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Learning Through Situated Innovation

Why the specific is crucial for participatory design research

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Abstract. Specific, situated participatory design (PD) practices have always been at the heart of Participatory Design research. The role of the very situatedness and specificity of PD practice for theory-building within PD research is, however, seldom discussed explicitly. In this article, we explore why and in which ways the specificity and situatedness of PD practices are crucial for PD research. We do so by developing the notion of PD as situated innovation based on a pragmatic epistemology. PD research aims at developing and continuously unfolding what PD can, might and should be. We show implications of such a pragmatic epistemology of PD on understanding and arguing for PD research approaches. These concepts are illustrated referring to PD practices as experienced in PD research projects. Our epistemological argumentation supports the emphasis on exploring new PD practices and learning and theorizing about PD from the specificities, in line with recent debate contributions.

Keywords: Participatory design, pragmatism, epistemology, situated innovation.

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1 Introduction

Specific, situated participatory design (PD) practices have always been at the heart of Participatory Design research. PD emphasises the cooperation between future users and other stakeholders around design, development and implementation of IT applications with the goal to promote socially, technically and also economically more viable design. As such cooperation as well as the design it results in depend on the specific actors, practices, and technologies involved, PD emphasises the specific. PD highlights the importance of situated needs for the development of supportive and complementary technology (Greenbaum and Kyng 1991; Greenbaum 2008). Also discussions on what is the core of PD, such as the ones initiated by Beck (2002) or Kyng (2010), relate to changes in the situated context in which PD takes place as motivation for changes in PD research. This emphasis on PD practice sometimes leads outsiders to perceive PD research as politics or policies rather than a scientific discourse focussing on a related practice. In this article, we explore *why* and *in which ways* the specificity and situatedness of PD practices are crucial for PD research. We do so by developing the notion of PD as situated innovation based on a pragmatic epistemology.

In developing and using the term *situated innovation*, we have deliberately wanted to highlight the creative, though integrative, character of PD. The discussion of the notion of innovation in economics and research politics would warrant an own article. However, in general terms, ‘innovation’ is used to denote a change that requires a significant amount of imagination, represents a relatively sharp break with established ways of doing things, and creates a new capability of some kind (Wessels 2007, 2010). Our usage of the term innovation is in line with work on user-driven innovation (Baldwin and von Hippel 2009) as well as work using the notion of participatory innovation (Buur and Mathews 2008) that emphasizes the role of users in innovations. This focus highlights the importance of consciously including future users in the design and innovation of ICT products. Further, one of the central course books on PD methods, tools and techniques (Bødker et al. 2004) uses user-driven innovation as part of the subtitle in its Danish original, “Professionel it-forundersøgelse:-grundlag for brugerdrevet innovation.” The basis of PD is that - through its principles and by providing methods, techniques and tools to include domain experts in the design process—it contributes to letting the innovation grow out of the situation. The innovation in PD practice also relates to PD methods, techniques and tools.

Using the notion of PD practice as situated innovation, we argue that PD practice is an epistemic, open-ended practice (Knorr Cetina 2001) that is in itself an epistemic object (Knorr Cetina 2001) of PD research. The grounding of PD research in specific PD practices is necessary to continuously unfold what PD can, might and should be. Our argumentation contributes to further clarifying the epistemological base for PD; and it provides a way to explore PD practices in ever new shapes and to learn, also in how we theorize about PD, from the specificities.

Further, the argumentation supports the importance of research design that promotes the direct engagement of researchers with practice for PD, such as action research (Simonsen 2009), design research (Koskinen et al. 2008; Bratteteig 2007) and/or different flavours of engaged scholarship (Mathiassen and Nielsen 2009; Van de Ven 2007). The argument presented here, however, makes a statement about the role of theory in PD research. As PD theories are about open-ended epistemic practices, they need to be open-ended and provisional, that is, based on

current understandings of how and why principles, methods, tools and techniques work that allow using and exploring them in other contexts. These theories are developed through engaging in situated design practices.

In line with the tradition of PD research, we develop the theoretical insights that constitute the contribution of this article informed through empirical investigations of PD projects. We do so in a three-step argumentation that is discussed, step by step, in sections 3, 5 and 6. The structure of the paper is that section 2 revisits the role of the specific in the PD research discourse, while section 3 presents the epistemological base. Section 4 then briefly introduces the cases we have chosen to inform our discussion. Section 5 develops the notion of PD practice as situated innovation, elaborating the role of design constituency and design space based on their relation to the concept of situated innovation. We show that central concepts of PD can be and further developed and explored using this conceptual base. Section 6, Learning through Situated Innovation, uses the conceptual base developed in sections 3 and 5 to explore PD research as an epistemic practice grounded in PD practice, and discusses the role of the researcher when interacting with and in these practices, elaborating the role of existing PD knowledge for the PD practice and vice versa. Finally, section 7 summarises the conclusions of the article.

2 The role of the specific in participatory design research

Accounts of specific PD projects have been central for PD research from the very beginning. PD as practice and as research topic came about when researchers engaged with users in real world design contexts. Many presentations of PD report about the fundamental insights developed in a small number of founding projects that explored the cooperation with non-IT professionals in the design of software and information and communication technology (ICT); Kristen Nygaard (1992) cooperated with the Norwegian Metal Worker Union supporting participation in the design and development of IT systems; Pelle Ehn and colleagues cooperated with type setters around the design of what today would be called desk top publishing systems (Ehn 1988); and Tone Bratteteig and Gro Bjerknes (Bjerknes and Bratteteig 1987) cooperated with nurses around the design of ICT supporting the cooperative work at a hospital ward. (Examples for such accounts can be found in (Floyd et al. 1989b) and in (Kensing and Greenbaum 2012).)

These founding projects established a research practice that places the involvement of the researcher in concrete real world collaborative design and the collaboration with those impacted by the technology designed in the centre of the research. Looking at the PDC proceedings this tradition is confirmed: by and large all conference presentations report research that is grounded in the engagement of the researchers in PD practice. Along the same lines, the recently published *Handbook of Participatory Design* (Simonsen and Robertson 2012) highlights three projects exemplifying the current PD body of knowledge and simultaneously showing how PD can be explored in new and changing contexts: PD and the Global Fund for Women (Trigg and Ishimaru 2012) explores the conditions and possibilities of continuing in-house PD in the context of a non-profit organization balancing information management concerns and work

place democracy. An article about the HISP network (Braa and Sahay 2012) reports from the continuous development of an open source Health Information Management software and its appropriation and organisational implementation in different developing countries. Capacity building is here core to a sustainable deployment of the software. The Action for Health project (Balka 2012) explores PD in a hospital where the design and implementation of technology relates not only to a set of interconnected work places, but to organizational strategies and cross sector policies and standardization endeavors.

