLOSSPOLS project, financed through the EU's 6th Framework Programme, investigated – among other foci – gender relations in and throughout the free software communities in EU countries (Nafus, Leach, and Krieger 2006a; 2006b). The findings of

20 For more information on this initiative see their website at: http://adainitiative.org/ (initially accessed: 2011-05-08 ; last accessed: 2014-10-16)

this project mainly confirm what the before mentioned contributions already showed. To some extent, individualist approaches and dismissals of social aspects are much more common among Free Software developers, than in more mainstream software development. In sum, what the FLOSSPOLS study added to the discussion, was its role as a policy paper arguing for inclusion of more women in FLOSS. The report mentions FLOSS communities' bias towards rewarding "the producing [of] code rather than the producing [of] software. It thereby puts most emphasis on a particular skill set. Other activities such as interface design or documentation are understood as less 'technical' and therefore less prestigious." (ibid, 5) By shifting focus on those more neglected types of work, other opportunities for participation might arise, since writing code or doing design work are less bound to technical programming skills while facilitating those skills broadly disseminated beyond technical lay people.

Taken all together, we might say that the free software movement is a good example of the differences of the notions of *participation* and *participatory*. There the label participation is integral, yet the process usually is not at all participatory. Despite all talk about "prosumers" or "produsers" – the merging of producers and consumers or users – there are no methodologies to engage in participatory practices. Rather, developers seem to be their own imagined users/publics. Only in that sense the dichotomy seems to change. Yet the vast majority of free software users/publics are mostly invisible to the developers of free software.

Nevertheless, changes are happening, and gaps between Participatory Design and FLOSS approaches are becoming more and more visible within research communities. We will come back to that in chapter 6.

Now let us take a short look towards the fundamental motivation of Participatory Design.

3.3. Intentions and theoretical foundations of Participatory Design

A strong driving factor behind *participatory design*, in its origins and the actual academic field, is a theme of democratization of technologies (Gärtner and Wagner 1996), (Kautz 1996), (Blomberg, Suchman, and Trigg 1996). At the core of this theme are issues of power and matter – in its multiple meanings. Also when we look to analytic models of citizen participation, like Sherry Arnstein's "Ladder of Citizen Participation" (1969), it becomes clear that it is not only about who may participate when and where, but also about how resources and powers shift within these processes.

While participatory design had its starting point in the Scandinavian 1970ies, driven by workers unions and researchers engaging from or with their perspectives, a main current throughout its further development is the work of feminist and anti-racist scholars in epistemology, STS and computer science (as referenced in the introduction section). There, the issues of power and participation where addressed explicitly. Important insights in these fields were then also supplemented – beyond the question of workers' and women's participation – by focusing on ethnicity, age, sexuality and other categories through which societal stratification takes place.

Feminist and anti-racist literatures are also highly relevant to my own research, especially as I was

until a few years ago mostly perceived as a white male working in academia, which is also part of my early socialization (at least the white male thing). Now I am a white trans woman working around academia – still finding myself in a rather privileged position. So, such knowledges are not only in my own interest of working against oppressive patterns in society (and especially in science), but also help to partly overcome my own situatedness in a globally privileged position. And, at last, I share many of those views, as it is in my own interest to make the sciences more democratic.

In the following chapter, I will provide insights into feminist thinking about technoscience, as a specific focus of motivation to apply participatory approaches in these fields. Later, in chapter 6 we will find further links between the motivation to use Participatory Design (or participatory approaches to computer science in general) and these theoretical considerations.

4. Feminist epistemologies: linking theory to participatory practice

In the recent chapters we have been confronted with diverse theoretical considerations on why and how publics could and/or should participate in technoscientific endeavours. One very important strand of thinking about how knowledge (and technoscientific artefacts in general) are (and should be) produced is the feminist thinking about epistemologies. In this chapter I want to trace such thinking back from early considerations in philosophy of science and science studies to recent feminist analyses of technoscience, from which certain demands for and links to participatory practices in technoscience arise.

Already with early works in the social studies of science, it stands to reason that habits of thought are linked to and reproduce social contexts, and vice versa. A classical framework for such an interdependency might be given by Ludwik Fleck and his concepts of thought collectives and thought styles (Fleck 1935), which he actually developed on basis of his experiences as a medical doctor and biologist. In this account, Fleck explains scientific thinking and the way knowledge is produced. Based on these insights, we can relate technoscientific practices and patterns of inclusion and exclusion and investigate how they enable or prohibit specific forms of collaboration and participation. With Flecks framework we can understand circles that seem to be resistant to integration of diversity and participation as *thought collectives* that are bound to certain *thought styles*. These thought styles might prohibit them from seeing problems, which go beyond their own situated horizon. Hence they might also prohibit them from engaging in practices of participation and practices towards more democratic technosciences. Let us take a look at how Fleck explains those modes of thinking:

> *"Once a structurally complete and closed system of opinions consisting of many details and relations has been formed, it offers constant resistance to anything that contradicts it."* (ibid, 27)

This mode of thinking contains at least the five following components:

> *"(1) A contradiction to the system appears unthinkable. (2) What does not fit into the system remains unseen; (3) alternatively, if it is noticed, either it is kept secret, or (4) laborious efforts are made to explain an exception in terms that do not contradict the system. (5) Despite the legitimate claims of contradictory views, one tends to see, describe, or even illustrate those circumstances which corroborate current views and thereby give them substance."* (ibid)

This is a description of how science works. It could just as well be a description of how modern patriarchal and racist capitalism works. It models the spectrum of reactions by dominant players in technosciences to impulses of change, regarding the position of marginalized groups. This might also be a reason why many of the popular public engagement exercises in technosciences actually are nonparticipation exercises, with merely manipulative or therapeutic, sometimes at least informing character (cf. Arnstein 1969).

Of course this is only contextually valid, as not all technoscientists are prohibited by their own thought style to recognise an invalid exclusion of marginalized groups. Yet, this usually happens even if they don't want to and even if they try to counter it. Spoken with Fleck this can be explained in the following way:

> *"The individual within the collective is never, or hardly ever, conscious of the prevailing thought style, which almost always exerts an absolutely compulsive force upon his thinking and with which it is not possible to be at variance."* (Fleck 1935, 41)

Now, more than 70 years after Fleck demanded "a less egocentric, more general point of view and to speak of comparative epistemology" (ibid, 22), we still have efficacious and dominant epistemological systems at work, which favour disciplinary work over interdisciplinary work, and the latter over transdisciplinary work. But since then much work, especially in feminist science contexts, has been done to examine how epistemologies impinge on patterns of inclusion and exclusion in whole fields, as well as in concrete methods.

Against the classical view that there is only one scientific epistemology we now see the demand for other epistemologies. Through the 1970ies to the 1990ies there was much discussion going on about how science should be done and that it has to be done correctly. Out of feminist perspectives, if it was not to reject science at all, a more thorough and valid science was demanded. Science, if conducted at all, should be done correct. Science would only be really objective, that is, stripped off of all political biases, if the existing methods and standards would be applied thoroughly and consistently. Against this form of empiricist rigidity stood the analysis of science and technology as inherently patriarchal and was seen therefore as something that has to be rejected. But what did that mean? To reject *the* scientific epistemology? Which other epistemology could there be to replace it – as there hardly could be no epistemology.

A major change[21] in feminist analysis of technoscience was marked by Donna Haraway's work and her influential manifesto for cyborgs in the mid 1980ies (Haraway 1985). "Leading the charge against those who reject technology in favour of a return to a mythical natural state and against the proponents of a genetic determinism, Donna Haraway has become the most influential feminist commentator on technoscience." (Wajcman 2004, 80) With Haraway, classical dichotomies and distinctions between science, culture and society get blurred. Science itself is a cultural system and myths about objectivity can be challenged since sociologists of scientific knowledge have shown how socially constructed those knowledges are (Knorr-Cetina 1981) (Latour and Woolgar 1986). Haraway called this revelation an "epistemological electro-shock therapy, which far from ushering us into the high stakes tables of the game of contesting public truths, lays us out on the table with self-induced multiple personality disorder" (Haraway 1991, 186). As a result, she says, "[s]ome of us tried to stay sane in these disassembled and dissembling times by holding out for a feminist version of objectivity." (ibid) Out of those discussions we may formulate the main problem like Haraway does:

> *"how to have simultaneously an account of radical historical contingency for all knowledge claims and knowing subjects, a critical practice for recognizing our own 'semiotic technologies' for making meanings, and a no-nonsense commitment to faithful accounts of a 'real' world, one that can be partially shared and friendly to earth-wide projects of finite freedom, adequate material abundance, modest meaning in suffering, and limited happiness."* (ibid, 187)

While Haraway describes situated knowledges as a solution towards this rephrased question for a

21 Although it might be better framed as a shift of focus, as not all precedent feminist positions where so harshly opposed to science and technology. We even might find a class bias here, where white middle class women had much more luxury to openly oppose science and technologies than e.g. black working class women.

feminist objectivity, Sandra Harding describes how we may employ feminist standpoint theories to generate strong objectivity, because "[t]he problem with the conventional conception of objectivity is not that it is too rigorous or too "objectifying," as some have argued, but that it is not rigorous or objectifying enough" (Harding 1993). To address this problem we need stronger standards for methods, which generate strong objective accounts, that is, accounts that are not solely formulated from a supposedly neutral 'scientific' standpoint, but start at the demands of the disadvantaged and the oppressed. The main underlying problem is described by Harding:

> *"Knowledge claims are always socially situated, and the failure by dominant groups critically and systematically to interrogate on their beliefs leaves their social situation a scientifically and epistemologically disadvantaged one for generating knowledge."* (ibid, 54)

While spontaneous feminist empiricism "tries to purify science of all [...] bad politics by adherence to what it takes to be rigorous methods [...] this is far too weak a strategy to maximize the objectivity of the results of research" (ibid, 56). Therefore feminist standpoint theory demands starting research and asking questions from marginalized standpoints. "Thus, strong objectivity requires that scientists and their communities be integrated into democracy-advancing projects for scientific and epistemological reasons as well as moral and political ones." (ibid, 69) We have to systematically integrate marginalized groups into our (scientific) circles, actions and debates – this does not only mean to have a diverse research force but also integrative, participatory methodologies.

It becomes evident why it is important to bring marginalized groups into science and technology. But of course we cannot stop at the liberal feminist demand for quantitative balance of those working in science and technology. For example, Vivian Anette Lagesen highlighted the Malaysian case, where more than 50% of computer scientists are women, also in leading positions. Yet this is no cyberfeminist utopia, because the decisions to study computer science are still culturally enforced, even if individual needs would suggest different decisions (Lagesen 2008). Rather, we have to change the contents and ways of how science and technology are facilitated and we have to aim at integrating a permanent re-evaluation of our viewpoints towards marginalized and oppressed perspectives into our methods.

Based on these arguments, we do not have to seek far to come to participatory approaches in technosciences, that is theoretically. It is not my intention to show through historical analysis how feminist theorizing did in fact demand, support and influence the establishing of participatory methodologies, especially in certain ICT-areas. What I want to show is that, if we want to do technoscience seriously, we have to develop participatory or other forms of democratizing approaches and methodologies in our technosciences. This is of course based on the insight that our "goal is better accounts of the world, that is, 'science'" (Haraway 1991, 196). In context of ICTs and/or computer science we have to bear in mind that preceding every technological product/development is some kind of analysis of how the particular situations materialize, depending on our imaginations of which worldly activities are relevant in context of our technology (this is where we inevitably bring in our own values and political projects, right before we even start analysis). Beyond this, our technoscientific creations influence our further analytical framework or what is possible and/or reasonable analytically.

In her framework of *agential realism* Karen Barad shows how knowledge claims are always situated, even in it's most technical form. Through her feminist reading of Niels Bohr's interpretation of quantum physics she dissolves objects in the traditional sense, as objects never are closed, untouched, singular or in other ways not entangled with us or the rest of the world. In her framework our knowledges are based not on observations of (inanimate) objects but on intra-actions in/through/with phenomena. It is hard to break her insights down into two short paragraphs, but for our purposes we might work with the following rationale:

> "[P]henomena are not the mere result of laboratory exercises engineered by human subjects; rather, *phenomena are differential patterns of mattering* ("diffraction patterns") produced through complex agential intra-actions of multiple material-discursive practices or apparatuses of bodily production, where *apparatuses are not mere observing instruments but boundary-drawing practices—specific material (re)configurations of the world—which come to matter*. These causal intra-actions need not involve humans. Indeed, it is through such practices that the differential boundaries between humans and nonhumans, culture and nature, science and the social, are constituted." (Barad 2007, 140, formatting as in the original)

With every observation, every measurement and every technical implementation we intra-actively foster or shift boundaries between what may be understood as nature or as technical fundamentals, through which we build our tools as well as what we deem to be non-technical, social, human-related issues and decisions. This is not to say, that we are able to define those realms arbitrarily. We are also defined by those intra-actions ourselves. The core demand arising from this analysis is to engage in what Barad calls *ethico-onto-epistemology*. We cannot separate the technical, from the social and the scientific groundwork from the application in technological products. We have to develop a "process ontology" (Braidotti 2006, 199) to integrate ethical and societal considerations in our knowledge and technology building processes, "to posit the primacy of relations over substances" (ibid).

Common to all authors mentioned in this section is the advice that reflecting our individual situation alone is not enough, that we have to engage in our material-semiotic entanglements with other agents (human and non-human). Or as Rosi Braidotti reminds us: "Hyper-reality does not wipe out class relations: it just intensifies them." (ibid, 204) So far we have explored (ethico-onto-)epistemological foundations of technoscience in general. How these understandings shape the methods of computer science specifically can be shown, for example, by a critical analysis of the object oriented paradigm (Crutzen and Gerrissen 2000). In general, we will have to critically re-examine allegedly emancipatory potentials of (IC-)technologies and use frameworks and practices that enable and integrate marginalized and oppressed groups into technoscientific endeavours right from their start, one of which the findings section (chapter 4) should highlight.

The dissemination of feminist research into participatory approaches in ICT and computer science cannot clearly be drawn as it is much to diffuse, yet very important. An implicit question of the last section was why we should focus on feminist insights anyway and not, for example, on major strands in STS? One major reason to do so is feminist technoscience studies' focus on patterns of power and inclusion/exclusion. Those aspects are crucial for issues regarding who may or should participate in participatory approaches to technology design and/or development.

A bridging overview is given by Nancy Van House regarding engagements and relevancies of STS for information studies (IS). In it, she summarizes a range of topics useful for understanding and developing information systems (Van House 2004). She argues that "effective information system design benefits from investigation of the processes of knowledge construction that information systems support, as well as a reflexive, sociotechnical approach to technology." (ibid, 5) Most crucial for our purposes is the role of different publics – often reduced to users – in the technology development process and how they are constructed:

> *"IS's representation of users (even the term "users") are culturally and historically situated, intended to help in the design of services and systems, but not likely to reflect the participants' (information users and producers, knowledge workers) own views of their situation."* (ibid, 71)

One particular strand of research mentioned by Van House is feminist STS, in which she highlights research on gender and technology relations in general and feminist epistemology in particular. This research is important because it makes visible the "invisible" participants, which are usually overseen by mainstream STS approaches like SCOT or ANT.

With all that in mind our agency shifts and our processes have to adopt towards the integration of marginalized perspectives and the importance of relations. Not only the content of our research, but the process itself are now part of our focus. So, let us now focus on practices of participation in computer science.

In the following chapters I present my methodological approach and what I found out about participatory approaches among Viennese computer scientists.

5. Method & research interest

In this section I want to briefly lay out what, beyond the assemblage of theoretical inputs and its synthesis, I wanted to research with this work and how I did it. I will also situate myself in relation to what I am researching and I will try to be as transparent as possible about my own interests and how this might influence the work. As a short note in advance, I have to admit, that I could not fulfil all the requirements which I initially posed on this work, guided by qualitative research handbooks. But then, for a master thesis project, this might anyway be possible only in rare cases, where all the circumstances enable a deep and thorough, accountable and critically reflected research, embedded in a bigger project that suffices an inductive qualitative approach.

Before going into detail on my interest and the approach, I also want to briefly sketch the temporal framework of this project.

5.1. Temporal framework

As a master thesis project this research was supposed to be completed within 6 months. But neither could I point to a clear date that marks the start of the project, nor is this frame applicable to my work, as I was not able to work full-time on this project. The interest towards the topic and the project itself emerged gradually out of my coursework in the STS master programme at the University of Vienna, which I started in autumn of 2009. In spring 2011 I started to form a first outline for a possible master thesis project, which was then refined in autumn 2011. Until then I was granted a social stipend by the state of Austria, which allowed me to commit nearly full-time to this project (with exception of some additional wage work and my activist engagements). Therefore I planned the project to be done within a year. This quickly became unrealistic, as my stipend ran out and I had to take up several additional job opportunities, starting with summer term 2012. Until then my work focus was very much on the theoretical part of this project and on preparing the empirical research phase.