In their introduction to the PD handbook, Simonsen and Robertson (2012) underline PD's consistently socio-technical approach, its focus on the primacy of human experience and social agency and thus the accountability of design and designers to those whose lives will be affected: "Design is, fundamentally, about designing futures for actual people" (Simonsen and Robertson 2012, p. 5). This epistemological appreciation of the context and practices in which the technology being designed will be used, with its emphasis of the specific, has been highlighted by Greenbaum (2008), who proposes pragmatism, referring to Dewey, as a frame for understanding how we can learn and generate scientific knowledge from specific and situated PD. The article illustrates this by addressing the notions of space and place. The very success of PD research is its ability to reflect on how to relate and adapt its methods and guidelines to address PD in ever-new and changing contexts.

With specificity, we here do not aim at emphasizing the minute detail of the research account—though we agree about its importance for qualitative research—but rather the individuality and situatedness (Suchman 1994) of each individual project. An example can be found in *Design Things and Design Thinking: Contemporary Participatory Design Challenges* by Björgvinsson et al. (2012). The article links PD to contemporary discourse on design thinking, arguing that the object of design should be design 'Things' - or design 'Thinging', which focuses on assemblies of socio-material practices stretching beyond the individual design project, from design for design to design-in-use, in fact a chain of one design Thing after another. "However, the infrastructure [evolved through and in form of the earlier Things] also is accessible only by participation in specific practices" (Björgvinsson et al 2012, p. 108). Each of the specific design situations contributes to and contextualises the following PD events.

Kyng (2010) challenges the PD community to engage with new ways in which IT is developed and used, e.g., looking beyond the workplace, including private and mobile usage—e.g., by patients with chronic diseases and their families—as well as citizens using public services. Balka (2010) argues, in line with him, that we PD researchers need to both relate to the diversity of goals and interests of the heterogeneous communities we cooperate with and take the sustainable and long term outcome of the PD into account. Both argue for different and new ways of engaging with 'real world' PD in non-research organisations.

Recent discussions of research approaches explore how the specific can become the base of systematic research for instance through action research (Simonsen 2009), design research (Koskinen et al. 2008; Bratteteig 2007) or different flavours of engaged scholarship (Mathiassen and Nielsen 2009; Van de Ven 2007). These publications address the challenge of how to derive methods, techniques and guidelines from the specific design practice that are viable beyond that very situation. Action and design research therefore often emphasise the need to carefully design the intervention based on research questions, related work and hypotheses. Simonsen (2009) e.g., emphasises the resulting challenges for an action researcher: Engaging with real work PD

practice implies that the researcher has to let go control over design objectives, methods and the outcome.

As the introduction states the research question of this article is: Why and in which ways are the specificity and situatedness of PD practices crucial for PD research? Proposing an answer to this question, the article contributes to the discussion of PD research approaches by providing a conceptual base that allows articulating more clearly why PD practice is so important for PD research. Our argumentation thus contributes to further clarifying the epistemological base for PD; and it provides a way to explore PD practices in ever new shapes and to learn, also in how we theorize about PD, from the specificities, as proposed by Kyng (2010) and Balka (2010). As we will show, the concepts we develop contribute to a better understanding of the role of the researcher, and his or her contribution to PD practice as well as PD research.

3 Research process and epistemological base

The three authors, who have undertaken multiple PD projects over the years, met and discussed the PD process in selected projects in a number of workshops. From heterogeneous disciplinary backgrounds we shared experiences about PD research. Common to our experience was the importance of the unexpected and innovative—with respect to ICT design and use as well as regarding methods, techniques and tools—which resulted from the confrontation with the specific situation in which PD took place in each project. A common thread in our research was that the situated PD practice was where the innovation happened that challenged the perception of usage and design of technology the researchers had had from the outset. In the discussions we experienced a lack of concepts to express and argue for the role of the specific in the research process.

During and through workshops in Sweden (BTH), Denmark (ITU) and the Universities of Newcastle and Sheffield (UK) we developed a common understanding of how situated innovation has been at the core of our research, which resulted in further development of our theoretical understanding as well as methods and tools, rather than simply providing a test bed for application of prior research results. The concept of situated innovation indicates a marked shift of perspective, or even a shift of scientific paradigm. Based on this recognition, we started to articulate the notion and the shift of perspective it stands for in a joint technical report and several articles (Dittrich et al. 2009; Wessels et al. 2012).

We used an epistemological argumentation to explore the notion of practice, not as opposed to theory or academia (both, after all, inextricably dependent on their own practices), but as a notion to conceptualise everyday activity and its development through design and context-related adaptive change over time. We use Schatzki's development of the notion of 'social practices', based on Wittgenstein's philosophical investigations, as a common theoretical underpinning. Knorr Cetina's (2001) notion of epistemic practices complements Schatzki's emphasis on the regularity of practices with a consistent way to conceptualize practices around learning, development and change in and through design, innovation and research.

Practice is a central notion for many current schools of thought, but is seldom explicitly discussed in articles. Garfinkel, e.g., the founder of ethnomethodology, refers to Wittgenstein's

Philosophical Investigations (Garfinkel 2002), where the founding of social phenomena such as language and rules in social practice is formulated for the first time.

Relating our argumentation to pragmatism as the epistemological underpinning allows us to relate our different perspectives, even though we are discussing the importance of the specific in PD research from heterogeneous disciplinary and theoretical backgrounds. Author 1 entered the PD field from computer science and software engineering, but has worked across academic disciplines for many years. Already in her M.Sc. and PhD theses she adopted perspectives from the Frankfurt School (Dittrich 1993) and the later Wittgenstein (Dittrich 1997). The concept of practice can be used to conceptualise where the dialectics between existing social structures and the actions they both enable and constrain (Habermas 1969) take place. Author 2 has, as an Informatics researcher, a background in the Scandinavian school of skills and technology, human work practice and PD as well as a strong interest in American pragmatism (Eriksén 1998). Practice is also here a central concept (Nubiola 1996). Author 3 comes from Sociology with a strong emphasis on Sociology of Technology that addresses the meanings and practices of technology in social contexts (Wessels 2007, 2010; Castells 2001; Silverstone 2005).

To develop a consistent argumentation, we developed a minimum conceptual base for our argumentation based on Schatzki's (1996) practice theory, which we complemented with the notion of epistemic practices developed by Knorr Cetina (2011) in order to allow us to conceptualise PD practice—the concrete and situated ways in which PD is implemented—as well as PD research—aiming at developing understandings, guidelines, tools and methods to support PD practices—as epistemic practices.

The result is a theoretical discussion anchored and illustrated in three different PD research projects. Although this is an unusual genre for the PD community, it is well-established in philosophy (see e.g., Knorr Cetina 2001). In this approach, the validity of the argument depends not primarily on the empirical anchoring but on the rigor of the argumentation—careful development and application of concepts allowing the reader to contest or expand the argument—and on showing the usefulness of the developed concepts. We address this by illustrating the concepts based on our own research, and by using the argumentation to address one of the central questions in PD research, namely the role of PD practice in theory-building. These cases were chosen because they represent research contexts in which established ways of involvement of researchers in design practices were not applicable and thus the need as well as the advantage of expanding the understanding of the relation between researcher, PD practice and PD research becomes visible. The article should thus not be misread as an empirical article, e.g., a meta-ethnography.

The common base of our conceptualisation is anchored in epistemological pragmatism (Schatzki et al. 2001). This means that we see human collaborative practices as (re)producing social phenomena and structures such as language, social order and technology. At the same time, these social structures provide an affordance for co-constituting social practices. Practice can be understood as “a temporal unfolding and spatially dispersed nexus of doings and sayings” (Schatzki 1996, p. 89) that is constituted, actualized and sustained in its performance (Schatzki 1996, p. 90). “To say that doings and sayings forming a practice constitutes a nexus is to say that they are linked in certain ways. Three major avenues of linkage are involved: (1) through understandings, for example of what to say and do; (2) through explicit rules, principles, pre-

cepts and instructions; and (3) through what I will call ‘teleoaffective’ structures embracing ends, projects, tasks, purposes, beliefs, emotions, and moods” (Schatzki 1996, p. 89).

Schatzki et al. (2001) emphasize the foundations of social structures in the regularity of social practices. So how should we conceptualise design practices that are geared to changing social practices as well as technical artefacts? Knorr Cetina (2001) describes science and design as epistemic practices and argues that research as well as design “seems to be particular in that the definition of things, the consciousness of problems, etc., is deliberately looped through objects and the reaction granted by them” (p. 175). Epistemic practices aim at developing and unfolding of only partially existing and known objects, characterized by their “lack in completeness of being” (p. 181). “[O]bjects of knowledge in many fields have material instantiations, but they must simultaneously be conceived of as unfolding structures of absences: as things that continually ‘explode’ and ‘mutate’ into something else, and that are as much defined by what they are not (but will, at some point have become) than by what they are” (p. 182). In relation to PD and software development, a similar unfolding of the epistemic object through exploration and experimentation has been described as learning (Floyd et al. 1989a).

Referring to the design and construction of a particle detector, Knorr Cetina highlights that the incompleteness of the epistemic object is maintained even when the object is seemingly in place. “Finally, even when such an instrument is officially declared ‘finished’ and ‘complete’, the respective experts are acutely aware of its faults, of how it ‘could’ have been improved, of what it ‘should’ have become and did not” (p. 182). In her conclusions, Knorr Cetina proposes that “knowledge-centered work shifts back and forth between performance of ‘packaged’ routine procedures and differentiated [epistemic] practices” (p. 187).

This is in line with Schatzki’s argumentation. Using Schatzki’s categorisation cited above, Knorr Cetina’s epistemic practices can be seen as complex “teleoaffectively connected doings and sayings” (Schatzki 1996, p. 89). They are themselves practices based on established ways of doing design or research, in part guided by implicit understandings of how things are done, in part by explicit rules concerning methods and techniques. However, they are simultaneously geared to changing the socio-material environment and as part of it developing and understanding of the subject of design respectively research.

This Wittgenstein-based practice theory provides a common denominator allowing us to develop a conceptual base to discuss the role of specific and situated PD practices in PD research. In our continued discussion, we will relate the concepts we develop to this common denominator. The next section introduces our three cases. Thereafter we first develop the concept of PD practice as situated innovation and relate it to—for this notion central—PD concepts. Thereafter we use the conceptual base to discuss PD research as epistemic practice unfolding and bringing about an epistemic object—PD practice—which in itself is an epistemic practice.

4 The three cases

This section briefly presents the three cases and provides the contexts in which the relation between PD research and PD practice became subject to reflection. (The reader interested in the specific research methods and results is referred to the cited literature.) In the following section

5, we refer to the three projects to explicate the concepts we develop and expand based on the theoretical base developed above. In section 6, we then reflect on the role of researchers and disciplinary knowledge informing PD practice and the epistemological foundations of PD research using both the epistemological base and the concepts developed in section 5. To avoid repeating ourselves, the relevant aspects of the projects will be presented in the following sections.

4.1 KomInDu: PD for citizen participation in municipal spatial planning

In Sweden, the comprehensive plan is the main tool for strategic spatial planning on a municipal level. The Swedish planning legislation puts strong emphasis on consultations with those concerned. The main focus of the KomInDu project (Ekelin et al. 2004; Ekelin 2007), which was run in a medium-sized municipality in southern Sweden during 13 months in 2003-2004, was on making use of the internet for enhancing and renewing this consultation process and thus empowering citizens to take an active part in the shaping of the plan.

KomInDu was a multi- and interdisciplinary research and development project, which was initiated and run by the municipality, with the head of the municipal information office acting as project leader. The software platform was an existing web-based application which had been in use for several years in the municipality, and which had to be customized for this specific purpose. The explicitly stated aim of the project was to redesign and further develop both the municipal procedure of formal spatial planning and the process of developing a web tool for citizen consultations, along with developing methods of cooperative design involving municipal employees and citizens.

For the participating researchers, who came from the disciplines of Computer Science, Human Work Science, Technoscience studies and Spatial Planning, the project offered the opportunity of combining and comparing approaches and methods from two different design traditions that share democratic ideals and ambitions of nurturing citizen/user participation in design processes, i.e., PD of ICT and Spatial Planning. This proved to be more challenging than we had originally anticipated. Differences in perspective gave different interpretations of the design context and what it was we were in fact aiming to design, as well as of how participatory the processes actually were.

The overall aim of the project was to get citizens more actively involved in municipal planning processes, with a main focus on the comprehensive plan process. In retrospect, it is interesting to note that municipal citizens were not directly represented in the design constituency, and that the citizens' office representatives, who through their work practice had the most extensive contacts with citizens and their problems, came to play an increasingly peripheral role during the project. Citizens were invited to collaborate around developing a new consultation process not by being offered representation in the project group but by the municipality opening up new channels for citizens' dialogue via the Internet, i.e., they were offered a reactive, outsiders' role from the start.

The reflection on the limitation of citizen participation in the current comprehensive planning process later resulted in an initiative from the municipal representatives to start a new R&D project for user-centred PD of accessibility to public spaces in the municipality, this time

inviting handicap organisations and their members to participate from the start, and aiming for a decentralized, citizen-centric, social media approach based on user-generated content (Ekelin 2010; Wessels et al. 2012).