The first interview was conducted on 21st of December 2011, the second on 5th of April 2012 and the third and fourth interviews on 11th of July 2012. While initially I still could work as a student assistant at the Department of Science and Technology Studies (summer term 2012) and as a teaching assistant/tutor (winter term 2012/13), which helped to stay focused on STS work, this time period already marked a stagnation of my project, finally reaching a high at the beginning of 2013. This was accompanied by my increased efforts towards a so-called “gender transitioning” process from late 2011 onwards[22]. But I also do not want to neglect my own anxieties about

22 I am rather fond of fluid gender performances and would not be able to mark certain points in time at which I decided on enacting, performing and embodying certain (different) gender stereotypes in a (in this regard) dichotomously structured society. But there were certain periods which definitely put more strain on my personal and professional capacities. So, while the so-called process of “gender transition” does not fit my approach and would actually have to be extended to my whole life span, the period starting at the end of 2011 did put some manifest limitations on my financial and timely resources, as I also slowly started the process of formally 'transitioning' – which includes a necessary (by legislation) and usually costly psychotherapy and a lot of additional time investments for organisational or bureaucratic reasons. Without wanting to whine about personal affectedness, I have to realize retrospectively that such a situation indeed does put strains on what is possible within our regimes of work and science. I do not want to use this as an excuse, but as an important part of the explanation, why my research project is so scattered in its temporal domain.

doing empirical qualitative work and all the limitations I have to face in doing so. This, too, was another important component of the stagnation of my project from early 2012 onwards. Retrospectively, I would suggest every master student and also their supervisors to rigorously consider the requirements and the available means to do qualitative research in the context of a master thesis. Only under rather ideal circumstances I would recommend following such an approach. Nevertheless, also under not so ideal circumstances such a project is a wonderful learning field, if one is willing to accept a not so stringent, fast and bounded project that a master thesis (at least formally) is supposed to be.

After a full break from the project between end of 2012 and late spring 2014, I found increasing time and resources to start working on the project again. So while I started with the preliminary analysis of interviews already in early 2012, the main analytic interpretation took place in 2014, and the final stage of finishing the textual representation of my work fell into the months of September and October 2014. This included especially the findings section, the adaptation of my methods section as well as the conclusion and introduction. The theory chapter is by and large as I have left it at the end of 2012.

5.2. Research interest and approach

My concrete research interest is not only formed through theoretical considerations, but stems directly from my own methodological uncertainties and questions of how to do science. A general concern to me is accountable research. Or, to be more precise, how research can be done in a way, that is accountable not only to scientific peers but to all of its publics, or at least to those who are most affected by what comes of the research. I am particularly curious about participatory practices in research and development within the computer sciences, especially the field of *participatory design*. This includes the processes in which publics are constructed and therefore ex- or included in research reflections and practices. This curiosity in part also comes from a strong conviction that within such practices we can find suggestions and stimuli for more accountable research in a lot of different areas of the (techno)sciences.

But while this shapes my interest, I am unsure about the accountability of my own research, especially when it comes to questions of methodology. Regarding one important aspect of accountable research, Adele Clarke writes:

> *"For feminist and postmodernists more generally, then, questions of the accountability of research increasingly include extended efforts to understand the finer and subtler dynamics of the workings of difference especially but not only vis-à-vis sites of injustice. […] Such concerns are central to situational analysis." (Clarke 2005, 74)*

This is one reason for me to try such a situational analysis approach for my empirical work. However at least one problem arises with this decision. While for my theory input I could rely on a broad body of feminist technoscience studies research, providing a basis and context to my argumentation and giving the reader the possibility to either build trust and/or critically question my research, this is not so easily accomplished for the empirical work which is described in this and the following chapter. Because, for a research project to qualify as enacting such a situational analysis approach rigorously enough, a master thesis project is a conceivably unfavourable

environment, especially without being institutionally embedded in a bigger research project.

Nevertheless, situational analysis seems to be a promising approach for what and how I want to research, because (as we already have seen in the theory chapter) participatory approaches in computer science are not clearly bound to certain disciplinary demarcations. Even Participatory Design as a community is vastly heterogeneous and vague as a techno-social environment. Situational analysis now strongly builds on a "social worlds/arenas/discourses framework" which enables us to not only focus on "the usually highly bounded sociological framings of organisations, institutions, and even social movements". But it also takes into account "a more open, fluidly bounded, discourse-based framing of collective action" (Clarke 2005, 10). So, to choose a situational analysis approach over a classical grounded theory approach, is a necessary decision, as my goals, similarly to Clarke's, are "emerging in part from feminisms, antiracisms, and related commitments to equity [and] are to create approaches to empirical research that take difference(s), power, contingency, and multiplicity very seriously." (ibid, 11) Although I am not in the position of providing new methodological innovations, I still would like to explore possibilities of doing research in a way that is empowering to those who are seldom heard, seen or otherwise acknowledged within the realms of research and development.

Participatory design, then, seems to be one such approach within ICT research and development. It is therefore interesting to investigate how participants, and in a broader sense publics, are constructed in its research and development processes. This is the main background for the formation of research questions, which are, due to the necessary preliminarity of my findings, somewhat open and vague. In the context of a situational analysis research framework these questions have to be refined throughout the qualitative research process itself. But within time scales and resources for this particular project, I can only start with the first phase of such a qualitative research project.

So, while in context of this particular research I cannot fulfill the requirements of a robust and well-established situational analysis, I nevertheless orient myself along this approach to open up some first insights and hopefully also some incentives to do further research in this area.

My initial research questions to investigate participatory processes in computer science have been:

- How do computer scientists construct their publics?
- What role to they give to their publics in their work?
- What do they learn from their publics?
- Why do they use participatory approaches at all?
- And how do they position their participatory work within the (computer) sciences?

These questions then necessarily had to be refined and adapted to my project and the means to co-generate data and analyse it. Throughout the research process my interest then shifted towards the enacting of practices of participation, how participants are figuring in these

processes and the problems that arise for the researchers, when they want to do such research.

5.3. Limitations

While every research, at some point, tries to come to some form of (preliminary) closure and produces some sort of report, is therefore limited, this project is particularly so. I already mentioned some of the limitations of this project above. Here I want to add two further limitations that specifically apply to the tools and modes of analysis applied, pertaining the usage of situational maps and discourse analysis.

One of the central tools of situational analysis are situational maps – social world/arenas maps and positional maps. Additionally to all the advantages of using maps as analytic tools (Clarke 2005, 30), I want to add what is implicitly already there: not only "one can move around on/in maps much more quickly and easily than in narrative text" (ibid), it is also much easier to position and situate oneself in maps. And as, of course, "[n]o method overcomes the situatedness of its user" (ibid), maps may help to better explicate this situatedness.

So while I am very fond of maps – maybe also because, with my background in computer science, I feel much more safe to work with maps then with narrative texts – and while I did try to do some positional mappings, I quickly realised that I would need more material, different interview questions, more time and at least a few critical peers who would participate in reflective mapping sessions. As all of these factors are not given, I had to resort to a more thematically oriented sampling of the interview transcripts. Therefore the result is more of a preliminary first insight, which then might, additionally to my theoretical inputs, serve as "sensitizing concepts" (ibid, 28-29) for further research in this area.

It would also have been interesting to follow a discourse analytical approach within the bigger situational analysis framework, to highlight "*constructions* of meanings – meaning making – by those somehow involved" and to focus on the "analytics of power" (ibid, 149). Specifically interesting in this context are questions of how they discursively construct "participation" and "participants" (and therefore certain "publics") and the role their own positions of power and knowledge play in this. But in context of this project it was not feasible to do so, because I would have needed additional material and time resources to let the initial phases of interpretation and analysis be accompanied by this approach.

Finally, my research is not only limited by methodological options, but necessarily limited by my own situatedness. This I want to address in the next section.

5.4. Situating myself

No matter what methods we may choose, our research is always biased in certain senses by our own identities, presumptions, social positions and inherent interests. While I would love to address the necessary ethico-onto-epistemological issues underlying this argument and its implications for methodologies, this would go beyond the scope of this work. So I have to refer the those readers interested and/or sceptical, especially those with a positivist approach to

science, towards the arguments and texts I have assembled in the theory section on feminist epistemologies, most notably those of Donna Haraway (1985; 1988; 1991; 1997) and Karen Barad (2007), both with a background in the natural sciences. To counter a lack of reflexivity about my own situated perspectives and interests, I want to answer the following questions, posed by Adele Clarke (Clarke 2005, 12):

- *"Whose knowledge about what counts to whom and under what conditions?"* The knowledges of practitioners of participatory approaches in ICT research & development are my focus of interest. These knowledges are framed through my theoretical understanding of participation and publics. But I am committed to the practitioners views, as these are a guidance for my further research and the reworking of my practices. Hopefully these views will guide other researchers in STS, computer sciences and maybe also other research areas. So far the conditions under which these knowledges are relevant are highly theoretical, as there is only very limited space in academia and funded research circles to apply such knowledges. But it may be relevant to those who want to change some of these conditions.
- *"Who is the researcher?"* Well, sadly, only I am. That is, there is no team, there are no co-researchers and therefore there is not much space for multiperspectival reflection. To some extent there still is such reflection, as far as my interactions with friends, colleagues and my supervisor allow for. But this cannot substitute a tightly cooperating research team. Due to my own fractured identity as a hybrid (between computer and social sciences, between academia, practice and activism, between at least two different genders) I am to some extent sensitised towards differences, especially those of identities and their corresponding marginalisations. For the same reason I am also inclined towards "making differences more visible and making silences speak" (ibid, 10). But again, this cannot substitute for a transdisciplinary and multiperspectival research team.
- *"How is who they are consequential?"* There are at least two consequences of my hybrid identity, as well as my current situation. First, I might be able to easier gain access to participatory computer science circles than it might be for "pure" STSers, and to more fluently delve into their discourses. Of course this also means that I am more inclined to leave my STS position and framework and start to operate with terms of the field of research itself, rather than keeping some critical distance to explain what is going on, in a way, or argument, that is comprehensible and replicable to the outsiders of the field. Second, my project is an inherently political one. Not that any science wouldn't be, but my concern of being betwixt and between those different identity and disciplinary categories generates the uncircumventable desire to fight for / work for / be active in a way to enable different practices in sciences, that are more inclusive and more sensitive to power and differences, and that are committed to the well-being not only of scientific progress but also of peoples and societies affected by this progress.
- *"Who/what is researched?"* I am researching how participation is enacted in some contexts of computer science and how different non-/relevant publics are constructed in these

processes. I therefore interviewed 4 people who are in different ways engaged in such practices at the Vienna University of Technology. But I also am using a lot of theoretical inputs from the field itself, through journal articles and books. My own method repertoire also draws on reports from the field itself. However, that this was not applied so much in this project, as I only was able to do interviews and not a full-fledged multi-sited qualitative research project.

- *"With what consequences? For whom?"* At best, more computer scientists and STSers, or members of other groups of people, are increasingly thinking about why they themselves do or do not use participatory approaches and how they construct their publics. At worst, I am digging my own academic grave, either because nobody now wants to have me in science any more, or because I myself am increasingly disinterested to do non-participatory, non-engaged science. I think there will not be so many further consequences, probably also due to the limited scope of my study. Despite my careful selection of interview transcript excerpts and the anonymisation of my interviewees (as far as this is possible in this context), I hope that none of these excerpts or what I made of them will have negative consequences for any of my interviewees, especially for the two young researchers in my sample.
- *"Who paid for it and why?"* Nobody paid me specifically for doing, and especially for finishing this work. That is one reason, why it took me so long to finish this work (besides my sometimes much too high or idealistic standards and the setting of priorities towards unpaid work in emancipatory political contexts – probably not the best prerequisites for a scientist in our scientific regimes), as I had to earn money otherwise, by not doing science. Nevertheless, during the course of my work I was granted up to 2000 EUR from the Austrian Federal Ministry of Science and Research[23] through the University of Vienna in form of the "Förderungsstipendium nach dem StudFG"[24]. This stipend did cover travel expenses and conference fees. It made possible my visits to the Science in Public 2012 conference in London (UK), the Participatory Design Conference (PDC) 2012 in Roskilde (Denmark) and the 4S-EASST Conference 2012 in Copenhagen (Denmark). I presented a talk at the Science in Public conference as well as the 4S-EASST conference. Therefore these conference fees have been paid by the stipend. The conference fee for the PDC 2012 conference was not paid for by the stipend, as I did field work there but not present a paper. This might indeed seem unreasonable. Why did I get this stipend? Probably, because I had a good letter of recommendation and the support of several people at the Department of Science and Technology Studies, for which I am very grateful. And also because the University actually indeed wanted me to finish my work, as the stipend "should, through a one-time amount of money, help the student to finish his/her studies."[25]

23 At the time of receiving my stipend. Since 2014 the agendas of this ministry have moved to the newly merged Federal Ministry of Science, Research and Economy.

24 http://studienpraeses.univie.ac.at/stipendien/foerderungsstipendien-nach-dem-studfg/ , accessed: 2014-10-08

25 Quoted from link in last footnote. In the original: "soll mit einem einmaligen Geldbetrag dem/der

- *"Who/what is placed at risk by this research? How?"* Hopefully there is not any specific risk generated by this work. Of course there is the risk that my research is found flawy, especially by followers of positivist approaches to science (and there are a lot of them within the computer sciences). So this might fall back onto participatory approaches themselves. But I hope I could thoroughly explicate my intentions and the limited capacity of this particular research.
- *"Who/what is advantaged by this research? How?"* In a best-case scenario, participatory approaches gain more attention in the computer sciences as well as in STS practices. And of course I myself will be able to either bring my academic engagements to a closure or to further them through increased access options due to then being counted as post-master student, maybe a "real researcher". Of course then, this would probably disadvantage my skeptical sarcasm towards academic practices (but this probably would not be so bad, actually).

A further question I would like to add is, why I am, in certain senses, propagating participatory and transdisciplinary approaches to science but not applying these approaches to my own research at hand. The simple answer is just "time and resources". And this is maybe even the most concrete and accurate one. But beyond that I am still at a stage of academic research where I want and have to learn how to do it right. That is, my primary interest was to explore what it means to do research in a participatory manner. This project took up just enough of my resources to not have any time left to actually apply what I have found. But I am certainly inclined to apply at least some of those approaches to any further research and also to think about how at least certain transdisciplinary and participatory elements of research can be applied without much resources.

I hope to have given enough insights about my own situatedness to make it possible for others to hold me accountable and also to not assume I would have tried to give some great answers which I actually have not given. Much more than finding answers, my interest was in finding more, or maybe better questions to guide and help us in understanding research and its possibilities for transdisciplinary accountability.

5.5. Preparation, conduction and analysis of the interviews

As a general guideline for the preparation, conduction and analysis of interviews I oriented myself along what Ulrike Froschauer and Manfred Lueger outlined for qualitative interviews and corresponding research processes (2003). Their focus is the "analysis of social systems in their particular environments" (ibid, 13, translated from german)[26]. This poses some difficulties to my case, as *participatory design* (even as a research community) is not so clearly delineated from other social systems. Additionally, in its Viennese formation, it does not correlate with institutional differentiations at the Vienna University of Technology, let alone the broader ICT research & development context in Vienna. Nevertheless, with some adaptations, I found this

Studierenden helfen sein [sic] Studium abzuschließen".

26 In the german original: "Analyse sozialer Systeme in ihrem jeweiligen Umfeld"

apporach helpful to gain some preliminary insights into the field.

In contrast to more quantitative oriented research approaches, I choose to follow a more "theory constructing approach" (ibid, 19)[27] as far as this was possible to accomplish in such a limited study. Despite a rather open approach I had some theoretical foundations (as laid out in the theory chapter), which guided my approach to the field and the interviews.

A main goal of this work then, in alignment with a situational analysis approach and what Froschauers and Lueger call "theory constructing approach", is to gain first insights and to do the first steps in researching a "general area of phenomena" (ibid, 21)[28]. To be scientifically credible, such a research endeavour is only able to form robust statements and answers after a corresponding research process, which usually takes several years and a team of researchers. This cannot be fully accomplished by my project. My focus, hence, was to provide and generate questions to fuel and initiate further research in this area.

For the initial orientation phase of a research project drawing on qualitative interviews, Forschauer and Lueger propose a list of questions that have to be addressed (ibid, 25). Some of these questions are out of reach to answer, as my project is basically limited to enacting the first two phases in their design – the planning phase and the orientation phase, which only build the basis for the main cyclic research phases. Thus I want to at least address those questions particularly relevant for my limited project. I will transpose those questions accordingly, to focus on the relevant aspects:

- *Why interviews and not other forms of engagement?* I actually would very much have loved to additionally use participant observations in one of my interviewees' projects, or in any participatory design project, actually. But this would have been out of bounds for the scope of this work. For conducting a proper research on the construction of publics in the context of participatory design, I certainly would suggest to do interviews as well as participant observation and also additionally take project reports and communications into account.
- *Who should and who can be interviewed?* I would have liked to not only interview those researchers who are active proponents of participatory approaches, but also computer scientists who did work within the bigger context of such projects, but who are themselves not active proponents or even sceptical of such approaches. My first interviewee also hinted me towards two such specific persons, whom I have contacted. In one case, I did not get a response. In the other case the researcher, a computer scientist who was (in the description of my first interviewee) initially very sceptical of the whole approach but later started to enjoy it, did reply and was principally interested in doing an interview. Only at that time she was on maternity leave and wanted to postpone this until she returned to her work in Luxembourg. At this later point in time I did not have the resources any more, and this was also in the period in which my own project started to stagnate (see the above section on the temporal framework of this project). But indeed,

27 Orig.: "theoriekonstruierende Vorgangsweise"

28 Orig.: "allgemeiner Phänomenbereich"

there certainly are opportunities to interview different protagonists in context of participatory design projects. And one actually should do so wherever feasible, to enhance theoretical sampling (Strauss and Corbin 1998, 201–215).