In the KomInDu project, the researchers contributed to broadening the space for design and situated innovation by taking on the role of moderators and facilitators during design workshops and design discussions with the IT consultants and municipal employees from different departments, and by taking on the role of experts (the researchers from spatial planning) concerning the comprehensive planning process. Joint reflection and discussion contributed to raising awareness among municipal employees of the need for broadening the base for citizen participation in future development projects.

4.2 PD in the telecom industry

In the second case we present here, the cooperation focussed on the software engineering side of PD. We cooperated with a software development department of one of the major Swedish telecommunication providers around the design of flexible applications supporting back office administration. Providing mobile communication is a competitive and rapidly changing business. New types of services are invented and have to be implemented. This, plus the lack of standard systems supporting the telecom industry, puts high requirements on the IT systems and the development of them.

The case is based on long term cooperation spanning over two projects funded by The Knowledge Foundation (KK-Stiftelsen). During the first project, we observed extensive interactions between software engineers and users. The IT unit of the company, being one of the pioneers in Sweden, had developed a practice of cooperating with the user departments around the development of IT support. The cooperation between software engineers and users in the project was based on long-term cooperation between the involved team members. To support the cooperation, the software engineers published early prototypes throughout the development phase that were subject for discussion and informed the on-going design. The technical project manager and two other software engineers functioned as communicators between the business unit and the software engineers who—in this project—had a more technical role, focussing on the implementation of the software (Dittrich and Lindeberg 2004). This was not unique but part of the software project model the IT unit had formulated. We learned that the IT unit cooperated closely with the business units around the development of new software supporting the development of services and business practices.

The project highlighted an aspect that is seldom explored and reported in detail: technical design, usage, and the organisational development are not independent of each other. The evaluation of the suitability of certain designs for flexibility depended not only on the organisational context and work practice of the users or on the technical context, that is the existing infrastructure and its technical base, but also on the organisation of software development and the software development practices. Here the cooperation between users and software developers throughout the whole life cycle played an important role, when comparing a simple and maintainable design with a flexible, but also more complex, design (Dittrich and Lindeberg 2002; Dittrich et al. 2006; Eriksson and Dittrich 2007).

The researchers' role in the start was one of consulting and supporting the software engineers by together exploring technical possibilities and interface designs for end-user tailorable software. The software engineers were reluctant to discuss their development process with us. As software engineering researchers, we were expected to emphasize rigorous control over the development process, rather than supporting an open and evolutionary approach. Only towards the end of the first project were we invited to investigate the participatory development practice of the IT unit by performing an evaluative workshop of the project (Dittrich and Lindeberg 2004).

The projects resulted in the IT unit developing competencies regarding design processes and techniques for more tailorable and adaptable software, thus broadening the design space for the IT unit. Our research on the development practice explicated the actual development practices and that way helped to maintain them.

4.3 AMASE: Situating and mediating children's voices in healthcare

In the UK, there is a drive to provide community based multi-agency services for children with disability. This involves different health and social care practitioners working together to provide a holistic service that supports disabled children living in the community. Health and social care are communication dependent services (Wessels 2010). The context of the drive to join up services in the UK stems from the previous UK government's agenda of modernising public services, which focuses on investing in technology, putting the citizen at the centre and providing more transparent, open and accountable services. Changes in health and social care policy, with a specific focus on the child, have been influential in the move to multi-agency welfare provision in the 'community'.

The AMASE (Advanced Multiagency Service Environments) project was a four-year longitudinal study that sought to find ways in which design of ICT could be embedded into community care (EPSRC grants G-N10066 and GR/R53006/01). The research team was made up of eleven academics. The academic research group involved two sociologists, two anthropologists, four management/organizational theorists, and three computer scientists and system designers. The community participants were an ICT supplier; key workers from a multi-agency centre; a local authority management group; a children's service team; social services ICT; voluntary organizations; a disability centre and its parent and children network group; and parents of disabled children. The project was organized in four phases of community activity that fed into each other.

The problem that was presented to the developers was how to design an integrated communication system for the new multi-agency service. The key issue was that the professionals from each of the services, as well as those with specific roles in the service, only understood their own communication. The issue of community and patient interaction complicated the design problem further, because the community key workers had to be able to access the health and social care services as well as provide information to patients. In total four professional services were involved besides the voluntary sector and community-based interaction. Given this context, key workers in the community argue that the design of ICT systems should move away from fixed and static systems to more fluid, flexible, adaptive systems in order to meet the diverse needs of

variously positioned key workers and families in community care situations. In order to develop a community communication system the project team undertook a four-phase research process that facilitated the use of PD in phase four. The first three phases were important because knowledge and trust was built up in these processes that supported the PD applied work.

In the *first phase*, the AMASE team worked with local policy-makers to discuss the ways in which services for children were changing in response to national policy. The *second phase* involved a sociologist (from AMASE) and the Community Development Worker for children's services exploring the development of multi-agency working. They conducted focus groups with parents and their children, and the views of community key workers were explored by a survey and in-depth interview (Wessels and Bagnall 2002). This phase resulted in an understanding of the difficulties of the different stakeholders within the provision of care that was fragmented. The findings led policy-makers, practitioners and researchers to decide that a community research and development approach was needed. *Phase 3* of research implemented a participant observation study of a community multi-agency centre to gain an understanding of the practice and development of community services. The researcher worked with members of the centre observing both their professional centre-based work and their interaction with children and families, which interact with each other. The practitioners felt that the participant observation helped them to understand how they were developing new practice, which in turn would help them to design a communication system for their new work. In *Phase 4* a 'facilitative conversation' PD approach to participation within ICT development was introduced. This process was defined as the creation of a space in which different stakeholders, software developers and researchers create a dialogue to discuss the various dimensions of developing communication systems open-endedly. In addition, semi-structured interviews were undertaken to help understand users' expectations towards ICT. The process enabled members of children's services team to reflect on their working practices (Wessels et al. 2008).

The PD processes started in Phase one and continued throughout the project reaching an intensive design phase in Phase Four. The spaces of PD were carefully crafted out of the work done in each Phase where the researchers and the research participants reflected on the data that had been generated in the research process, which also helped the participants and researchers to develop ideas about the community communication system before undertaking PD workshops. These spaces were in the form of meetings and workshops in community centres. Given the different expectations about developing a community communication system, the PD workshops in Phase Four needed development of 'open-spaces' for discussion, which were called facilitative conversations by the design constituency, before, during and after the workshops. In these the participants could raise any concerns about the participation, the process and early outcomes. In this way the researchers could support the full and equal participation of those involved in complex community communication that would support services for children with disability (Wessels et al. 2008).