- *What are the competencies needed to conduct this research?* A lot of those competences actually needed, I was only able to gain through doing the research itself. But of course here a transdisciplinary team of critical researchers could have enormously countered a lack thereof on my side. In any case I would suggest that such a research has to be embedded in a project of bigger scope and within a research team. This was just not possible at the time of starting my work, and until now I have not heard of opportunities to do so. Of course this does not mean that they do not exist.

Further questions would have to be addressed if one takes up this initial research to go into the main phase of cyclic research (Froschauer and Lueger 2003, 28–31). Due to the context of a master thesis not embedded within a bigger project, I have to stop at the point where one actually might start with this research phase. Therefore my findings cannot fully evolve to a point where a "theoretic argumentation is saturated" (ibid, 30)[29].

5.5.1. Sampling of the interviewees

Due to considerations of practicability and access to a research field, I wanted to focus the sampling of interview partners around a somewhat bounded institutional setting in Vienna. This setting is one specific institute at the Vienna University of Technology, as participatory approaches are conducted there in different ways and one of my interview partners has a long history and relevance in Participatory Design. Additionally, through my former background as a computer scientist, who did their bachelor programme at the Vienna University of Technology, I had a good grasp of institutional demarcations as well as demarcations between different approaches to computer science. It also made it easier to access the field. In a bigger project of course, I would suggest to then at least have other researchers in the team, who are completely unrelated to this field, as I myself may be positioned too closely to this context and therefore not see reflective potentials on certain, seemingly self-evident issues and discursive positions.

My concrete approach was oriented along recommendations given by Froschauer and Lueger (2003, 54–55): in the first orientation phase I looked for "key persons" who are "internal experts on reflections of the field"[30]. My first interview partner then led me towards several further potential contacts. One of them was my second interview partner, also a professor at the same institute, who I already had in mind as a potential interview partner. I was also led towards two other researchers who were more sceptical of the field but also participated in one of my first interview partner's projects. But attempts to interview these two failed for different reasons (see above). The third and fourth interview partners where mentioned by my second interview partner. Both are young researchers who cannot provide the level of expertise on the reflection of the field as my first two interview partners. But I also wanted to gain some insights from young

29 Orig.: "gewonnene theoretische Argumentation als gesättigt"

30 Orig.: "Schlüsselpersonen" and "feldinterne ReflexionsexpertInnen"

researchers, because I was interested in how the field reproduces itself and how publics in this context are (implicitly) constructed.

For further research I certainly would advise to increase theoretical sampling (Strauss and Corbin 1998, 201–215) through a more diverse set of conversation partners, as well as through bringing in a transdisciplinary research team.

5.5.2. Form of the interviews

The interviews where led as a 2 person, face-to-face research conversation between me and my interviewees, with a lowly formalized form of conversation. The goal of the setting as a lowly formalized research conversation was to generate a positive climate of conversation (cf. ibid, 14). On a spectrum between "genuinely qualitative led conversations" and "interviews by questionnaire" (ibid, 34-35)[31] my approach lies relatively far on the side of qualitatively led conversations. But of course I had my theoretical inputs which served as my guide for follow-up and clarifying questions within the conversation. In all interviews I used a rather open entry and vague description of participation, in order to see where my conversation partners want to go with that. I oriented myself along Froschauer and Lueger's guidelines for the attitude towards the conversation (ibid, 59-60) as well as the course of such a conversation and the applied techniques (ibid, 60-62). The most important points made there, I want to explicitly mention here as well:

- Provide an open climate of conversation by demonstrating active interest (maybe even involvement) in the conversation partner's issues.
- Be curious and open to the unknown, but also question seemingly self-evident terms or topics. Ask or look out for what they mean to the conversation partners themselves.
- Facilitate the conversation partner's own structuring of the interview.
- Maintain an open conversational frame and avoid opportunities for yes/no-answers. Use paraphrasing and summarizing repetitions to check if your understanding goes along with your conversation partner's perspective.
- Start the interview with open questions in a way to explore the relevance of the researched phenomena in your conversation partner's life and to trigger a narration by them.

Regarding my own positions, interests and situatedness I was rather open to my conversation partners and briefly presented my research approach and interest before we started our conversation (or maybe already as part of our conversation). For me it was important to make transparent my own background in computer science, and that I wanted to gain insights in how participatory research in computer science can be done as well as in the corresponding problems that arise.

I generated guiding topics and questions for every single interview, based on my research interest, the already sampled interviews, and the informations about the interview partners I had.

31 Orig.: "genuin qualitativ geführte Gespräche" and "Fragebogen-Interview"

However this list of guiding questions was usually of very peripheral concern in the interview itself. For further research a closer analysis of the relation of these lists to the actual conversation might provide suggestions for refined foci of interest and conversation techniques.

5.5.3. Interview analysis

As I already mentioned above my general methodological approach is one that does not want to produce objective and universal knowledge but rather to create "as reliable and useful forms of understanding as possible" (Froschauer and Lueger 2003, 185). This I try to do roughly within a framework of situational analysis (2005). But to all limitations laid out above, in effect, for analysing the data at hand, I resorted to something more similar to a classical grounded theory approach, as laid out by Anselm Strauss and Juliet Corbin (1998). As a key feature of the analytic coding process they explain:

> *"Although we do not create data, we create theory out of data. If we do it correctly, then we are not speaking for our participants but rather are enabling them to speak in voices that are clearly understood and representative." (ibid, 56)*

But while one of my intentions was of course to let my interviewees be heard on their own terms and to make them, as well as their practices, visible to a broader scientific community, my intention was clearly not to create a theory out of this data. Even if I would not have taken serious feminisms's critiques towards positivist approaches to science in general (see theory chapter) and Clarke's critiques towards classical grounded theory in particular (Clarke 2005, 1–36), I would not be able, under the current circumstances and with the means available, to do so. Therefore I aligned my analytic practice along the practice of "open coding" (Strauss and Corbin 1998, 101–121) with a focus on thematic issues which arise for my interviewees in relation to their practices of participatory ICT research and development.

Regarding this approach there still are several limitations. Most of the requirements for a robust interpretation and analysis of qualitative interviews (Froschauer and Lueger 2003, 80–106) cannot be met in the course of this project. The most important aspect in this regard is the missing team of co-researchers and an extended time frame for extensive and reflective interpretation and analysis cycles.

Nevertheless I tried to make the best of it and to provide some exploratory insights to wet the appetite for more in-depth research in this area. Let us now move on to these actual findings.

6. Findings

Based on the approach I have laid out in the last chapter, here I will present the insights I rendered out of the conducted qualitative interviews. Through an iterative interpretation of the interview data, that is the transcripts I generated from the audio files I recorded through the conversations, I created seven thematic codes or issues of relevance in context of participatory practices of my conversation partners. These issues are of different scope, some of them assembling several subcategories (Froschauer and Lueger 2003, 63–64; Strauss and Corbin 1998, 113–120). The aim of this chapter is to present these issues correspondingly in 7 sections with according subsections.

But before, I will briefly introduce the broader context of the field of study, by presenting some practical insights into participatory design – beyond what we already have seen in the theory section.

6.1. Setting the stage – the field of study

After several decades of the Scandinavian approach to systems design and participatory design research (see chapter 3) there is no easily accessible monolithic overview of this approach available. Maybe such an attempt would even counter the approach's own intentions of not closing things down but opening up diverse patterns of engagement and of making the seemingly invisible visible and those usually unheard be heard. Yet, just as I attended the Participatory Design Conference 2012 in Roskilde, Denmark, it was announced that there will soon be an *International Handbook of Participatory Design* (further referred to as the "Handbook"), published by Routledge in its International Handbooks series. This handbook, edited by Jesper Simonsen and Toni Robertson, finally came out in 2013 and assembles contributions and challenges to participatory design as well as some outstanding applications thereof (Simonsen and Robertson 2013).

The first lines of this handbook already give us a rough outline of what participatory design is about and who is supposed to participate in it:

> *"Participatory Design is about the direct involvement of people in the co-design of the technologies they use. Its central concern is how collaborative design processes can be driven by the participation of the people affected by the technology designed" (ibid, i)*

Here we find a discursive uncertainty about who the publics are, or who is supposed to be involved. While the focus on *"direct involvement of people in the co-design of the technologies they use"* might suggest a more narrow sense of relevant publics to be involved, the focus on *"participation of the people affected by the technology designed"* seems to be a much broader notion. In both cases this strongly depends on the researchers understanding and framework of *technology* and *use* or *affectedness*. The introductory paragraph does go on by noting that it is about *"principles and and practices aimed at making technologies, tools, environments, businesses and social institutions more responsive to human needs"* (ibid). So it is as much about the participatory design of technologies as the design of participatory technologies. As we will later

see in the remarks of one of my interviewees, there is a broad spectrum around those two aspects, with some of the most intriguing projects bringing these two foci together. In such projects dense and complex networks of participatory interaction emerge and the boundaries between different groups of actors become blurred. In such settings it seems there is a rather open set of publics, that is framed and constantly reconfigured within such projects.

But the above mentioned discursive uncertainty reflects the broad range of approaches to participatory design. The Handbook assembles a lot of vivid and diverse examples of such approaches. It provides a good overview of practical and theoretical concerns, as well as of the diverse fields of applications for Participatory Design. As it would be out of scope to introduce to you all these examples, I can only invite you to take a look at three cases, which are highlighted in the Handbook as outstanding applications of Participatory Design.

The first one is a report and reflection by Randy Trigg and Karen Ishimaru on their work as in-house IT staff at the Global Fund for Women. Since 11+ years they are constantly (re)developing and (re)designing the central database applications within the Global Fund's ICT infrastructures (Trigg and Ishimaru 2013). In this reflective report we can see how also in rather bounded social structures the PD process not only has to reflect on who its publics are but also that it constantly reconfigures its publics, as it does with the social context it takes place in – in this case the whole organisation of the Global Fund for Women.

The second report by Jørn Braa and Sundeep Sahay reflects on two decades of development of, initially, the Health Information System Programme (HISP) in post-apartheid South Africa and the software and its reconfigurations in other geographical contexts (Braa and Sahay 2013). While the initial project, starting in 1994, developed rather well, several adaptations in different regional and cultural contexts did not work out or needed major reconfigurations of the project's approach, as the possibilities to construct and engage publics for a PD project are strongly influenced by the greater political frameworks. This also shows that PD projects might have to explicitly involve and win certain publics over others in order to be successful (or even possible).

While the DHIS software framework, that came out of the initial HISP project, was built in a participatory framework, the software also was built to facilitate participation. In Braa and Sahay's words this was a process of *"'eternal' participatory and exploratory prototyping, or evolutionary Participatory Design. There is never a 'finished' system in the HISP case"* (ibid, 240). This is also reflected in the maintaining of the (now) global software core, which allows for easy local adaptations. So in effect now different instances of the software are run in different parts of the world, and the global maintainers (now coordinated through the University of Oslo) try to integrate issues and solutions from local reconfigurations back into the global configuration. They are now relying much more on FOSS-based, distributed, and cloud approaches, which also ease local adaptations and access to the system. But this brings new challenges, as freely and openly available cloud-infrastructures and technologies in general cannot replace the efforts of a Participatory Design approach. They rather have to go hand in hand. So in this regard PD is as much about capacity building as it is about technology development. Another reflection we can take from this project is that a PD process that develops technologies also co-develops

organisation and communication structures. But this insight is also usually vivid in many other reports on PD projects.

The third report is by Ellen Balka on the ACTION for Health project, a four year and $3 million project, funded by the Social Sciences and Humanities Research Council of Canada (Balka 2013). The main aim of the project was to explore end-user consumption of online health information, changes to health sector work practices and ethical & legal issues in context of health sector computerisation. It ran from 2004 to 2007 but drew on "a long-standing commitment by Canadian researchers to undertaking politically engaged research, oriented towards effecting change" (ibid, 259). As the project sought "to influence change in relation to technology work practices", this also involved "engagement with and dissemination to public policy decision-makers." (ibid) The whole work within the project did draw on complex partnerships that enabled access to and navigation/orientation within the research field. But, concluding, Ellen Balka suspects "that over time, such partnerships will require new organisational forms, new policies within universities and among funders, as well as new forms of partnerships." (ibid, 276)

Beside the reflections on these tree projects, two further contributions in the Handbook are especially interesting for our investigation. I will briefly cover their main points, where relevant in context of this resarch.

In their contribution on ethics in/of Participatory Design, Toni Robertson and Ina Wagner reflect on the constitutive role of ethics for PD and how ethical motivation "structures its definition and ongoing development" (Robertson and Wagner 2013, 65). Regarding the principles of PD they write:

> *"One is that the people who do a particular activity (including work) know most about how it gets done. So involving them in the design of the technologies they will use means that the outcomes are more likely to be successful." (ibid)*

Without this principle PD could not be applied. But of course it is only one of the principles thereof. It strongly depends on the ethical considerations following this principle, if and how PD finally plays out. Because with the above principle we could certainly ask what sets apart PD from other approaches of user involvement. Questions of who is involved (and how) are of important matter. In the section called "Ethical issues of working with users", Robertson and Wagner address these questions. They introduce these questions with the classical notion of the "users" who then become "participants" (ibid, 71). In their following elaborations this notion is broadened by extending it to "participant stakeholders" (ibid, 72), reflecting on the complex relationships of the members of diverse communities who are engaged in different ways in the PD project. Because of such diverse involvements a PD project "involves negotiating issues of non-discrimination and equality of access, as well as of responsibility and accountability." (ibid)

Depending on how one follows-up these questions with concrete actions, PD projects sometimes only apply a mode of "user research" or "user-centred design", in which participants "contributed but they were not 'full participants' and theirs was only one and not the most important voice", although they have been the primary users of the system (ibid, 73). But Participatory Design, Robertson & Wagner's reflection, has to encompass more, should not just focus on making better

technologies through user participation “but use participation as a means for resolving conflicts that emerge in technology use.” (ibid, 81)

All these points hint towards a much broader understanding of participants than just “users”. Especially in “resolving conflicts that emerge in technology use” (ibid), PD might has to engage non-users or other critical publics as well. While Robertson & Wagner, like most PD authors, don't speak of *publics*, taking up this notion might be a useful resource to further integrate such issues into the methodologies of PD. This, then, brings me to the another notable contribution in the Handbook.

Carl DiSalvo, Andrew Clement and Volkmar Pipek reflect on the emergence of community-based Participatory Design, which is in their terms “Participatory Design for, with and by communities” (DiSalvo, Clement, and Pipek 2013, 183), as a significantly different setting than the more classical PD contexts of organisationally (more clearly) bounded and locally non-dispersed social structures, which are often work environments. For community-based PD a different set of problems and hindrances to participation arises than in the more classical cases. DiSalvo et al. apply a variety of notions of “communities”, one of them “communities of practice” as proposed by Lave and Wenger (1991) (cf. Cox 2005). As these different communities are not always tied to a common spacio-temporal environment, many participatory tools of engagement used in more bounded contexts might not work. Additionally an “important challenge for Participatory Design researchers and designers is to recognise and negotiate the plurality that exists within communities” (DiSalvo, Clement, and Pipek 2013, 184). With these notions they present and reflect a broad range of PD projects in/with different types of communities.

In their reflection “new forms of politics” (ibid, 199-200) are embraced and they explicitly draw on the notion of *publics* (ibid, 200-201) “as a way of providing an issue-oriented focus of relevance to community-based work” (ibid, 200). Their reflections resonate with what I have assembled in the theory subsection on *“Publics” and “participation”*. In regard to new forms of politics they reflect approaches of agonistic pluralism and they draw on other prominent PD researchers, as Pelle Ehn (2008) who also takes up such an approach. Their contribution is the only one in the Handbook, that uses a concept of *publics*.

With this conceptual background they try to focus not so much on establishing consensus that represents dominant groups' interests. Rather they try to enable conflict and contestation in a constructive way in order for participatory settings to bring forth the diverse needs of a technology's publics. This can also be understood as an attempt to “resolving conflicts that emerge in technology use”, as Robertson & Wagner highlighted above as an important aspect of PD (Robertson and Wagner 2013, 81).

Using the notion of *publics* opens up new questions for PD research. DiSalvo et al. summarize this with reference to Ehn (2008):

> *“Ehn points out that one of the needs of publics is the provision of platforms for coordinating, facilitating the expression of multiple voices, planning and, importantly, for dealing constructively with the disagreements that inevitably occur while in pursuit of issue-oriented action or change.” (DiSalvo, Clement, and Pipek 2013, 201)*

In providing such infrastructures the PD researchers/facilitators are actively (re)constructing publics, or as DiSalvo et al. write:

> *"[I]nfrastructures, particularly information technology infrastructures, may support the emergence and maintenance of publics on the one hand; on the other hand, by their nature (taken-for-grantedness, dependability), they create publics around issues such as access, reliability, ownership and usage." (ibid, 203)*

And to accomplish self-reliant infrastructures in community-based PD, they note an increasing reliance on Free and Open Source Software (FOSS) infrastructures. Here another focus of attention that has to be increasingly addressed in future research arises: despite the increasing use of FOSS and open access infrastructures

> *"there have so far been few Participatory Design initiatives that have taken on FOSS or open access media as a primary focus of attention. This appears to be a gap worth addressing, since open source/access approaches are revolutionising information technology applications and use, but largely without the benefit of a reflective or collaborative practice of taking users' experiences and interests directly into account when developing new systems and services." (ibid, 204)*

While propagating more exchange between FOSS and PD contexts, they also highlight the fruitful interactions with STS research (as in the case of establishing the notion of publics for PD). This, too, resonates with what I established in chapter 3, although it is necessary to also explicitly include feminist technoscience studies research. I will come back to this in the concluding chapter.