In all three projects our preconceptions were—in parts radically—challenged. Far from being a test bed for techniques (telecom case) or methods (AMASE and KomInDu) and providing incremental improvement of methods, tools and techniques, the research resulted in all cases in a substantial re-thinking of our preconceptions and in radically new research questions. The following two sections present an argumentation that has been developed in dialogue with the research projects.

5 Participatory design practice as situated innovation

In all three projects, PD methods, techniques and tools contributed by facilitating more socially, technically and economically viable design solutions. The specific ways in which this facilitation took place were different in the three projects. It is notable, however, that we researchers did not, in any of the projects, take on the traditional role of Participatory Designers evolving PD methods, guidelines and tools for the project. Our roles as PD researchers and how we contributed in that role to each project rather evolved during the unfolding of the respective projects. We see—with Greenbaum (2008)—the specific situation and the design taking place there as the core for both PD practice and PD research. In this section we develop the notion of *situated innovation* to conceptualise what the specificity and situatedness of the design contributes to both the respective project and PD research. We then discuss and expand the concepts *design constituency* and *design space* that are central to the situated innovation dimension of PD. These three concepts provide the base for the discussion of PD research as epistemic practice in the following section. Each of the subsections first develops respectively expands the concept, then it explicates the concept based on the three cases, and finally the relation to existing PD research is discussed.

5.1 Situated innovation

As discussed in section 2 above, design can be regarded as an epistemic practice (Knorr Cetina 2001), the object of which is not yet complete. The purpose of epistemic practices is the development and unfolding of this epistemic object. Through this process the epistemic object is brought into being. PD, as we argue in section 2, is such an epistemic practice. With the notion of innovation, we want to emphasise the creative dimension of this epistemic practice. PD comes in many flavours. However, a common denominator is that it relates to concrete design of ICT in relation to concrete changes in the context of usage. It addresses co-development of the technical and the social, even if it is mediated through e.g., product development processes (Hansson et al. 2006). Extending the conceptualisation of PD through the use of situated innovation emphasises that innovation is not only grounded in the context but also emerges from the processes of PD. Using Knorr Cetina's notion of epistemic practice (2001), PD principles and methods support the epistemic practice of designing by highlighting the need to include relevant actors, and mediating the joint unfolding of the epistemic object—the socio-technical change—that is being brought about.

In all three cases, the innovation consisted of changes in the social and organisational realm as well as in the technical support for the tasks at hand: The KomInDu case resulted in situated innovation consisting of design and deployment of the internet-based module for dialogue with the citizens around the comprehensive plan. It also resulted in deeper insight into the challenges of developing a technical platform for citizens' dialogue around the comprehensive planning process, as it gradually became clear that the entire process needed to be reconceptualised in order to open it up for serious input. This aspect was later addressed in a new project. In the telecommunication case, technologies promoting run time flexibility were deployed together with the explicit design of user-developer cooperation when such changes became necessary.

The AMASE case resulted in substantial change of both service provision and the supporting IT infrastructure.

The term *situated innovation* highlights the creative, though integrative, character of PD. One could argue, in line with Suchman's concept of situated action (Suchman 1987), that innovation is always situated one way or another. Taking a PD stance, we use the term to both emphasise the importance of situating technical innovation with the corresponding changes in the social world, and highlight the local PD as an important contribution to the understanding of how IT can better human affairs, to relate the unfolding design to the specificity of the context of usage. This is in line with Suchman's notion of 'artful integration' (1994) emphasizing that design is integrated with existing structures, both technical and social. In developing and using the term situated innovation we aim to highlight the innovative, though integrative, character of the design. At the very heart of PD is that it contributes to situating the innovation through its principles and by providing methods, techniques and tools to include domain experts into the design process. In other words, doing PD is not (only) about being nice to the users, but about supporting a socially, technically and economically more viable socio-technical design (also for users). Doing PD is about simultaneously innovating *in situ* and situating innovation, and this process is, or should be, the epistemic subject of PD research.

5.2 From user developer cooperation to heterogeneous design constituencies

PD focuses on the inclusion of users in the design of ICT and corresponding organisational changes. From an epistemic practice point of view, the participation of relevant stakeholders is necessary to unfold the epistemic object in ways relevant for the viability of the design. The unfolding of the design object when including users in the design process has been discussed in many PD articles. For instance, Dittrich et al. (2003) describe the changing object of design depending on different actors and stakeholders in the process when designing e-Government systems. Kanstrup et al. (2008) point out and describe how the object of design 'explodes' into the face of IT-designers when relating to the lives of their users: in their case, patients with chronic diseases such as diabetes. Common to the articles above, and many articles relating to real-world design settings, is that, with the inclusion of more actors, new perspectives are brought into the design process, that is, new and relevant dimensions of the epistemic object (Knorr Cetina 2001) are unfolded. In realistic design situations, though, who is relevant to include into the PD processes might not be easily identifiable from the beginning, and might change based on the developing understanding and unfolding of the design object. Design constituencies are as much subject to the unfolding as the design object is.

What is subject to design and who is the designer? In all three projects presented above, this has been an issue of negotiation and needed to be established. In the KomInDu case, participating researchers from different disciplines and municipal planning practitioners perceived the object of design quite differently, while the citizens, whom we were all allegedly designing for, were never really invited to participate. In retrospect, this challenged us to be more reflective about our own roles, and to problematize how central stakeholders came to be left out of the project. The telecom case interlaced PD of technologies facilitating design-in-use with the PD

of the concrete application serving as a pilot and evaluative project. In the, for PD researchers, unusual position of working with software engineers, the practitioners taught us about PD in an industrial context. Though we were not actively influencing the participatory setup, we witnessed their skilful establishment of it. In the AMASE case, professional designers, members from a diversity of governmental agencies and the subject of the services, families with disabled children, formed a heterogeneous base for the socio-technical design. Here, the researchers played a role both in establishing the participatory process and in informing and mediating it.

We use the concept of a design constituency (Wessels et al. 2008) to describe the process of formation of specific assemblies of individuals and actors who participate in and legitimize the design process as well as its outcome: Our definition of a design constituency is the—more or less formal—assembly of social actors that has a remit to facilitate inclusive and democratic socio-technical change, in the best case through multi-disciplinary, multi-perspective and multi-positional approaches to design. The core constituency is—depending on the case at hand—recruited from a variety of user groups, designers of hardware, software and user-interfaces, policy-makers and any related interest groups. Researchers might be part of it. The constituency can be formed either in response to a specific socio-technical design project, or can be formed in view of longer term socio-technical change, seen, for example, in the on-going organizational and system changes to health and social care. Though established in the beginning of an explicit design project, the design constituency can be expected to change over time. The project organization thus needs to allow the members to position and re-position themselves in reaction to the developing understanding of the design issues and the design space. New members might be recruited, and some members, who have contributed and are assured that their interests are met, might leave the constituency. The trajectory of the constituency's life cycle can vary with the nature of the design problem, but it does have the potential to support a more iterative approach to design, thus providing space for developing a kind of design-in-use ethos, or at least a reflective and user-designer feedback process during design and development. Design constituencies develop even if no heed is paid to their establishment, and moments of establishing a design constituency can be found in more traditional project management. In the telecommunication case, the establishment of different groups (project group, reference and steering group) provides one such example.