Now, having grasped some insights into PD as a research field in general, let us explore particular approaches to it in the field at the Vienna University of Technology.

6.2. Interview results

To gain some insights into how Participatory Design and participatory approaches in computer sciences are practically enacted, I conducted interviews with four people who are, or have been, working at an institute at the Vienna University of Technology, which is positioned in the fields of Human Computer Interaction (HCI) and Computer Supported Cooperative Work (CSCW). Some people there are actively involved in the Participatory Design community. In general one finds different participatory approaches and practices in the work that is done at this institute. The empirical analysis further focuses on one particular project, where PD approaches were centrally applied. It was conducted in part by the above named institute and funded within the Sixth Framework Programme of the European Union. As one of my interview partners was involved centrally in this project, it appears as a central point of reference throughout the interview.

The interviews are anonymised as far as possible. In the chapter 5 there is a detailed explanation about how I found the interview partners. The same applies for the method of interview analysis itself.

Before we dive into the analysis, I want to shortly introduce my interview partners:

Ada: My first interview partner was a professor at the Vienna University of Technology (VUT),

meanwhile retired. She is very engaged in the Participatory Design (PD) community. Her original academic background was in physics, her PhD was in the field of nuclear physics. In her habilitation in the late 1970ies she moved towards social science research in the context of science education. After doing projects in the context of industrial sociology she became a professor for "Informatics & Society"[32] at the VUT. Through this professorship she then connected to two communities. One was around Computer Supported Cooperative Work (CSCW), the other one was around Gender and Science and Technology conferences as well as Women, Work and Computerization conferences. Through both communities she became increasingly involved within PD and the PD community. Since the 1990ies until today she was also part of several EU-wide and Austrian-wide ethics committees, where she had to do with science policy issues. In regard to the interview analysis she is the main protagonist of PD in this assemblage of interviewees.

Neah: My second interview partner was also a professor at the VUT. She works at the same department like Ada, although in "the other" subdivision/group. While Adas group was more focused on CSCW, this group is focused on themes of Human Computer Interaction (HCI)[33]. Intitially Neah started off doing social work and nursing as well as computer science. In her terms *"it was hardcore mainstream computer science, so we didn't even do HCI or anything like that as a coursem or Interface Design. But I just knew that I really cared about the people side. And I just happened to hear this term CSCW."* [IntB, R.1] This was back in her PhD phase, which lead her to reworking her whole PhD and she *"ended up doing a PhD that really was about interpreting Anselm Strauss' theory of action for the purposes of design."* [IntB, R.2] After her PhD she worked in industry as an user experience consultant, before she joined an HCI lab at a British university. In 2009 she then became professor at the VUT. In this assemblage of interviewees she is the critical HCI practitioner who draws on many aspects of PD, but positions herself in a wider context of doing participatory approaches in general. In contrast to the other three interviewees who are Austrian native speakers, she is an English native speaker, so no interview translations were needed for her excerpts.

Ruby: Ruby was my third interview partner. At the time of the interview she was working in her first year as university assistant. She works in the same group as Neah, but her university assistant position is one especially tailored to teaching, which is why she was not involved in other projects at the institute, except one project to develop participatory and interactive courseware for courses in the main computer science curriculum provided by

32 In the german original: "Informatik & Gesellschaft" - in the 1980ies and '90ies it was a common trend in german speaking countries to establish "Informatik & Gesellschaft" chairs at the computer science faculties.

33 HCI and CSCW often are mentioned together in context of computer science as they, like at VUT, are placed in one department which is seen as the people-oriented part of computer science. At german speaking universities this is a common phenomenon. All interview partners refer to this situation in some form as marginalization within the computer science faculty. Ada reflects on that as following: *"I didn't want to be in such an institute with the '& society' label. I rather wanted to move into the computer science, because I thought this is the better strategy […] It was an exclusion. I fought that with tooth and nail. A few years ago there was a restructuring of the computer science faculty again. There I said that I actually want to have a different institute. It was indeed an exclusion."* [IntA, R.2 & R.3]

her institute. She came to this position since she was already involved in teaching projects of the institute as tutor and student assistant before. Part of this early career track in this particular context also involves being engaged in student activism and extracurricular activities around interactive and critically engaged projects bringing computer science students together. Throughout her studies she more and more developed an interest in Interaction Design, which correlates with her general desire for interactivity in learning, teaching and political/student engagement. In context of my assemblage of interviewees she is the aspiring junior scientist who is still searching for her theoretical and inter-disciplinary position within the broader HCI community.

Yann: For my fourth interview I met with Yann, who at that time was a Software Engineering master student who was at the end of his studies and only had to write his master thesis. He was engaged in the same sub-group of the institute as Ruby and Neah and has worked there before as tutor and student assistant. In his computer science studies he started of with Technical Computer Science but then moved towards Software Engineering, as this better suited his skills and interests. Besides his main study programme he engaged in a lot of extracurricular activities, very similar to Ruby. They both know each other from this context and they both shared similar paths into the working context of the institute. But while Ruby did her master in Media Informatics, which was more oriented on the institutes teaching and research, Yann did a *"somehow boring Software Engineering master […] Yes, in this case one really can say that, to be particular, an unbelievably boring study programme."* [IntD, R.1] This playing down of his own main study programme refers to the huge amount of not only extracurricular activities but also a lot of courses he did outside the computer science faculty and his interest in interdisciplinary and critical approaches in science and technology. In context of all the four interviewees he resembles the junior software engineer who does not necessarily follow an academic career. He is fascinated by participatory approaches, but in his own realm more occupied with tinkering on his own (free software) projects.

Now that I have introduced the interviewees, I will focus on the main aspects that came up in the interviews, as they relate to considerations I have brought up in the chapters 2, 3 and 4. Issues of user/public participation in technoscientific projects in this analysis, of course, pertain to the specific context at the VUT and those projects my interviewees have been involved in. Nevertheless, the references and explanations given by Ada and Neah, the two professors, also highlight the broader context of the PD, CSCW and HCI communities, where they are engaged in.

6.2.1. Participation

Probably the most obvious aspect of interest is "participation". But the most important part here is how the interviewees understand participation and how they enact it. As a general term "participation" is rather vague. In our interview context it most often relates to participatory engagements in the development of technologies – that means not only the tools that are developed but also the social contexts in which these tools are developed as well as the surrounding scientific field(s). Arising from my theoretical interest and what the interviewees

told, I want to focus und the following three more specific questions:

- Why do the interviewees want to enact participatory processes, why are they *doing* participation?
- How are they doing it or how would they want to do it? What forms are there to be participatory?
- Who should participate in what? Who are the *publics* of their participatory approaches?

Before we follow these questions I want to make clear that all the interviewees are proponents of participatory approaches in computer science in one or another way. While their individual approaches may differ as well as their reflective critiques of those approaches, they all are marginalized in a broader framework of computer science and have to deal with some amount of ignorance by scientific peers and funding agencies. This is also highlighted in the subsection on resource-related problems (6.2.2.), but to give a broad picture I want to quote what Ada told about participatory approaches and computer science:

> "*So the first thing I always heard was: 'yes, we also once tried to cooperate with users, but that did not work because they don't know what they want'. […] But there are methods and processes to find that out together. And I think they still have not understood this." [IntA, R.4]*

> *"I would say my colleagues, until today, don't know what I am doing. And the user-orientation is applied in a very constrained manner. […] And also user-centered design, I think, is a constrained form of participation. [...] Participatory Design is the tight cooperation with potential users, from the beginning on, from the conceptualisation. And ideally a project should end with real use; where one is able to observe how this thing is now integrated into the work or life context; if people are getting along with it, and what they do. This would be the ideal so to say." [IntA, R.5]*

Here we already see that there are a lot of (inter)disciplinary distinctions and perspectives on participation. For Ada it is important to distinguish her *participatory design* (PD) approach from *user-centered design* (UCD). While here it seems UCD an PD are different approaches, others would contest this notion. Neah, as we will see below, places both approaches rather on a spectrum of participatory approaches with varying degrees of user or public involvement. Regarding a bigger community, there even is an ISO standard (ISO 9241-210:2010) on "Human-centred design for interactive systems" which summarizes principles used both in UCD and PD. In the standard it is also noted that, although these terms are often used synonymously, it rather uses "*human-centred design*" than "*user-centred design*" to make clear "*that this part of ISO 9241 also addresses impacts on a number of stakeholders, not just those typically considered as users.*" (ISO 9241-210:2010 2014) So it seems there is a broader picture of *publics* than just *users*. Nevertheless the form of integration of those publics varies strongly depending on context and approach, as we will see in the further analysis.

6.2.1.1 Why participation?

To understand how participation works and which problems arise, as well as to gain some insights into the (un)imagined publics of those computer scientists who use such approaches, it is a good starting point to ask why they want to include participatory practices, when they develop

technologies. Nevertheless we should not overrate this question – at least it does not yield more insights then asking it just the other way around, namely, why do so many other computer scientists not engage in participatory practices? In light of the disciplinary hegemonies within computer science and technology development in general we might miss that point, as it seems outstanding, when people use participatory approaches. In most cases the motivation is yet the same – only the conclusions on how to go there are different. This is exemplified by an answer Ada gave when I asked what the core motivation is to do participatory design:

> *"Better systems. I think it is a simple answer. Simply to make systems, that really support users and that enable them in doing things better, do different things, new things. Simply better systems. And I think this is a very strong motivation. And a sufficient motivation." [IntA, R.14]*

This is, according to Ada, a common denominator among members of those different approaches of participatory technology development. I would argue that it is even a common denominator among most computer scientists. The important difference is, as Ada also points out, who then is defining those better systems and how strong political questions are reflected by the facilitators of participatory approaches. This is also very much depending on the use situation, which is evolving throughout a participatory project. Therefore we have to assume that the goals of a project or even the general framework might change in ways the initiators favour. How the facilitating scientists react to such a situation is a question of political and ethical commitment. This could be an important criterion to differentiate between diverse approaches on the continuum of participatory practices in computer science. A similar view is provided by Neah, when she says:

> *"I would see myself as somewhat deeply committed to privileging peoples perspectives in design processes [...]. But how that practically plays out is very depending upon everything." [IntB, R.3]*

So participation is not just some method one can apply by book in order to gain better technologies. It is rather a collection of principles that may lead to technologies and sociotechnical processes which better fit the needs of those who want or have to apply or use them. And therefore it might also lead to more efficient use of technologies. But how it plays out, depends on the political and ethical imperatives of the facilitators of these processes. We could also say, it depends on their standpoint. *"Privileging peoples perspectives"* in Neahs definition means privileging the perspective of those who are usually not heard or seen. And who this is, is of course depending on the context, although common patterns of societal marginalization give some hints on whose perspectives are not heard or seen. So there is a clear political stance at the core of motivation to do participatory technoscience. It is just not always made that explicit. Sometimes it is also framed as a logical conclusion, like in Rubys answer to why one would include users perspectives in design and development of ICTs:

> *"Well, one develops for people, usually. And those should be integrated as far as possible, in my opinion. [...] Because as far as I can see it does not make sense to develop things which are used by any persons about whom I don't know anything." [IntC, R.26 – R.27]*

As an example, Ruby tells a story about her families computer usage and her status as "the

expert" in this context. Reflecting on that story she tells how so many standard use cases in daily computer use are tailored to an experts need insteed of the vast majority of computer users:

> *"Because 90% of the people using computers are not experts in this context. This does not even have to do with a generation gap, but people who are not dealing with this day after day need something different than myself. And this I cannot even see, because for me things are logical, which are incredibly complex for others. So, yes, that is why you preferably have many people who contribute as much as possible. That has to be within measures because otherwise you would never finish the project […] but it is in any case inevitable to include those people who in the end should use it." [IntC, R.27]*

Here I wondered if this is some sort of implicit standpoint theory approach. But just as in the general sense of political impetus, I did not get a clear answer here. The whole application of participatory processes in development, in Rubys case, is framed as the logical thing to do, maybe just as logical as it seems to most computer scientists not to do, or actually not to think about participatory approaches to their work. According to my assembled data I cannot provide more insights on that, but I would suggest that there is also a crucial component of political-scientific socialization involved here, which could be further investigated.

6.2.1.2 How to be participatory?

What does it mean to be participatory in research and development? How does participation play out in practice? My interview partners have different answers here as they draw on different experiences and fields of engagement. As we already have seen there are some distinctions according to what is really understood as participatory. This is also tied to the definition of *participatory design* as a framework and community. Neah gives us some contextual insights on that:

> *"There is a strong Scandinavian version that still strongly positions itself in the whole theme of democratization and workplace and workers designing their own work processes and technology being part of that. […] Another tradition of PD that is almost synonymous with User-centered Design. […] I started to realize that people coming more from the American tradition would often use user-centered design and participatory design interchangeably. […] So, actually PD is this whole continuum of ways of engaging with people in different settings." [IntB, R.3]*

This is a more open definition – or rather contextualization – than Ada gives us, as she is much more a strong opponent of the Scandinavian version of PD with its strong and explicit ethical stance. This has to do with Neahs positioning in an HCI context that uses participatory approaches rather than PD itself. It also points towards different frameworks and different (implicit) publics in their work. Ada put the following question as a crucial one for participatory approaches:

> *"Yes, there is the question, for whom does one develop? This is a question of loyalty." [IntA, R.15]*

This is a question which also seems to be at the heart of Neah's approach, as she told us before that she is "deeply committed to privileging peoples perspectives in design processes" [IntB, R.3]. But not being involved in the PD framework itself, it seems different interventions become possible. In the following, Neah describes a project she did in industry which was in her words rather "in the user-centered design mode":

> *"So [the users] were informants rather than participants in the design process. But the work that we did in industry was hugely influential for the company. […] When I started bringing in this sort of expertise it was quite new and we had to fight for credibility and we also had to really work hard to know how to work in these multidisciplinary teams, so that we could influence what was built in this labs […]. At the time I left, people where now asking for us to be involved in projects or coming to us with stuff and asking for input and using us almost as surrogate users […]. Mainstream software developers, design architects, business analyst people, who came to value the importance of taking a user perspective in the design. What we actually did was not that radical, but the impact was radical." [IntB, R.4]*

While in a PD framework the publics are explicitly sketched out, usually as users or stakeholders, here Neahs work was addressed towards colleagues and project partners, in turn also towards the management. So we could frame this as a sort of policy intervention which shifts project funding and allocation of resources towards approaches where the position of the user is more valued and at least input by users is integrated conceptually into research and development. This is a form of exchange where developers try to get some information from the users about their needs and potential use patterns of whatever is developed. Developers learn something from interaction with users. But neither this learning process necessarily is a mutual one, nor does it seem to be able to step outside a pre-conceptualised framework of what the users need in the overall sense. According to Ada then, this would not suffice for a participatory process:

> *"Participation has something to do with learning, with creativity. This is very important. To learn cooperatively and with creativity; and there are incredibly many methods; and what is missing in these participative processes, that they basically stay on a level where opinions are queried, or that some topic is discussed." [IntA, R.53]*

This was her view on public engagement in technosciences, which seem to also fit the "public engagement" in user-centered design.

So, when we talk about participation computer science, or rather the even smaller contexts of HCI and PD, we find a spectrum of public engagement processes that are sometimes clearly labelled as participation, although the validity of this labelling is contested within these contexts.

Now, to get a more concrete view how the interviewees enact participation, we have to take a closer look at what they say about their projects. When asked for one of her bigger projects, where participation was encated on a bigger scale, Ada mentioned an EU-funded project in which participatory tools for urban planning have been developed with participatory methods:

> *"And this was fascinating, because participatory urban planning in this form does not even exist. So there was the intention to show that this is possible and that citizens are able to contribute to urban planning, if they are well prepared and the process is well prepared." [IntA, R.6]*

What they have realized very vividly in this project is that participation has to be applied both to the "outside" and the "inside" of the project context. There where a lot of different actors involved, some marked as scientists, others marked as political and public experts and then those who are seen plainly as citizens. All those actors had to participate on different stages and in different phases of the project in order for the whole project to be successful. So on the one side there are different sorts of expert publics – like in the urban planning process architects, urban planners, city council members, in general all those people who are usually involved in classic

urban planning processes. Then there are also those general publics, constituted of citizens (without further demarcation) and members of specific advocacy groups. With this composition of participants the crucial part for the project to work was negotiation work, as Ada tells:

> *"Well, participatory processes have incredibly much to do with negotiation. All those different perspectives of those different participants have to be negotiated. Because they are not compatible from the start on. […] I think in most cases this is a balancing act. Except one cuts it short.[34]" [IntA, R.10]*

In context of this particular context this meant:

> *"There definitely have been a lot of questions, where we had a lot of fierce discussions with our project partners, the participants and the architects and urban planners. It took us rather long to convince them and to assert certain forms of approaching the thing. Because they did not want that, they didn't accept it. Then he says: that does not work. Yes, so participation always means conflict and negotiation." [IntA, R.39]*

These remarks point to the power aspect between the facilitating researchers and other project members. Ada specifically reflects on this fundamental aspect of participatory design as following:

> *"And in a participatory project […] not everything is negotiable, for example. I definitely had great influence on the project and there where things I just expected. These were, so to say, my initial political premises. Hadn't these been fulfilled, I would not have done the project. Yes, this is also rather interesting to look at. That there are some basic issues which are not negotiable. How it is then enacted, well yes. But that one basically develops a participatory tool and that one basically does it that way and not another; yes, and who is not tagging along has to stay out. Yes, yes. Again a question of power." [IntA, R.37]*

So here we have a good reflection on all those power issues prevailing in participatory projects, including ones own power through facilitation of the project processes. It seems, that here something happens on a micro-level, what in other cases has already been described for macro-level public engagement exercises in the sciences: that there are forms of uninvited publics which tend to be excluded for the sake of the project to work (as seen from the project facilitators perspective) (cf. Wynne 2007). Yet, the uninvited publics are not necessarily the ones with less power. So this too, makes it necessary to permanently reflect ones own position, if participatory approaches should lead towards knowledges and products which empower the powerless (in context of technological options). There does not seem to be a clear methodical safeguard against the reverse effect.

A similar problem in regard to technological options and participatory development was reported by Neah in context of several of her projects:

> *"Here is a whole world of industry and new technologies maturing, but no one really knows what to do with them. So we're really exploring what might be possible ways these could impact; so one other project that was really challenging […] because [the participants] don't have a need. […] So we were trying to tell them what the technology could possibly do, but really trying to be really careful about not, through telling what it could do, then telling what*

34 Here the translation of "Except one cuts it short" seems rather weak. In the original Ada said "Außer man fährt mit der Eisenbahn drüber". This would be literally translated to "Except one drives with the train over it" and is a saying which in this case signifies a disinterest in others perspectives and the own position of power to assert one owns interest.

was possible" [IntB, R.4]

This again is a problem of basic issues and the framework of ones approach. And it is an issue of loyalty, as Ada told us before. In Neahs words this reads:

> *"So that was really challenging, 'cause again we're not going to say, you know, we are here to help you, to solve problems. And we didn't want to take a functional, a system technology approach at all, dealing with the functional disabilities. But rather we wanted to deal with the person." [IntB, R.4]*

It is the question of commitment rather than a methodological one. Participatory approaches, not only PD as a discipline, are inherently political and have to constantly reflect about their political imperatives. So the question about how to do "good" participation is also not one that can be answered on a solely methodological basis. These commitments and political imperatives seem to be a core factor for how concrete participatory practices may then play out. In terms of scientific replicability this is a viable information that is missing from much too many papers, as far as I could see.

Another example of how participatory approaches in computer science are enacted and reproduced is the area of teaching and scientific education within the computer sciences itself. This is often neglected but rather important when it comes to sensitizing a field and its students (or in other words: soon-to-be-scientists) towards participatory approaches in their later work. An example of such a project is the development of an interactive courseware, which is used at Neah and Ruby's institute for ground courses in computer science. Although this, too, pertains the question of "how to be participatory?" I will present insights on this project in chapter 4.3.4 on scientific offspring and (inter)disciplinary reproduction.

6.2.1.3 Who (should) participate(s)?

In the previous section we have already seen that the question of how to be participatory is strongly dependent on who is addressed in the participatory process. Depending on who the publics are and who of them are invited, the participatory process may play in often unforeseen ways and the choice of methods might have to be revised. In this section I want to further highlight issues and problems that specifically arise due to the addressing of publics and the final composition of participants in my interviewees experiences.

Here both professors have the feeling that there is a lot of change, innovation and shifting of methods and methodological commitments in the last two decades due to a substantially increased amount of technological options. Also PD projects today are so strongly connected to classical working contexts anymore, as Ada tells us:

> *"It is about community building. And there is not such a well defined group of users. […] In order to reach people at all, to build participatory structures at all, this is rather complex. Because through the internet alone participation does not work. And here questions arise. Who involves themselves? And also, are there people we are excluding through defining the site of participation in this way? Well, I would say, to find the right persons depends rather strongly on the context. And this is also simply a question of power." [IntA, R.9]*

In her big urban planning project she then made out two groups of participants:

> *"We had project partners who participated because the have been, so to say, the affected architects, who should advance the participatory urban planning. And then we had the participants in our workshops. And they course had of a limited role, yes. Because they changed. […] They have not been involved in the project from the start on. Rather they had more a sort of classical user role. A little bit a consumer role too. […] And well, this is a completely different form of participation. They have been challenged as contributors. That they cooperatively develop something and be part of a process, which, I think, all of them found interesting. And they also gave direct feedback. But the most we actually got out of the video observation, with which we then tried to understand everything that happened there." [IntA, R.37]*

The interesting part in this project is that there was not this rather linear distribution of facilitators of participation and participants. Rather they had different groups of actors who were supposed to participate in different ways, as well as to learn different things and enact participation itself differently. Concerning the architects, the project team tried to push them towards using participatory approaches themselves. They had to convince them that participation means certain gains of knowledges and qualities in the final product. For the workshop participants, who were recruited out of a more general public, the gains of participation seemed self-evident. Although everyone in the process not only had to participate but also learn how to participate, especially the architects had to learn how to facilitate participation (or were supposed to do so). And while there was a lot of negotiation work to be done with all participants, the architects certainly had a better standing, because they had been involved in the process over an extended period of time. Negotiations with and between workshop participants could be confined to a single workshop, as in the following example:

> *"For example in this workshop there were two people who had been mainly concerned about accessibility and how it is with parents, with prams and with wheel chairs or with elderly people who have to use a walking stick. That is why I said, to just only make one participatory workshop in such a project; well, we did not have an alternative, it was a research project and it was fascinating and a lot came forth of it; but, so to say, as a participatory procedure in a urban planning project this has to be arranged differently." [IntA, R.41]*

So this also already points towards a resource related problem. But what it shows in regard to public involvement is that the more multifaceted a participatory approach is the more robust knowledges will be produced. There has to be a multi-staged and -phased combination of participatory processes within one project. Ideally participants would be able to take part in more than one workshop. But all these factors are usually limited due to resources. Another interesting question, which did not come up through the interviews (due to the focus on the resource limitation) is, which criteria there are to decide when there was "enough" participation. Given a hypothetical situation where resources would not be an issue, when would participation stop, or would it ever stop? This is an open question that would be valuable to follow in further investigations into this topic.

But let us also take a look at Neah's projects and the difficulties she encountered. As far as she talked about it in the interview, her projects are not as grand-scale like Ada's reference project, concerning resources and composition of diverse publics that are being engaged. The projects Neah talked about are dealing with specific publics, all of them with special needs or, let us say, a non-normative social position: health patients, disabled persons, kids, old people. All of them do

not fit into the normative picture of white, male, educated citizens towards our whole technosocial environments are tailored. So one of the most crucial aspects for Neah is how to establish the grounds for participation, some sort of equal footing or a communication basis, where participation is not just a paternalistic approach of helping the helpless, but rather an emancipatory process:

> *"And working with [a patient who has difficulties with articulation] there is the thing of how to communicate with him and how to do things that tapped into things that mattered for him as a person in his everyday life. […] And so things like that, where participation again plays out differently, because he can't actively participate, but you are trying to respect the principles of a participatory approach." [IntB, R.4]*

And reflecting on methodological and framework implications she further tells:

> *"So, because they are institutionalized we don't have a shared experience. And so much of what we do in PD in some way sort of almost presumes some common ground in terms of shared life experience, shared language, shared concepts; […] what that showed to us was, how much we did take for granted or presumed as basic prerequisites or requirements for participation, that many marginalized groups don't have in the same way." [IntB, R.4]*

This shows us that there are different publics and different individual participants who depend on different forms of participation, at least if their participation should also enable them to voice their own interests. This is not only due to communication issues. Also institutional framings impinge on who gets a say and who doesn't or who is actively participating in the design processes itself and who is only participating in an user- or consumer-role, as Ada has put out above.

Neah mentioned one project where they explored new sensor-based technologies for school-museum cooperations. And although the kids had played a vital part in the whole exploration process, they weren't "actively involve[d] as participants in the design" [IntB, R.5]. Because of pragmatic decisions in the project layout and the institutional arrangements only the teachers were involved in the design of the following exploration process. Here the hierarchical role of the teachers and their privileged position in terms of voicing their interests and communicating with actors within and outside the school, made them seem to be the primary partners in the participatory cooperation within the project. Only afterwards it became clear that certain voices where missing – because they were missing only in certain stages and phases of the participation process – in this case the voices of the kids.

Or yet in another project with health patients it became clear during the process that the initial primary participants were only part of the actually engaged participating actors – and that these have to be conceptually included in the projects framework:

> *"I come from a nursing background, so I sort of know the importance, the role of informal care networks and family; but we thought that, I think, without thinking about it, we were implicitly with the notion that we are working with the stroke patients, that they are our primary participants. And it very quickly became clear that we weren't working with the individual; you know, the unit of an answer, so the unit of participation was the network. […] We had to really think who we involve there, we really worked at ways of engaging with the partners or the extended care network, and then tried to work out how we listened at all levels to understand, do the stroke persons interest coincide with what the partners are*

telling us. […] We would have liked ideally to have had the resources to include the professional care network of each of that participants. But we couldn't." [IntB, R.5]

So even if you are sensitized to specific problems and demands for participatory settings, institutional factors are shaping your participatory framework. Whereas in the case of the school-museum cooperation the social organisation of the participating contexts was a major factor, here the resources seem to have been a major limiting factor, as the researchers rather quickly realized the conceptual problem but could not rearrange due to limited resources.

With this let us move to the chapter on resource related problems in participatory design and development processes.

6.2.2. Resource related problems

As we have already seen in the recent sections, a major problem regarding resources pertains the time and finances to conduct single participatory events within a project and to invite more diverse participants over longer period of times. Like when Ada told us about the workshop in context of the participatory urban planning project, that what is missing is some flexibility to change and extend participation patterns in the course of the project:

"And then one of course has more possibilities, to reshuffle the participants, and then one recognizes that probably some perspectives have slipped your mind, which you then could bring in." [IntA, R.11]

But of course one cannot go on forever and bring in all potential individual users or stakeholders, not only due to limited resources, but due to reaching certain goals in a project, and to finally develop artefacts which will be used. It is more a question of participation in an iterative manner, and how far it reaches. In Ada's perspective it usually does not reach far enough, and this is mainly related to missing project funds:

"And often it ends, so to say, when you release the product into reality. And then the project too ends. With that also the project funds end. But one needs project funds to do further research on this." [IntA, R.12]

In Ada's understanding of participatory design, a product or technoscientific artefact still changes after its initial development and release. Therefore the process of participation should not only apply to the primary design and development phases but also to the later use- and redevelopment-phases. While in the former phases certain publics are participating in the project teams research and development, we could argue that later on the researchers would participate in the publics' use of the developed technoscientific artefacts in order to support redesign processes. This is happening in part anyway, with or without researcher involvment. But this understanding of scientific work seems to not be compatible with classical funding schemes in the technosciences. Another pitfall is the allocation of resources within funded projects in general:

"In this area one basically gets the research grants for the development of technologies. And the projects would never have played out this way, if I wouldn't have worked so incredibly much myself in the project, well with the ethnography and the analytic work. No EU project would fund that. Not in the area of development of technologies." [IntA, R.32]

As an explanation, why such projects cannot be sustained over longer periods of time, Ada tells us the following (again specifically pertaining her participatory urban planning project):

> *"That, of course, the area of academic research is a limited one. […] Some academic researchers venture out and create a spin-off, but this already is a different type of activity. And if you don't find a partner in the economy or the city administration, who is willing to integrate that, the project is over. Also my co-workers are always awfully sad and say: now we have developed such a beautiful thing and now it gets dusty." [IntA, R.42]*

But it is not only a pity for them, also the project partners would want to continue on this project and don't have the necessary means to:

> *"So, in France, in this centre for architecture, they immediately said: let everything here. But then I would have had to leave my people there too. Because, of course, the prototype has not been developed so far; and the problem is, one does not just leave a technical tool there, but actually a procedure. And when they heard that actually the whole preparation of such a workshop takes 3 months; well, then everybody says: no, thanks, for that we don't have the resources." [IntA, R.43]*

As these comments show, there certainly are crucial limitations to participation through scarce funding. And this also points towards the policy area as a potential field of engagement, and as one *public* of participatory design projects which is maybe addressed too little so far. But this will be an argument in the later subsection on policy issues. Still, not all limitations are due to scarce funding and limited resources in general. Let us now take a look towards conceptual limitations and how the field around participatory design is reproducing itself.

6.2.3. Conceptual problems and (inter)disciplinary reproduction

Beside all resource related problems there are some other crucial difficulties in applying participatory approaches in computer science. They involve conceptual and methodical limitations as well as the reproduction as a scientific field of engagement – the recruitment of young researchers into a sphere of scientific engagement where participation becomes an integral part of the applied methodologies.

In this chapter I will highlight some of the cornerstones my interviewees presented in the context of this problem domain. As we have seen above, the problem of who gets to participate is in part shaped by the resources at hand, but still there are some conceptual problems here too, because, as Neah told, even with your best intentions and even if you are already strongly sensitized to this problem, you often only realize within or after a project, that you should (or could) have involved other people, *"or you realized you've privileged some peoples voices over others inadvertently, but it has implications" [IntB, R.6]*. And of course this is not something one could wish for to just disappear, but something that has to be addressed theoretically and methodologically. It just seems these concerns are yet not researched extensively enough:

> *"I don't know what the solutions are. […] if this is your, what you think is your immediate area of concern, just try to map out, whether the other layers sort of influences, direct or otherwise, or another map of social worlds or whatever; somehow maybe trying to do this more systematically. We have done that on the fly, but you know, we never have done that before really, thought like that systematically, cause in all the User Centered Design textbooks it is just you know, who is the user, and pick that individual." [IntB, R.6]*

In order to find solutions to this through doing research, it certainly is helpful to have scientific communities like the participatory design community. In the specific context of german speaking countries the PD community is rather small and there are other (inter)disciplinary developments that gave rise to social issues in computer science – and in another sense also channel these issues into a framework of what is important to research and what not. While the establishment of separate "computer science & society" institutes[35] opens research spaces for just these crucial questions, Ada sees also some conceptual problems here:

> *"For me the discourse is conceptually not sophisticated enough.Well, and this is also a problem, that I and colleagues have, with whom I cooperate, for example in the CSCW area, that we lose conceptual sharpness, and that concepts are created which are, at best, metaphors, but that would not withstand any scrutiny." [IntA, R.24]*

These problems, in Ada's view, seem to be coproduced with disciplinary demarcations around this trend to establish "computer science & society" departments:

> *"And the computer science & society, well this always was a somehow scientifically not very sophisticated thing. I think one has to move into the disciplines and one has to deal with the concepts there in order to achieve something." [IntA, R.25]*

An open question to Ada, and to her community, as she tells, is why they so far have not been able to get into mainstream systems development - or rather why none of their approaches are used there and a lot of software is developed in a way that not the software is developed in accordance with the users' needs but the users have to adapt to the software systems' demands. As a prominent example of such a case she mentions a widely used proprietary enterprise resource planning software. But in general there is a shift away from business and work contexts, which also might account for some vagueness in concepts and methodologies:

> *"The participatory projects emerged in the Scandinavian countries, and back then with a very strong and explicit political commitment. They worked together with labour unions. And these projects then have been such, where software was developed bottom-up. Specifically for a certain area of application. Alone this of course has changed a lot since back then. Also because the technologies have changed. And the focus increasingly lies on the development of generic products. And it is probably not by chance that now we have recruitment problems. When I look at the younger generation that does participatory design – also overwhelmingly from the Scandinavian countries, I am usually the only Austrian at the conferences – then they usually have community development projects or development aid projects, where the coordinates are of course rather different ones. But to really do participatory projects in enterprises, I actually don't know of many." [IntA, R.12]*

In general, Ada tells us, the focus increasingly shifts towards *"areas which are more easily researched, and which are not so conflict-prone."* [IntA, R.13]

But then, what does the young generation think? Why would they actually want to do participatory design and development and how are they socialized into fields like participatory design in particular or HCI and CSCW in general and the participatory approaches prevalent in these fields?

35 As I have already written about in the introduction of Ada's character and position, a lot of "Informatik & Gesellschaft" departments are set up to do all the "social" and "people" related work in computer science. At the Vienna University of Technology there is a similar institute, which is the working place and/or central scientific focal point of all my interviewees. Participatory approaches in the computer sciences at the VUT are applied and researched primarily, if not exclusively, in this institute.