The notion of a design constituency opens up to a view beyond the user-developer dichotomy, which is often perceived as an adversary one, to include heterogeneous user communities, IT professionals, and other stakeholders. This has been observed by other PD researchers as well: i.e., using the terms shop-floor IT management, (Eriksén 1998; Kanstrup 2005); and infrastructure development (Karasti and Syrjänen 2004). With a similar purpose, Björgvinsson et al. (2010) use the very notion of design constituency to develop the notion of design-‘thing’ or parliament to be able to conceptualise long-term and multiple actor design processes including both explicit design, use and design-in-use: With the continuously unfolding development of the work practices and technology within a certain context of use, who collaborates and on which terms needs to be unfolded as well. With the notion ‘thing’, Björgvinsson et al. emphasise a democratic organisation of design constituency. The continuous evaluation and evolution of who is part of the design constituency has been particularly important in the cases when the social domain is complex and requires specialist and in-depth knowledge as well as involvement of affected citizens (Eriksén 1998; Wessels et al. 2008). Löwgren & Reimer (2013), in a

recent article about how collaborative media challenges how we think about agency and design processes in interaction design, use the concept of infrastructuring in a similar way: “In design theory, more generally, the disappearing role of the designer and the changing nature of design processes from delimited to ongoing have been part and parcel of the conceptual challenges for quite some time. We find the concept of infrastructuring from the field of participatory design to be particularly pertinent also for the purpose of coming to terms with collaborative media from a design perspective” (Löwgren and Reimer 2013, p. 95).

Also Simonsen (2012) proposes to reconsider the relation between software developers, domain experts and PD in the context of long-term projects where PD does not necessarily precede the implementation. The mediation of heterogeneous design constituencies has been a shortcoming of PD methods e.g., in relation to the implementation of systems coordinating work across organizations, like ERP systems (Pries-Heje and Dittrich 2009). The recruitment of the design constituency establishes whose voice will be heard and who will take part in the co-operative design. The very notion of design constituency opens up to invite a broader spectrum of groups involved in socio-technical change, such as user groups, social and organizational researchers, system designers, and technological capacities and to relate the different arenas (Balke et al. 2008) upon which the design of infrastructural IT systems comes to bear.

5.3 The design constituency opening up the design space

The unfolding of the design constituency is part of unfolding the epistemic object (Knorr Cetina 2001). Who is included in the design constituency contributes to understanding what it is that is to be designed. With the establishment of the design constituency, and thereafter by the design constituency, the ‘what’ of the design is negotiated: which subset of the socio-technical structure supporting and constraining the design problem is up for discussion. In other words, the understanding of the possible directions in which the epistemic object can be unfolded is developed. This constitutes what is in PD often referred to as design space.

The design space is, on the one hand, limited by the mandate of the design constituency and limitations of (the existing) technology. PD implicitly contributes to the scoping of the design space by mediating user participation and thus bringing requirements from the work practices of future users to bear on the design. On the other hand, the perception of the members of the design constituency influences the de facto limitation of the design space.

In the KomInDu project, the design constituency was initially delimited by the municipal representatives in dialogue with the involved researchers. The epistemic object seemed obvious; the comprehensive plan. However, during the design process, the various understandings of what was the object of design came in conflict with each other, which revealed a need to rethink the comprehensive plan and how it is perceived and used. Only after the end of the KomInDu project was the design constituency enlarged to include citizens, which opened a broader design space. The concepts of ‘design constituency’ and ‘design space’, as we use them here, open the “floor plan” for PD for broader, more long-term and shifting participation. Could we as PD researchers do better in laying out, understanding and reading such floor plans, as a way of making PD practices more sustainable?

In the telecommunication project, the use of methods allowing for configuration and customisation of the application after the initial development opened up for so far not experienced flexibility after implementation. This in turn led to discussions on how to and who should make sure that changes to the system are deliberated and tested. Domain experts and software engineers together balanced technical and social dimensions when deliberating the final design (Dittrich and Lindeberg 2002).

The AMASE project worked to fully develop a design constituency appropriate for the development of a community communication system for services for children with disability. The constituency was made up from community health and social care practitioners, parents with children with disability, local government policy makers, the University's researchers and consultants from the software and technical developer company. Working through the four phases of the project the design constituency built up knowledge and trust through sharing experience and ideas in community based workshops that utilised PD methods and tools. This process helped to ensure that the different perspectives, voices and requirements were articulated in the PD workshops. Further, the community itself was then ready to implement the system and undertake changes in the service provision. Service users felt that they had been involved in the development and were more ready to participate in the new service provision.

It is not surprising that a large part of PD methods and tools are geared towards expanding the perception of, mainly, participating users, but also professional designers and developers. Future workshops and creative design workshops are some of the most prominent examples of this. (See (Bødker et al. 2004) for a textbook on PD methods and tools.) Muller (2003) places the design space, or—in his words—'third' or 'hybrid space' belonging to the usage as well as to the design domain, in the centre of PD. Like the design constituency, the design space is not fixed, but needs to be unfolded, and develops through the design process. The different perspectives of the members of the design constituency contribute to broadening the design space. This has been discussed under the notion 'mutual learning' in the PD community (Floyd et al. 1989a; Keil-Slawik 1992; Kensing and Munk Madsen 1996; and many others).

As we discuss below, the involvement of PD researchers in PD practices in the projects we reflect on here resulted in broadening the design space, the scope of what was understood as possible. The next section reflects on how we as researchers can learn from situated innovation and explicate such experience-based knowledge in order to support and inform future design situations, as well as building PD theory.

6 Participatory Design research as epistemic practice

In accordance with Greenbaum (2008), we see the specificity of the situation in which the design takes place, the specificity of the "working relations of technology production and use" (Suchman 1994), as the nexus for PD and thus crucial for PD research. In the previous section we expanded PD with the concept of situated innovation and showed that it can be used to develop and expand central PD concepts in line with the tradition of PD. Emphasising PD practice as situated innovation, though, creates a challenge for PD *research*. The innovation that is part of the epistemic practice relates 'change', 'imagination' and sharp breaks with established

ways of doing things. Both the emphasis on the situatedness of the design and the emphasis on the innovative dimension of design, at first glance seem to contradict the emphasis on generalizability within science. In the following, the first subsection, Learning through situated innovation, develops a concept of PD research that builds both on the epistemological base and the concepts developed and expanded in the previous section. Thereafter we use the concepts developed so far to discuss the repositioning of the researcher and the contribution of the researcher to both PD practice and to PD research, even when the researcher does not control the researched PD practice as researcher-designer.