6.2.3.1 Growing into fields of participation and user-orientation

To adapt to participatory approaches in computer science certainly doesn't seem to be the logical thing to do throughout your studies and further scientific socialization. And those who do nevertheless need a strong personal motivation to do so. Here several political and social factors surrounding their main studies have been key for Ruby and Yann. For both it did play an important role that they had the opportunity to become socially involved with and even work at an institute, where participatory approaches to teaching and learning as well as to research and development are actively employed or at least have some visibility through the people working in such projects. For Ruby, in her 4 years already working at the institute in different positions, it was *"the feeling, that also the whole design process is being done together"* which sharpened her interest for those type methods where a lot of different people are integrated into the core processes [IntC, R.4]. For Yann too, an interest in participatory methods arose through his work at the institute. This becomes rather vivid when he talks about his interactions with Neah and what she told about her projects. But in Yann's narration his political engagements are more foregrounded. In general Yann talked a lot about his political and activist socialisation and engagement in emancipatory student politics. For him this also meant opening up to different fields and perspectives. It also meant that he spent a lot of time on extracurricular activities – things and knowledges that are not counted when it comes to computer science education but which nevertheless frame his approach to computer science. But actually both, Ruby and Yann, have been engaged in similar political contexts and for both a lot of extracurricular activities have been a key to forming their approach to science, work and cooperation. For both also their interdisciplinary interests are formed in part through their extracurricular activities. But they put their scientific home in computer science. Ruby for example took an excursion to communication science and media studies but found out that although there are interesting inputs and other skills she could use, computer science methods fit herself better:

> *"But I didn't bear at all this writing of texts by the kilo. In that case computer science did appeal rather better to me. I don't know, I think the approach is great, because one grows into writing texts, but I also need my logic somewhere. And this, to me, was missing in media studies. It was rather nice, but it also was just as overladen as a curriculum as here [in computer science]." [IntC, R.7]*

This is just an example of how disciplinary navigation throughout ones scientific education works out often rather boldly. The important aspect seems to be the notion of the curriculum as "overladen". This signifies that there are skills which are deemed as important for ones own work as a computer scientist, but which are not an official part of the education. Especially in the context of participatory design and development approaches, where interdisciplinarity and a broad mix of methodologies is applied, it is hard for young researchers to evaluate such approaches and methods, as they are neither part of their own curricula nor of other curricula outside computer science. So there is a lot of additional work for a young researcher who wants to go into this direction. Or as Ruby tells regarding her situation of having to adapt to a whole new research field after finishing her bachelor & master degrees:

> *"I definitely have the feeling, that I have to read a huge amount of things, which are standard for HCI. […] In any case, I have the feeling that only now the time is coming where I am able*

to deal with the theoretical backgrounds." [IntC, R.21] And further: "Well, I suppose that in the Austrian system, or in computer science it is obviously the case, that this gets relevant only after your studies – if you are interested to really go further and work into this direction." [IntC, R.22]

Here again there is one crucial condition: only if you are interested to further go into this direction, you can then deal with issues of HCI or participatory approaches and their theoretical groundings. What certainly helps to establish this interest is the social proximity to researchers at an institute. For both, Ruby and Yann, this seemed to be a cornerstone in their scientific development. But of course there also has to me some formation of interest beforehand. For Ruby this was given in her studies not only through content but rather through teaching approaches and teaching styles:

"Well, there were just different approaches, which have been more practical, but also supported the teaching in great ways. […] So this have been approaches which better suited me than going to technical informatics courses to hear long lectures that might have been nice but where I didn't really see myself fit in […] I rather needed this practical approach with its 'this way it is in real life'." [IntC, R.8]

As we will see later, this also has to do with the application of participatory approaches in teaching itself. But also regarding the content, there is little available to guide young researchers into finding suitable approaches and methods for participatory design and development. Especially without institutional backing, or the perspective towards a career in the field it seems hard to stay in computer science and yet approach it differently than it is suggested by the mainstream education. For Yann there was a key moment after he finished his bachelor studies and had to decide what to do next:

"And then, well, I thought, actually I have done so much, also at the [InstituteX], and actually it would be somehow obvious to; well, I mean, STS was not around as a programme back then, but today, I probably would just have started with STS. And I tought, actually this would be much more interesting, and there'd be much more personal gain for me. Financially probably not. […] So it definitely was a combination of different factors. […] That I witnessed how onesided some people looked onto that. And also that, at the [InstituteX], I could experience first-hand how completely different their perspective has been." [IntD, R.9]

So again we have this institutional and social proximity which is important to motivate young researchers to actually try out different approaches. (And without wanting to over-interpret through my own particular history and position,) I would also say that here an unmet demand is implicitly spelled out. It is a demand towards ones own discipline for better contextualization of methods and openness towards interdisciplinary approaches. While I chose to commit myself to the new STS master programme in 2009 because of my aspiration to actually do science and technology, in particular computer science, differently, Yann decided to not leave computer science. He might have done so, as he told, if the STS programme would have been around when he started his master programme. But it wasn't. So his solution was to start a software engineering master and do a lot of additional courses from other areas such as sociology and science studies introductions, psychology and philosophy:

"30 ECTS of stuff from the University of Vienna, which I now can't use for my programme. And yes, I wouldn't want to do without it again. So I still count it as my academic training." [IntD,

R.9]

While there is a interest of young computer scientists to do computer science in a more interdisciplinary and maybe also participatory way, they don't find the necessary means for it within their own discipline – except when they get the chance to work and socialize at the one institute where these approaches are valued highly. For example, Ruby tells us that participatory design as an approach is rarely mentioned even in the media informatics program, which is mainly driven by the HCI and CSCW groups of the computer science faculty: *"Well it definitely didn't become clear that this is something important. It was rather just mentioned in a side note maybe."* [IntC, R.18].

All in all it seems participatory approaches in computer science are not visible inside the computer science education at the Vienna University of Technology. Maybe this is also a field where the main protagonists of such approaches could re-evaluate their set of (implicit) publics they address. Until further changes, students and young researchers have to invest a lot of time and energy to grow into the field and adapt to its approaches. Certainly not the best situation to propagate such approaches. Nevertheless, for students and young researchers this is an ambiguous position, as it is also fascinating to find ones own ways. Regarding all his extracurricular activities Yann tells that, *"without this I would have finished long ago. But I would certainly have studied significantly more boring."* [IntD, R.6]

6.2.3.2 Interactivity, Cooperation and Participation in scientific education

While participatory approaches to computer science are not very visible to students of computer science at the Vienna University of Technology, there are some participatory approaches to teaching, which might open up the possibilities of students envisioning participatory work in computer science at all. Ruby is part of a teaching project that uses an ICT-system to facilitate interaction and cooperation among the students throughout the lecture. The system is developed by the lecturer and his co-workers at the institute, one of them is Ruby. With this project an alternative teaching style is enacted – at least regarding the initial lectures in the computer science programme with large numbers of listeners:

> *"Because when 600 to 800 people are sitting in a lecture hall, it's understandable that as a lecturer it is hard to build up any relationship with the people."* Therefore this lecture uses ICT to enable such processes: *"I have the feeling, that it builds up relationships. Not only to the lecturer but also between [the students]." [IntC, R.9]*

The system is a sort of discussion platform, not unfamiliar to classical web forums, but with a different approach of visualizing and enabling discussions. It also uses other elements accompanying the lecture itself, like the possibility for students to annotate and comment the slides while the lecturer is talking. They can ask questions and work them out cooperatively – through the lecture itself as well as between lectures. One of the main ideas, according to Ruby, is that people can use their tools and gagdets like notebooks and phones to actively engage in the lecture instead of only passive listening – or instead of using the tools and gadgets to do different things, completely unrelated to the lecture. What this system then does is, in Rubys view, to establish a situation in which

> *"not only the lecturer is an expert, but where people, who already bring with them some knowledges, are able to drop that. And the feeling of not being a blank slate but also bringing in something of ones own past; this I can do rather easily within this system. Well, I don't know, the participation is significantly increased through their ability to bring in their own knowledges [...]". [IntC, R.11]*

But of course not everyone is able to participate in the same way or at all, only because there is a system to exchange notes, comments, questions and answers:

> *"Well, when you look at it, there's something that happens in all online platforms: that there are many people which are writing really much, and than there is a big mass that is writing little to nothing. This is not really counterbalanced by the system either. That is of course always a problem. But it at least provides a platform of participation to those who actively use it." [IntC, R.11]*

Additionally to this discursive platform they also facilitate a blog and meetings at the end of the term, where students are invited *"to tell how they experienced the system, what didn't work at all, what worked well."* [IntC, R.15]. To these meetings there are usually around 6 or 7 students out of around 600, who actively come forward and participate in these processes. About the role of the students in this participatory process, Ruby tells, that *"they actively contributed with ideas"* rather then being *"beta-testers"*, as several suggestions and ideas of the students are adapted for the permanent re-development processes of the system. Nevertheless the role of the students as participants also was a limited one:

> *"In principle there are ample design processes where one can involve people. It starts with the generation of ideas, to the making of prototypes, testing of prototype, and simply doing iterative design with the people; well, depending on who the users are. In our case it was more like that we have included people and heard what they said, but in the end of course we ourselves decided, ok, we are going this way and not the other one. […] So the decisions were more our part then, what we think is making sense in the first place, or so. But even that can be done together with the users in a participatory design approach." [IntC, R.26]*

So there is one clear demarcation in this project, which is the one between students on the one side as users of the system and on the other side the lecturer and developers of the system on the other side. From Ruby's comments we cannot infer differences beyond the student groups, which seem to form a general public in this project, except that there are some who are engaging themselves more and others who are engaging very little to not at all in the participatory events and places of the project. But when we look closer, the demarcations become more blurry, as students themselves are (re)developing the system. And although it is also a kind of research project, it is not a classical one with rather stringent project structures but much more an ongoing research and development endeavour placed in the messiness of daily life routines and the researchers own demands for a tool to support their academic teaching. Asking for the character of this project Ruby tells the following:

> *"Well yes, it is definitely research. This project is also continuously refined. The version we are currently running is just a new one again, which has been developed by students throughout the last half year, where a lot of changes are integrated, which we have seen in the last version, things that didn't work well. […] So it is definitely more or less a research work of [the professor who is giving the lecture], which is somehow running along, where again and again new people take part and bring in their ideas. […] This is of course a problem for the students. Because they of course are working with a beta platform, more or less." [IntC, R.14]*

According to Ruby such a system – despite of having bugs all the time and all the problems that the permanent (re)development brings with it – does *"promote a lot of things, which I personally like in everyday university life"* [IntC, R.15]. She refers to the increased interactivity and cooperation, compared to other courses. Also that there is the possibility to open rooms for interaction and engagement.

While this project is not framed explicitly as a participatory research and development project, it certainly has some of its characteristics. Some premises for such a project are even fulfilled much better than in more explicit projects that have to rely on funding and a common project plan which is mostly limited in time. As Ada told us before regarding her big EU funded participatory design project, one of the major limitations there was that the project was finished after a defined point in time and that they did not have the possibilities to do many iterations of workshops and redevelopment phases with different sets of participants. Also they could only develop a prototype and not observe and accompany its actual use.

So there seems to be a good basis for an ongoing participatory ICT project. And although it is not framed as such in a specific sense, it might gain some additional strengths through thinking about it in these terms. Then questions of power and a differentiation of the participants and publics can be asked and this might yield some new insights for further innovative redevelopments of the system.

In an overall context of computer science education at the VUT this lecture with its accompanying ICT system is an exception. And the system of course is tailored specifically to one or two lectures in the computer science & society context, where interaction is much easier to accomplish, as Yann tells us, who experienced this system as a student as well as part of the institute in his function as tutor and student assistant. He also tells us that this system, although it is a *"laudable exception"*, only fits this certain case. For a different lecturer in a different lecture, who tried the system too, it did not work at all [IntD, R.22]. Interaction, cooperation and participation are, if at all, only possible in smaller courses with 20 to 30 students maximum. At least this was his experience. And also in regard to his whole curriculum in software engineering, participation is neither referred to or enacted in action nor in theory. Generally the role of the user is a rather limited one:

> *"Well, uhm, but in software engineering this actually does not exist at all. The human who is using the software only appears as a customer. […] And as an element in an UML diagram." [IntD, R.14]* And further: *"Well, actually a lot fell short, not only participatory design. Also everything where classically every computer science would call it soft skill, e.g. business administration, came of badly." [IntD, R.15]*

Also things like *"team building, leadership, organisation or such stuff"* fell too short in his experience, things one could argue are even important for software engineering in big projects [IntD, R.12]. Although there are courses in *software architecture*, here the architecture usually only refers to the architecture of the software but not the software architect as an interdisciplinary coordinator or orchestrator, who has the engineering skills but also is able to relate to non-technical domains and social contexts with all their demands and limitations rather well. An interest in all these things as well as some skills in applying them came for Yann from his

political engagements as well as from his close proximity to the InstituteX where he could get some insight into Neahs work and how she uses participatory approaches.

As we have seen in this section and its subsections, interactivity and interdisciplinarity are rare experiences for students of computer science and young researchers have to work hard if they want to find approaches to computer science that value users and publics as active contributors to research and development of technologies. In the next section we take a more specific look on issues of interdisciplinarity and interactivity within participatory design projects.

6.2.4. Interdisciplinarity & interactivity

For a participatory ICT project to be successful, the project team has to assemble a broad range of skills. And for research in participatory ICT contexts there is a certain demand on interdisciplinarity. While we have seen before that such skills are not highly valued in computer science education, although there would be a demand for it. Or as Ada puts it:

> *"We need people who are well-versed with the technical part. And here we also have a problem, that students in the design area sometimes don't want to do technical stuff. But that is, I think, unacceptable. They still have to be properly educated on a technical level. We need good technicians I think." [IntA, R.26]*

While Ada describes herself as a disciplinary hybrid with some knowledge of the technical core aspects but working with social science methods, she places participatory design as a scientific approach or discipline within computer science. Only that it also *"requires competences, which normal system developers don't have"* [IntA, R.27]. As a participatory project forms, there are different design decisions that have to be met, coming from different domains, all of them having technical implications. You need people who, beside understanding the different domains and decisions, have the technical competences to foresee if these decisions and its technical implications might hinder the development process [IntA, R.34]. Such requirements are not always easy to fulfil. As we have seen the common computer science education rather neglects such competences. One way to do so in practice is to build up these competencies throughout the project. But this is only feasible for long-term projects, as Ada tells from her experience again referring to the EU funded project on urban planning:

> *"In projects of several years you can also build up this expertise. And of course there is a division of labour. But in principle; well, we only had two people who really could programme the complicated stuff. But the product designer as well as the artist have participated strongly in discussion about how our concepts are being technically implemented. […] We did a lot of video observations. Here also many have participated. And perhaps not everyone may be able to write a paper on that themselves, but at least they can co-analyze and co-evaluate. […] This is a really dense cooperation, with different focus areas." [IntA, R.31]*

But to establish a framework and interpersonal relations for such a dense cooperation one needs time. As Ada tells, both computer scientists who where responsible for the core programming have initially been rather sceptical. For one of them,

> *"coming from computer graphics, we always have been this strange institute. But she actually did rather enjoy the process. And she then did an excellent dissertation, how technical development processes change, when one keeps in mind all those contexts." [IntA, R.31].*

This is to some extent confirmed by Ruby, not so much for a project situation, but for her general work environment at the institute in Neah's group. There is an atmosphere of interdisciplinary interaction, where colleagues are integrated in the work of each other, and *"without this, I think, nobody would like to work here."* [IntC, R.5].

While a participatory approach demands interdisciplinary skills and commitments, also an interdisciplinary work environment leads to conducting participatory approaches, as Neah tells, *"interdisciplinarity sensitizes you to different sorts of issues"* and sometimes *"reducing the complexity is actually removing all the stuff that matters."* [IntB, R.16] So while classical system developers try to reduce complexity on a rather technical level implicitly through not looking at a lot of issues, an interdisciplinary approach brings such issues into the field of perception – issues which often relate to users' or diverse publics' needs and demands towards a technical system.

A more concrete interdisciplinary exchange that brings up such issues is the one between participatory design, HCI and CSCW on the one side (the side of computer science) and feminist theory and action as well as STS on the other side. This will be highlighted in the next section.

6.2.5. Exchanges with feminism and STS

In participatory design as well as CSCW and HCI in general, there is a significant amount of exchange with STS research as well as feminist research. Or at least the former areas draw on knowledges of the latter. If exchanges in the other direction are just as vivid I would not dare to judge, because my analytic focus lies on and my empirical material comes from the former context, but I am inclined to doubt it, as I have seldom seen research in STS that integrates new insights from computer science in general in its own approaches. As Emma Whelan shows for the relation of mainstream STS and feminist work in STS (Whelan 2001) a similarly asymmetric relation might be given for our domains of interest.

Of my interview partners, only Ada and Neah commented on feminist influences in their own research domain, as they could draw on some personal history in the field. Ruby and Yann only mentioned their experiences in student politics as a field where they became increasingly sensitized to issues of social dynamics, power and conflict, also specifically gender and diversity. But it was not an explicit factor in shaping their own approach. But in both their cases I also did not explicitly ask for such influences on the research community and their own scientific work.

For Neah *"feminist literature gave voice to, or sort of articulated a lot of things"* she experienced herself while working in the field [IntB, R.14]. It provided an analytical framework for a lot of those experiences and issues that are usually neglected in software development, because the software is developed by a privileged team, usually mostly consisting of men, able-bodied persons, white middle class and/or academic people. But of course there is not only feminism but other political movements too, which open up such issues. And it is also not solely a women thing:

> *"I think there are different ways of engaging with technology and of thinking about technology. And one way is; you know, there are a bunch of people who take more of a concern for the people and design side. It happens that a fairly portion of them are women. […] There are a lots of blokes who do this as well, so I don't think it is strictly bound in chromosomes at all; it's perspective!" [IntB, R.12]*

According to Neah it is about taking "*more holistic views*". And while she mentions that she never had *"any sort of formal feminist philosophical training"*, she has been involved *"in women and technology type of organizations"* [IntB, R.12]. And these engagements also provided additional focus and gave rise to a more holistic perspective, which, in the framing of participatory approaches should lead to "better" technologies, because the better fit the users' (or peoples) needs. And while feminist contexts or literature may provide such a basis, it seems to be a skilful art to use it without making it too explicit – fearing accusations of bias, or of just being dismissed. For example Neah and colleagues, when working in industry, tried to set up a gender equity group but without naming it that way:

> *"We didn't want to call it gender equity, because if it gets framed in terms of male or female stuff it gets dismissed. What we were trying to argue for in the company [...] is diverse ways of engaging with problems. […] And we need those diverse perspectives. If you just had people like me, these systems wouldn't run either. I'd be useless. So it's recognizing the diverse perspectives and skills we need, I think." [IntB, R.12]*

So it is not only issues relevant to feminism, but that a lot of issues coming from feminism open up to general issues of power and inclusions/exclusion of people and perspectives in technoscience. Neah frames this like following:

> *"And I think that, yeah, I think it is a big issue of diversity. And that's being more influential and important to me. And not naming the particular feminist theorist who's being influential." [IntB, R.13]*

And she also mentions that there *"is lots of brilliant work being published"* in areas like STS, sociology as well as PD and CSCW type literature *"about the lived experiences, but they are not influencing the mainstream agendas. I don't have any answers for that yet."* [IntB, R.9] So while there is a lot of exchange within participation and user oriented areas within computer science, and lots of research influences from social sciences and philosophies, not much of it is taken up within computer science as a bigger context. Neither does there seem to be much of a flow back into the social sciences and philosophies. Also, in Neah's positioning, as not having received *"formal feminist philosophical training"*, it seems there is a bit of divide putting the social science and philosophies into a position of doing basic research while in those parts of computer sciences where it is adopted, then the application follows. This may be a practical and productive division of labour. But it might also hinder conceptual innovations within computer science itself, as conceptual sharpness within the computer science domain sometimes gets lost, as Ada has told us before.

For Ada conceptual sharpness is not only lost in computer science, but also in feminist discourses about the natural sciences:

> *"When I started to become interested in these issues, the feminist critique of science was very interesting and very vivid. And this all slid a little bit into something literary. […] But I found it important, to be from inside. And this I don't see anymore. This feminist critique of science and technology, I actually don't see it anymore." [IntA, R.21]*

Here Ada means specifically that explicit feminist engagements within specific disciplinary contexts like CSCW, but also STS, got lost or are not as vivid and visible as they once have been.

While she attests a big influence of feminist thinking in philosophical discourses, she does not see much of explicit discourses in computer science and its specific disciplines itself:

> *"Well, a lot of women who do CSCW research are also feminists. But, so to say, the feminist discourse is actually not conducted as feminist discourse. It is rather a more implicit issue." [IntA, R.23]*

But as there are fluctuating influences of feminism, participatory design was not a primarily feminist movement, as Ada also tells:

> *"In participatory design, well, it was not primary a women's thing. In the Scandinavian countries, I know them all; I also got to know Kristen Nygaard[36] back then, and all his students; but the Big Boys, well yes, many were boys […] And then there are also some women among them, but this was not; this was much more politically driven. And the feminist discourse did much more come; well it is hard to assign people; so, Leigh and Jeff have been a bit of STS, but they haven't been in participatory design […] And, STS too, isn't infiltrated by feminists. That would be too much to say, if you look at the Big Boys there." [IntA, R.18]*

Also in mentioning Bruno Latour as one of the Big Boys in STS, Ada attests to the Actor-Network Theory (ANT) that it initially was an interesting approach, but that through scientific stardom and disciplinary dynamics, it is increasingly used with an exclusivity that hinders innovative developments in understanding work and technological development [IntA, R.20]. Adas comment on this issue was not more explicit, but it falls in line with many feminist critiques of ANT (cf. Whelan 2001; Sturman 2006). Of central concern to Ada seems to be the exclusivity of the approach, or of how the approach is enacted. So rather than to establish some grand theory or too rigid methodologies that can be used within participatory design texts, it seems that the exchanges and synergies between different approaches are often more valuable to participatory designs and developments of ICTs. And here again feminist theorists and practitioners had some considerable influence:

> *"There is this nice concept of invisible work. Things, that are not made explicit – but not because one could not make them explicit, but because they are overlooked. […] So one concern of participation or participatory procedures is to make invisible parts of work and activity visible." [IntA, R.15]* And further: *"And those who, so to say, conceptually advanced these issues in this area, came from feminism; or, partly from feminism. It actually had a very strong influence." [IntA, R.16]*

So, in this section we got some sample insights, how researchers who use participatory approaches in computer science relate to feminism and STS. But of course this picture might look rather different with other researchers, as both of my interviewees took a feminist stance themselves.

But now let us take a glimpse towards an area where feminist influences are not at all common and often neglected, which nevertheless is surrounded by mantras like "software by the people for the people", namely the realm of free/libre and open source software (FLOSS) development.

36 Kristen Nygaard (1926-2002) was the co-inventor of object-oriented programming, one of the core paradigms of software engineering. He also was among the researchers who established the Scandinavian approach to systems development, which is a strong influence in or even the origin of participatory design, depending on ones own positioning.

6.2.6. FLOSS related issues

The insights in this section are rather limited, because this issue is usually not directly participatory design type research, and because I only happen to had one interview partner who, rather by chance, also happened to be a developer of a free/libre and open source software (FLOSS) project. Also this interviewee is then a rather unusual member of the FLOSS community, as he has an explicit pro-feminist and politically emancipatory stance – which is at least atypical, when we compare it to our insights about FLOSS communities in the theoretical part of this work (see chapter 3.2.).

But maybe exactly this position is an interesting one for closer investigation. As we have already seen in the former sections, Yann's disciplinary background is one of software engineering, where participatory approaches are rather neglected. Nevertheless he was enthusiastic about such approaches, partly due to his own political engagement and stance towards inclusive politics and partly because of what he experienced in working in Neas group at the InstituteX. So, how then, does a FLOSS developer who is fond of participatory approaches to ICT development relate these approaches to his own FLOSS project and how are publics in this project figuring?

The project Yann is working on is a software project that aims to provide a simpler system for shared authentication than what other common projects in this area provide. A central aim is to make such a system easier to use and hence more available to a broad range of users – as the common systems in this area usually need a lot of expertise to be used, even for rather simple use cases. The project is maintained by Yann and a few other people from the context around the students council, who operate a range of ICT services for students and the general public. As a "free and open" project it invites everyone who is interested to participate. All project members are working in their spare time on the project, and basic resources are available for the ICT infrastructure needed.

Regarding the general question if Yann would like to use participatory approaches to software development had he the resources to do so, he replied:

> *"Hm, it depends on the context, I think. It is always the question of what one does. […] I mean, for example I have this open source project about shared authentication, where I could not imagine how I'd do that there." [IntD, R.25]*

After my question what the project is about, Yann gave some insights on how the project emerged out of the students council own needs to make the management and use of the diverse ICT-services they operate easier. So the definition of tasks for this system has been rather clear to him, which he mentions as a reason for not needing a participatory approach:

> *"And in this case then it does not make much sense, I think. Well, I don't know, I'd be happy to be convinced otherwise, yes, I'd be quite open to that. So, as soon as you write software that directly interacts with users, yes, there it is great to use such an approach. That indeed, yes. So, if an opportunity arises, I would indeed do that. So, now, at the InstiuteX or elsewhere." [IntD, R.26]*

This is an interesting passage in Yann's explanations, because it highlights the crux of probably most of smaller free software projects. Even if the acting protagonists in such a project are fond

of participatory approaches, the main requirement is already provided through ones own practices and wishes. Or as Yann put it: *"Yes, this basically was really the requirement: 'I want to have'"* [IntD, R.29]. The whole project only emerged because there is a specific need, and this is a users need. In this case it was the need or desire for easier or more convenient management of accounts for diverse ICT services. So, if you already have a clear requirement, why would you actually want to find out about the 'real' requirements by letting some vague publics participate? And, as a free software project, it is open to participation anyways. But then, usually only programmers or system administrators are the sole kind of publics that even fulfil the basic requirements for participation in the core processes of the project. This limited set of publics is the main addressee and user of the system too. This further becomes clear when Yann talks about the motivation for starting the project:

> *"Because on the one side it was of course somehow a use case […] and on the other side of course, also from a system administrators perspective, as you called it. Because there just was no good system around, with which you could implement [the easy management of accounts on diverse ICT systems], or at least none that made me happy, let's put it this way, yes. And of course also out of a engineering curiosity. […] And of course, also just a fun with hacking perspective. So actually I think, in this case, it was a combination of those three." [IntD, R.30]*

So there might be a tendency in smaller free software projects to project ones own perspective and situation onto potential publics. Of course it does make sense this project worked out this way. And indeed it might make the life of users of the management side of shared authentication systems, that is, system administrators, more easy and comfortable. But there actually might be other publics, at least those who use the authentication interface, even if this interaction with the system is rather short. But also the social contexts, in this case a more or less loosely associated non-profit context, might be affected or would have some interesting inputs.

I suppose that there actually have been further interactions and in some sense participatory moments in the life of the project. But this was not the topic of the interview, and in general this whole field might be an interesting investigation of its own. What I would extrapolate from my scarce information at hand is, that there are actually moments of participation and exchanges with publics in this project, which are not always framed as such.

While in free software projects macro level perspectives and discourses are often missing (at least in the beginning) due to the bottom-up-character and usually scarce resources, this is to some extent also true for the context of computer science in general, as we will see in the next section on policy and ethical discourses.

6.2.7. Policy & ethical discourses

Already in the section on resource related problems for participatory design projects we have seen a lot of issues that are tied to funding schemes and research policies. In this section we will take a closer look at the area of policy and ethical discourses in computer science and specifically around participatory design and development projects.

To open this section I want to quote the following two comments by Ada and Neah, which outline one of the major problems with policy and participation in computer science:

> Ada: *"The political momentum in PD, which got lost; or: where has this political momentum gone and how do we define this political momentum? So these are question which the community brings up. And we still have the fact that there are so many failed systems. In the health area the percentage of such systems is estimated by about 70%, that runs into the millions; I'm curious about ELGA, into which they pump millions, and where nothing comes out. That this correlates with inadequate methods of systems development, yes. That one just does not understand the complexity, the work processes. And then they try to impose something and wonder, why it is not adopted or why it does not function as it is supposed to function, and people have to find work-arounds." [IntA, R.13]*

> Neah: *"I have been involved in medical informatics since the 90ies, and it has always been the case that doctors have had much more power and say, and nurses' needs and nursing informatics and physiotherapists, pharmacies or everyone else in the care profession doesn't get any voice in the design of electronic medical record systems. I see similar things happening with the push to technology in the home for older people. It is all driven by the health sector, by health departments, who want to save money in keeping people out of hospital. And that is really scary, that I see old people not being involved at all." [IntB, R.6]*

In both these statements a central issue is the asymmetric distribution of power and the assertion of specific interests, in the software development processes as well as in meta-structures where it is decided which software should be developed, i.e. funding and policy bodies. While for Neah doctors and health departments always could assert their interests over that of other health care professionals and patients, for Ada it is the area of (state) politics and policy as well as the systems developers and their non-inclusive approach.

As one specific example Ada mentioned the ELGA project – a state funded project to introduce an Austrian-wide electronic medical record system, which, in the public argumentation of the ruling parties and other central medical institutions, should help to make medical services better and also provide the public user, that is, the patient, with more control over their own medical records. Criticism came up already at time of development of the system. Several interest groups raised concerns, that the system might be too bureaucratic, that privacy issues were neglected and that it wouldn't fit the work practices of medical doctors (cf. ORF.at 2012). Meanwhile a law was passed that became effective by 1st January 2013, to provide the jurisdictional basis for the implementation of ELGA. The system should be fully implemented in an iterative roll-out until 2022. Until today one of the initially praised functions of ELGA has already been taken back, because it did not work out as expected (*Derstandard.at* 2014a). Also the start of the implementation is postponed, because privacy concerns now are also taken up by the ministry of health (*Derstandard.at* 2014b) and because of according technical tests and potential redevelopments (*DiePresse.com* 2014b). Also, increasing concerns are voiced that certain public groups, especially elderly people, are being excluded from an self-determined use of ELGA because they often lack access to such online systems. According to an article in *Die Presse*, a major newspapers in Austria, from June 2014, 60.8 percent of Austrians above 65 years have never used the internet. Not only for this reason medical doctors and several of their associations and interests group warn of using ELGA and promote the opt-out from the system, which can be individually requested. Until 22nd of June 2014 around 170,000 Austrians did opt-out from the system (*DiePresse.com* 2014a).

Of course success or failure of the ELGA system cannot be clearly attested, but certainly a lot of

problems and public resistance arose even before the concrete development of the project. The use of a participatory approach could have brought with it better conceptual projections of necessary components as well as greater public acceptance. If this really is the case, it could only be evaluated after such a project is enacted in a participatory design approach. But according to Ada the chances for this are rather low:

> *"Last year I did an assessment for the bioethics commission regarding assistive technologies, home care technologies for elderly people. I find it incredibly relevant. There I wrote that they have to be developed in a participatory manner. But nobody is interested in that anymore. […] But these are all things [the technologies], which are sold as inherently beneficial. Yes, and I think that there are exciting developments, and I am the last one to be against technological development. But there are massive problems and massive illusions tied to it. But nobody wants to address these issues. […] No threat potential or catastrophic potential comes from these technologies." [IntA, R.48]*

So there actually is some policy discourse about participatory design when it comes to specific areas of application, but this discourse doesn't seem to be very influential on actual policy making and research funding. Also on the EU level, Ada tells, there is no room for participatory design at all. One might be able to do participatory projects, but in the specific area of technology development *"it runs into completely different directions"* [IntA, R.45]. A further explanation, given by Ada is:

> *"As long as one is not affected, nobody is interested in that. And, so to say, daily life is not interesting enough. Also working life is obviously not interesting enough any more."* And further, mentioning a specific enterprise resource planning software: *"[It] already invades the hospital area and really only out of the interests of management. It does support nothing on-site. And I don't know how one could make these issues ripe for policy." [IntA, R.50]*

The same is mentioned by Neah, who also did a lot of projects in the health area. For her it is the question of how to balance different needs and what the criteria are by which we define if a technology makes something better. Because it is the question, for whom it makes what better. And public and policy discourses in this area are often not qualitative ones and not oriented towards individual needs and well-being:

> *"And this is where we get into social construction of 'what works?'. […] The measures on which success were evaluated were system oriented; I mean system as in the health care system, sort of financial implications perspectives of the applications. […] So that is changing the rhetoric and the methods about what is important to measure or evaluate." [IntB, R.11]*

This might also link to the lost political momentum in participatory design, or rather point to a way of re-establishing such a momentum. While classical participatory design, or the Scandinavian approach to systems development have been closely tied to work contexts and labour unions as actors who also had some weight in policy debates, today it seems there are no grand and unifying interest groups to impinge on such discourses and to bring daily life and work back into a relevant sphere for policy debates. So one thing to do might be to establish alliances with diverse interest groups. This would of course mean to do engaged, partial research. Only because e.g. assistive technologies are not attested a threat or even catastrophic potential does not mean that their impact might not be huge, and with vast social consequences. For Neah it is also important to be specific about where it is necessary to use participatory approaches and where

not:

> *"We do have to recognize when it makes sense to involve people and not. […] I think there are times where participation really matters and there are also challenging participation areas, because there are multiple players, they are complex, they touch upon large scale political agendas, they touch upon large scale commercial agendas. […] So, there is bigger things, I think, that are really critical. We are fundamentally shaping futures for lots of people, in a way that filling out a parking ticket isn't."* *[IntB, R.8]*

So there is definitely a need for more policy debates in computer science. But, despite having the classical detached scientist approach, to wait for them to happen is probably a rather frustrating strategy. If computer scientists want to apply more participatory design type research, one part of a strategy might be to establish policy debates within and beyond the computer science and to look out for suitable allies among their publics and other related sciences.

As we now went through a lot of insights and perspectives on how participatory design is enacted by researchers and what key issues and problems arise in this context, in the following chapter I will reconnect these findings with the theoretical framing (see chapters 2, 3, and 4). This serves the purpose of synthesizing some conclusive remarks and to give an outlook on what further research might bring about for participatory inclined computer scientists as well as for critical STS researchers who are fond of writing about participation.