6.1 Learning through situated innovation

PD research, like PD practice, can be described as epistemic practice. PD research, however, is not geared towards exploring and unfolding the situated, specific design, but towards exploring and unfolding PD practice as its epistemic object. Thus, the specific projects, applying PD in specific contexts, can be seen as exemplars, broadening and unfolding our understanding of what PD is and can be. This can be, for example, through aiming at understanding situated innovation and studying PD “working relationships of technology production and use” (Suchman 1994) from a member’s point of view. Though such studies are by no means unimportant, purely observational studies on their own are not enough to develop and evolve PD methods, techniques and tools to promote socio-technical design that leads to more equal, viable and sustainable usage of IT across different design situations. The specific PD projects can also serve as possibilities to explore and experiment with the methods, techniques and tools. In such cases, the researcher actively engages with the specific PD practice, contributing to, and at the same time learning through, the situated innovation.

New knowledge is in all three cases developed by confronting existing knowledge with the situated design and innovation practice. Both what works in the specific design situation, and what does not, provides starting points for exploring the conditions the situation provides for the methods, tools and techniques the researchers bring to the situation, and helps pinpoint their limitations. Further, this knowledge provides a starting point for exploring alternatives, and thus expanding the existing body of knowledge, the understanding not only of what PD practice is but also of what it can be. Each design situation in itself only provides a specific case, a proof of existence: PD can in such and such contexts be supported in a specific way which results in socio-technically viable innovation. The role of the research community is to provide a frame for accumulating and comparing such specific results. The comparison with other design situations over time leads to an unfolding of what characteristics are influencing the situatedness of PD in practice.

Taking a pragmatic point of view, the specific is not necessarily a deficiency of the individual case, which the researcher must strive to minimize through rigorous scientific procedures. We can complement Knorr Cetina’s concept with some of the earlier work by the founders of American pragmatism: Dewey (1938) highlights the need for a philosophy of experience, where what we learn from the specific situation can be articulated and accounted for as central to what we can know. He defines the situation as the interplay between internal and objective conditions that provides the background for experience taking place (Dewey 1938, p. 42). Experience, ac-

According to Dewey, is not a passive perception, but rather involves interaction with the environment, and thus changes both the environment and the individual's base for future experiences (p. 43–44). It is not only researchers who learn from the experience of situated innovation through PD practice. Also involved domain experts and IT professionals develop their understanding of the interaction between social practices and technology and their understanding of the design and development process. They will carry this experience with them and might use it to unfold the object of design in new contexts. Research is geared to not only use the experience to inform own future epistemic practices but as a base for descriptions and categorisations, that is theories (Schatzki 2001) of what PD can and should be, as well as methods, tools and techniques unleashing this potential.

This process of bringing together thought, observation and practice in formative, world-constitutive ways is grounded in the concept of abductive thinking which is central to American pragmatism (Bertilsson 2009). Bertilsson describes Peirce's concept of abduction as "the pivotal moment of inquiry, where thought, observation and practices meet, where we as observers come a bit closer to the world, and perhaps also assume the role of participants" (2009, p. 218). Van den Ven describes abduction as theory building that starts with surprising observation, maybe contradicting existing theoretical conceptions, where the contradiction is resolved through extending and improving the theory. (Van de Ven 2007, pp. 103-104) For us as PD researchers and practitioners, this means that based on our previous experience and knowledge about design situations, we interact with the new situation, and, based on the effect of our action, we confirm as well as develop our understanding of the participation and design. In recent years, abductive thinking and sense making has been high-lighted and explored also in design research, as being central to design synthesis (Kolko 2010).

Peirce's theory of inquiry recognizes an interpretative universe, making multi-perspectivity part of the very phenomenon we are studying, and are part of. Abduction allows space for the rational of the empirical. It results in theory. Theory in the broad sense can be defined as (abstract) descriptions (Schatzki 2001, p. 4). Such description will always only capture certain aspects of the epistemic object in the making, supporting specific purposes (Knorr Cetina 2001). The abducted theory leads to hypotheses, which, when researchers address situated innovation—as an open epistemic practice—provides insights that may not be 'proven' by conducting experiments in a positivist scientific approach. These insights, rather, need to be further elaborated by informing new design situations and evaluating the observable outcome.

The previous section 5, Participatory design as situated innovation, can be read as an example of such abductive theory building: by developing and expanding the concepts of situated innovation, design constituency, and design space, we broaden and deepen our understanding of PD. However, as the object of PD research is PD practice, an open epistemic practice, comprising both socio-technical innovations and innovation of how PD can take place, and, moreover, the researcher is likely to influence this process, doing PD research requires a reflexive attitude aiming at understanding what happens as an interaction between yourself as a researcher and the PD practice you are relating to. The following subsections provide an example by further exploring PD research. They show that the concepts developed so far allow to more clearly argue the importance of the specific of PD practice for PD research. We start by reflecting on the researcher's role in the projects, discuss what the researchers brought to the project and how the research based on learning through situated innovation contributed respectively to the existing

body of knowledge. Each subsection first briefly introduces the issue, then exemplifies the issue based on the three cases and finally discusses the issue based on the concepts developed above.

6.2 (Re-)Positioning the researcher

In the early PD research projects, PD researchers often acted as participatory designers teaming up with users and their (trade union) organisations in order to show how design can be done in a different way (Pedersen 2007), see also (Bjerknes and Bratteteig 1987) and (Ehn 1988) for examples. The outcome was a proof of concept showing how certain methods of PD lead to viable technical design, which in turn promotes a more appreciable situation for the involved users.

None of the projects presented here involved researchers in the role of IT professionals who were in charge of a PD process. Like the other members of the design constituency, the researchers had to negotiate and re-negotiate their role throughout the process. In the KomInDu case, the researchers found that they needed to re-negotiate their roles as well as the conceptualisation of what was actually being designed. All of the involved researchers felt they were coming from a Scandinavian PD tradition, but in fact they were addressing different objects of design, and also had different ideas about how citizens could and should participate in the design process.

In the telecommunication case, the researchers started as ‘technical consultants’ for the software developers. Research prototypes exploring both interface design and technical implementation for an end-user tailorable program were supervised. During the implementation phase, one of the researchers participated in the programming. The initial reluctance to discuss their development process with the researchers indicated that the practitioners were very aware of the—potentially disrupting—influence of the researchers. Based on the experience in the first project, the research cooperation in the second project included both users and software engineers and included both development processes and actual PD.