7. Conclusions

As new modes of governance of science increasingly rely on notions of public participation and public engagement to legitimate research spending and the governance regimes in place, many of the enacted public engagement exercises rather resemble forms of tokenisms or actually nonparticipation, than forms of participation which give power to the participants to join in forming governance decisions (Irwin 2006; Felt and Fochler 2010).

Science and technology studies spent some considerable energies to investigate, analyse and publicise these relations. But while these investigations focus mostly on policy discourses and the publics' (potential) participation in forming opinions and decisions on how and which science should be done, very little energies are spent on investigating participatory approaches in the technosciences, which place publics and participation in the sphere of concrete technoscientific practices (Lengwiler 2008; Smallman 2014).

With my research I addressed this gap in showing that there are indeed such practices and even a whole field, namely Participatory Design, which is devoted to enact such modes of participation (cf. Simonsen and Robertson 2013). In doing so, Participatory Design is using STS and feminist research to reflect on its own practices. But while these reflections lead to insights, which could be useful for STS and feminist research itself, little is made visible about Participatory Design's practices and reflections – at least so in the main stream(s). STS should take a closer look at the way its own notions and concepts are applied in Participatory Design and how they are reconfigured. This could provide new foci and innovations in research on public engagements with(in) (techno)science.

On another side, Participatory Design could also focus more on policy issues and areas of science policy deliberation to gain momentum and to shift funding schemes and policies towards embracing public participation not only nominally, but also to provide the necessary resources for participatory engagements in concrete technoscientific practices. As Ellen Balka noted (in context of a huge Participatory Design project), there is the need for "new organisational forms, new policies within universities and among funders, as well as new forms of partnerships." (Balka 2013, 276) – at least if responsible and participatory approaches to technoscience should be applied, which new modes of science and governance of science as well as major actors, eg. within the EU science policy circles are demanding (cf. Nowotny, Scott, and Gibbons 2001; Stirling 2008; Simon 2013). Herein lies a potential synergy between Participatory Design and STS. Also closer relations between (mainstream) STS and feminist technoscience studies, as well as between Participatory Design and feminist technoscience studies might not only provide conceptually fruitful innovations but also provide new spaces and practices of research.

My research can only provide the preliminary insights to spawn more thorough investigations, which then include several iterative, or cyclic, main research phases (Froschauer and Lueger 2003, 28–31). Therefore, as a part of my conclusion, I want to address questions which Froschauer and Lueger pose for every iteration in the main research process (ibid, 30-31): With my research, I could so far provide a first exploratory glimpse into practices of participation in concrete

technoscientific practices, specifically in context of Participatory Design and more user-oriented strands of computer science. Much about the constructions of publics has to necessarily stay vague at this point of research. Further interviews, participant observations and discursive analysis of Participatory Design projects and with researchers therein are necessary to develop more conclusive insights. Also a focus not only on those propagating participatory approaches, but also on those who are sceptical – within Participatory Design projects or more generally in computer science – can strengthen the analytic interpretations and highlight additional important aspects, like boundary work between different approaches and disciplinary distinctions within the field. Additionally, a multi-perspectival and transdisciplinary research team would be better suited to do a critical reflective analysis of Participatory Design, than I myself, as I am in part computer scientist and aspiring to, and propagating such approaches. This also would enable a less biased approach – not that bias could be completely done away with, but certainly more critical distance can help for a thorough analysis.

However, to gain more robust insights on the constructions of publics in context of Participatory Design, there is the need for further research in form of full-scaled qualitative analyses of specific Participatory Design projects. This cannot be accomplished within the time and resource scales of my master thesis project.

As a more organisational and methodological conclusion, I therefore recommend master students and their supervisors to rigorously think about the requirements and the available means to do qualitative research in context of a master thesis. Only under rather ideal circumstances I would recommend following such an approach. Nevertheless, also under not so ideal circumstances such a project is a wonderful learning field, if one is willing to accept a not so stringent, fast and bounded project that a master thesis (at least formally) is supposed to be. Furthermore the possibility and advantages of using already existing data should be taken into account. Especially the sampling, conducting and analysing of interviews is a quite time consuming process – time that could be instead used for extensive and reflective interpretation of the data. Students who are following such a qualitative research approach within their master thesis project should become clear about the limited possibilities in their situation and therefore the probably limited outcome (except they are working within a bigger research project, where they can draw on expertise of co-researchers and team reflection). Even so, I do not suggest not to do such research at all, but to help the student/young researcher to get it done without becoming crazy about it.

From a research perspective, a look towards other areas in computer science might prove valuable. Especially areas like software engineering might be insightful, where the focus is on developing software for diverse contexts and on broad scales (from small up to grand scale projects), which seldom use public engagement (at least in the Viennese context) to tailor their products towards users' needs. How are publics constructed in these processes (or how are they not, or only implicitly constructed), and how does this impinge on the developed architectures? How is it possible at all to develop some sort of architecture without engaging publics? Which implicit epistemological and political assumptions lie in these approaches. Another area of computer science which might be interesting to search for constructions of publics is technical

and theoretical computer science. These are areas which, at first view, don't have much to do with users or publics. But then, the (virtual/abstract/knowledge) products which are produced in these areas might be very consequential for broader publics. Just think about algorithmic authority and distributed epistemic responsibility (cf. Simon 2013) – as these issues are pervading our all daily lives (as scientists and researchers as well as members of diverse publics).

Therefore *we*, now signifying an alliance of feminist technoscience researchers, critical STSers and theoretically informed activists and practitioners, should try to cooperate to strengthen emancipatory approaches and spaces in the fields we are researching. Critique is an important tool to do so, but there is a difference between formulating disengaged critiques as an 'outsider' of the phenomenon – something which is anyway a naïve assumption (cf. Barad 2007; Haraway 1988) – versus formulating critiques in a solidary way. The latter approach to critique acknowledges our own entanglements in phenomena we are researching and tries to open concrete paths for solutions to the analysed problems, even if we are unsure about what these paths might look like. Instead of (only) demanding from diverse technosciences that they should open up to 'the social', 'the public' and to our own critiques, we ourselves might have to also open up to technoscientific approaches of interfering and intervening in the world, of taking a stance and changing the world. Nothing else is what the technosciences do: they engage in material-discursive practices shaping all our futures.

This also means we have to engage in discourses outside of our own comfort zones of critical STS or feminist technoscience research. And if it is one thing we should have learned from past research within these comfort zones, it is that we cannot be 'not political'. And better than hiding one's aspirations in fear of being labelled 'political', 'partial' or 'subjective' by scientific peers, we should highlight their own partiality and outline why we are doing science and why we are doing it this way and not another way (the latter part is of considerable importance, when it comes to questions of normativity and complicity in hegemonic practices).

We should not just look at the obvious potential catastrophes in science policy deliberations but also highlight the potential catastrophic consequences of policy deliberations in other areas too – areas which are usually seen beneficial per se, like for example health care and assistive technologies. Here I want to repeat what Ada, one of my interviewees, said regarding these technologies:

> *"But these are all things, which are sold as inherently beneficial. Yes, and I think that there are exciting developments, and I am the last one to be against technological development. But there are massive problems and massive illusions tied to it. But nobody wants to address these issues. […] No threat potential or catastrophic potential comes from these technologies."* [IntA, R.48]

In this quote, Ada highlights how science policy circles as well as many publics don't connect potential catastrophic consequences to ICTs, especially assistive and health care technologies (much in contrast to other debates around genetically modified organisms, atomic energies, nanotech, stem-cell research or other contested 'risk technologies'). But there indeed are such potential consequences, when it comes to the social and ethical organisation of our individual and collective lives. Neah, another one of my interviewees, drawing on her experiences in medical

informatics, highlights this too:

> *"I see similar things happening with the push to technology in the home for older people. It is all driven by the health sector, by health departments, who want to save money in keeping people out of hospital. And that is really scary, that I see old people not being involved at all."* [IntB, R.6]

While these researchers are struggling with reconfiguring their participatory approaches, to tackle such issues at least within some of those concrete technoscientific developments, they could need support by STS researchers to highlight the policy related issues – which is what STS researchers have to some extent mastered over the last few decades.

So this again could be read as an implicit call for us – STS and feminist technoscience researchers – to engage in these discourses, practices and debates.

For all these reasons I want to close by coming back to where I started – a glimpse towards what utopian/dystopian thoughts might help us to do: to remind us that the future is still unwritten, and that we can't just wait until it happens, for it might not be the future we would like to return to in reality.

Conny (who comes from the past/present), visits Luciente's family
during their breakfast (in the/a future). She tries to
understand why they have made contact
specifically with her:

“

“No one is helpless. No one controls.” Sojourner had a flattened leathery face and eyes that twinkled with a lively pleasure. “We can't make things come out in the past. We can only speak to those who listen.” She winked at Conny.

[…]

“Why are you contacting us? You said I'd understand but I forgot to think about it. It's kind of a vacation from the hospital.”

A surge of discomfort passed around the table. “It's hard to explain,” Bee said, frowning. “Nobody's supposed to discuss advances in science with you. It might be dangerous—for you, for us. Your scientists were so … childish? Carefully brought up through a course of study entered on early never to ask consequences, never to consider a broad range of effects, never to ask on whose behalf …”

“But I'm no scientist. What do you want from me?”

[…]

Barbarossa cleared his throat. “We could put it: at certain cruxes of history … forces are in conflict. Technology is imbalanced. Too few have too much power. Alternate futures are equally or almost equally probable … and that affects the … shape of time.”

She did not like to be lectured by him, for he reminded her of other men, authorities in her time, even though she could see that in this setting he had no edge on the others. “But you exist.” Still she waited for the price, the stinger.

“Maybe. Maybe not.” Luciente smiled, her eyes liquid and sad. “It's not clear. We're struggling to exist.”

”

in:

Marge Piercy: *Woman on the Edge of Time* (1976, 188–189)

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List of abbreviations

STS ..... Science and Technology Studies

PD ..... Participatory Design

CSCW ..... Computer Supported Cooperative Work

HCI ..... Human Computer Interaction

ICT ..... Information and Communication Technologies

FLOSS ..... Free/Libre and Open Source Software

FOSS ..... Free and Open Source Software

VUT ..... Vienna University of Technology

STEM ..... Science, Technology, Engineering and Mathematics

MINT ..... Mathematics, Information sciences, Natural sciences, and Technology

Abstract (englisch)

Technosciences, with their practices as well as their products, are shaping not only our future, but also our social life – whether at home, at the working place, in our social and intimate relationships or in our academic worlds. To address potential consequences of technoscientific research, public engagement seems to be a key ingredient for responsible research and innovation. At least there is a noticeable turn towards participation and public engagement in technosciences within the last two decades. Science policies increasingly demand that scientific projects think about their societal consequences. Large governance bodies, like the EU, are building frameworks of public engagement in the technosciences. They also maintain databases for tools of participation. Nevertheless, what we often find in practice, are forms of "participation" which could better be described as "tokensim" or "nonparticipation".

Science and technology studies (STS) did put a lot of effort in analysing such relations. But while most of the deliberations on whether and how to use participation are tied to the area of policy discussions, nearly no effort has been made to analyse and think about public participation in concrete technoscientific practices. With this work I address this gap through providing some preliminary STS-framed insights into the field of Participatory Design (PD) – a technoscientific field which, since its early formation in the 1970ies, builds on the participation of diverse publics in its concrete technoscientific practices and projects.

As a means to generate these insights I am using a theoretically informed empirical approach, derived from the framework of Situational Analysis. As core linkage between theory and practice in my own approach as well as between questions of public participation in the technosciences and considerations about the legitimacy and responsibility of research, I draw on feminist theory and feminist technoscience studies, which have highlighted the ethico-onto-epistemological entanglements of every technoscientific research endeavour – including my own research as well as STS research in general.

Further research can build on these exploratory insights to highlight potential synergies between STS and PD. New approaches to fulfil the demands of responsible research and innovations could be forged through further research on this issue. Nothing less then our future is at stake.

Keywords:
participation, publics, STS, Participatory Design, feminist epistemologies, Responsible Research and Innovation

Abstract (deutsch)

TechnoWissenschaften (Technosciences) formen mit ihren Praktiken und Produkten nicht nur unsere Zukunft, sondern auch unser soziales Leben – ob zu Hause, am Arbeitsplatz, in unseren sozialen und intimen Beziehungen oder in unseren akademischen Welten. Um die potentiellen Konsequenzen von technowissenschaftlicher Forschung zu adressieren, scheint öffentliche Beteiligung (public engagement) eine Schlüsselkomponente verantwortungsvoller Forschung und Entwicklung zu sein. Zumindest seit den letzten zwei Jahrzehnten gibt es eine wahrnehmbare Zuwendung zu Partizipation und öffentlicher Beteiligung in TechnoWissenschaften. Wissenschaftspolitiken verlangen von wissenschaftlichen Projekten zunehmend, über deren gesellschaftliche Konsequenzen nachzudenken. Große Kontrollorgane wie die EU, entwickeln Rahmenkonzepte für die öffentliche Beteiligung an TechnoWissenschaften. Sie verwalten ebenso Datenbanken mit Werkzeugen zur Partizipation. Trotzdem finden wir oft Formen von „Partizipation" vor, die besser als „Alibiaktion" (tokenism) oder „Nichtpartizipation" (nonparticipation) beschrieben werden können.

Wissenschafts- und Technikforschung (*Science and technology studies* (STS)) haben einigen Aufwand betrieben, um solche Verhältnisse zu analysieren. Doch während die meisten Auseinandersetzungen darüber, ob und wie Partizipation verwendet werden soll, an Diskussionen über Politiken und Richtlinien gekoppelt sind, wurde bislang kaum einen Aufwand betrieben, um öffentliche Partizipation in konkreten technowissenschaftlichen Praxen zu beforschen. Mit vorliegender Arbeit adressiere ich diese Lücke, indem ich erste vorläufige Einblicke in das Feld des *Participatory Design* (PD) liefere – ein technowissenschaftliches Feld, das seit dessen früher Formation in den 1970ern in konkreten technowissenschaftlichen Praktiken und Projekten auf die Partizipation verschiedener Öffentlichkeiten (publics) baut.

Um diese Einblicke zu generieren, verwende ich einen theoretisch informierten empirischen Zugang, der von der Situational Analysis abgeleitet ist. Als zentrale Verbindung zwischen Theorie und Praxis in meinem eigenen Zugang sowie zwischen Fragen der öffentlichen Partizipation in den TechnoWissenschaften und Überlegungen zur Legitimität und Verantwortlichkeit von Forschung beziehe ich mich auf feministische Theorie und feministische Wissenschaftsforschung, welche die ethisch-ontologisch-epistemologischen Verflechtungen jeder technowissenschaftlichen Unternehmung aufgezeigt haben – meine eigene Forschung eingeschlossen, wie auch generell jede Forschung im Feld der STS.

Weiterführende Forschung kann auf diese explorativen Einblicke bauen und damit potentielle Synergien zwischen STS und PD aufzeigen. Neue Ansätze können dadurch etabliert werden, um die Anforderungen verantwortungsvoller Forschung und Entwicklung zu erfüllen. Nichts geringeres als unsere Zukunft steht auf dem Spiel.

Schlüsselwörter: Partizipation, Öffentlichkeit(en), STS, Participatory Design, feministische Epistemologie(n), Responsible Research and Innovation

Curriculum Vitae

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Education

1989-1993	Grundschule in Bad Eisenkappel / Železna Kapla
1993-1997	BRG Völkermarkt
1997-2002	HTL Klagenfurt Mössingerstraße – Technische Informatik & Internet Engineering
2002-2003	Philosophie (Universität Klagenfurt & Univiersität Wien)
2003-2009	BSc Technische Informatik (TU Wien & Universität Wien)
2012-2013	TutoriumsTrainer*innenLehrgang 2012/13
2009-2014	MA Science – Technology – Society (Universität Wien)

Work & extracurricular engagements

1998	Internship as electrician in Bad Eisenkappel / Železna Kapla
since 2002	diverse freelancing projects in server, network and website creation and administration
2005-2013	Diverse activities & functions within/around the Austrian Students Union (Erstsemestrigentutorien, Zentralkoordination des Unabhängigen Tutoriumsprojekts, Studien & Fakultätsvertretung Informatik, Sachbearbeiterin für HomoBiTrans- & InterQueer* Angelegenheiten der Bundesvertretung)
2012-2013	Student/teaching assistant and tutor at the Department of Science and Technology Studies, University of Vienna
since 2013	Systems administrator at the Institute of Theoretical Chemistry, University of Vienna

Academic engagements

2009, Sept.	11th European Conference on CSCW, Vienna (Austria) – Student volunteer
2010, Sept.	EASST Conference, Trento (Italy) – Participation
2012, July	Science in Public Conference, London (UK) – Talk presented
2012, Aug.	Participatory Design Conference, Roskilde (Denmark) – Participation
2012, Oct.	4S / EASST Joint Conference, København (Denmark) – Talk presented
2014, Nov.	Changing Worlds Conference, Vienna (Austria) – Talk presented

Further notable projects

2009 & 2010	Organisation & facilitation of seminars on “Informatik & Geschlecht” (Gender & Computer Science)
2010	Organisation of a seminar on FLOSS from a sociopolitical perspective
2013 - 2014	Editing collective of the brochure: *Antisexismus-Broschüre. Perspektiven, Alltagssituationen, Handlungsspielräume*