In the AMASE case, the researchers, each with different sets of expertise, i.e., the computer scientists, the management experts and the social scientists, had to understand the multiple perspectives and situations of multi-agency social care activity. This meant that each researcher had to change role from ‘expert’ in their field to ‘novice’ in another field as well as engage in roles with the user group, which was made up of nurses, social workers, educational workers, families with handicapped children and the local policy makers.

Not being in control of the design process resulted in additional difficulties on the side of the researchers. The different rationales of research and ‘real world’ design practice became visible. Whereas design processes are geared towards developing a viable socio-technical design, researchers are measured according to contribution to the research community in form of publications. Researchers have to follow scientific standards and relate to a scientific discourse that might, or might not, be relevant for the involved practitioners. This might influence the way the researcher gets involved in the design process. The rhythm of research and development differs. Research publications take at least one or two years from the first formulation of the idea to the published form. Often the topic raised is not relevant for the practitioners anymore when the researcher is still reworking her article. In other words, through the researcher, the whole research discourse interferes with the project. To be able to research epistemic practices, the researcher needs to be open to that the answer to his or her research question might challenge the research

question itself. This is difficult to handle in a research tradition that requires the researcher to be in charge of the research process. Without such openness for the situated innovation, though, we will not be able to continue to explore PD practice in ever new contexts and thus contribute to the unfolding of what PD might be.

6.3 The researchers' contribution

Common to all three projects is that the researchers, in contrast to the early PD projects, did not act as researcher-designers and were not in charge of the design process. So how did they influence the design process? In the KomInDu case, the researchers' background in PD traditions from several different research disciplines provided a conceptual frame for reflecting on the design situation and thus supporting the practitioners involved in taking on the mediation of a PD process within the municipal administration. Although this mediation of PD practices did not work as unproblematically as we had expected, and did not actually bring the citizens into the design constituency, the discrepancies between what we were aiming for and how we went about it were revealed and reflected on during the project, and later resulted in a new, more citizen-centred project focusing on social media and a citizen-driven approach. In the telecommunication project, the contribution made by the researchers was of a more technical nature. The possibility for flexible design of software to extend the possibilities for design-in-use and end-user development opened up for a discussion of how to make use of these possibilities. The researchers led the exploration of different technical solutions by supervising and implementing research prototypes and evaluating them together with software engineers and users. Software engineers, users and management together decided on a design and a cooperation model that combined improved flexibility with the high requirements on correctness. In the AMASE project, the researchers contributed by both establishing a broad design constituency and making health care practitioners' work visible in the design constituency. This was especially important because the health and social care system itself was undergoing change to multi-agency community provision and it was the health care practitioners who were shaping and managing that change. Therefore the practitioners were the experts in the on-going change and they needed to be supported in articulating their needs of an ICT system to underpin these new and complex services.

As we researchers were not in control of the design process and methods, we could not 'try out' methods and designs in a straightforward way. Our disciplinary knowledge contributed to the design by widening, informing and structuring the design space; bringing so far not considered themes to the table, introducing innovative technical possibilities, or broadening the design constituency and promoting so far not considered actors as participants. What we brought to the table depended on our specific research interests as well as on the role the design constituency assigned to the researcher. In all cases, though, researcher participation contributed to an unfolding of what the IT system subject to design could be, to the unfolding of the epistemic object.

Conceptualising the object of PD research not only as tools, methods and guidelines of PD but also as the epistemic practice of PD allows the researcher to contribute to PD practice in different roles and learn from how the design constituency reacts on the contribution.

6.4 Contributing to disciplinary knowledge

Being part of a design process where other actors took the responsibility for the process and the outcome led to a different kind of results than taking a role as lead Participatory Designer would have done. It allowed us to unfold the epistemic object of the research process in different ways than if we had acted as researcher designers. Though we were not able to straightforwardly apply and evaluate our methods, tools and technical ideas, becoming a member of and negotiating our contribution with a design constituency resulted in a more realistic evaluation and adaptation of them.

In the KomInDu case, where the researchers moderated and facilitated design workshops and tested and discussed possible design solutions with the IT consultants, but did not actually “do the design” themselves, the empirical research resulted in a more reflected understanding of varying objects of knowledge and traditions of PD within different disciplines. Situated innovation, thus, took place during the iterative design of the ICT support for citizens’ dialogue during the project, as well as in a more in-depth conceptual shift of the definition of citizen participation in the municipal planning system. This became visible when the next, more citizen-centric design research project was initiated, and the municipal practitioners invited representatives from the earlier citizen focus groups in to the design constituency from the start (Ekelin 2010).

The telecommunication case resulted, on the one hand, in an understanding of the complexity of contextual factors that need to be taken into account when evaluating advanced technical possibilities (Dittrich and Lindeberg 2003). Although programming language technologies to provide runtime and design time flexibility are manifold, the solutions often do not match requirements in the specific context. On the other hand, the PD practice provided the researchers with well-founded insights on how use-oriented development can take place in an industrial setting (Dittrich and Lindeberg 2004). The reflection on the research process contributed to the formulation of a discipline specific action research method (Dittrich et al. 2008).

The outcome from the AMASE project was the development of a social formation methodology. Driven by our understanding of the significance of both situated and mediated conversations in community welfare, our approach is organized through a social formation of academic researchers, various community members, care workers, policy-makers, and system designers. The methodology seeks to address the multiple voices and perspectives in multi-agency community welfare within an inclusive approach to the design of services and communication systems in the development of adaptive and flexible ICT. To capture the complex processes of positioning and re-positioning of the different actors, the concept of design constituency has been developed (Wessels 2007; Wessels et al. 2008; c.f. Molina 1995).

In all three cases, the epistemic object—what PD can be and how it can be supported in its aim to develop more viable information technology—has been unfolded into new directions and that way been extended and further developed. At the same time as many of the established principles and methods and tools have been confirmed, the very concept of PD has been extended beyond developing new tools for the toolbox. However, contribution to the PD body of knowledge is founded on the interaction and dialogue between the contributions the researcher brought to the table and the ‘answer’ the situated innovative PD practice provides for the researchers contribution.

7 Conclusions

The article aimed to reflect on the role of the specific of PD practices for PD research. Based on Schatzki's (1996) work on practice and Knorr Cetina's (2001) work on epistemic practices, we developed the notion of PD as 'situated innovation', an open ended epistemic practice that unfolds the respective socio-technical design that motivated it. We used the concepts of practice, epistemic practice, and situated innovation to expand central PD concepts and improve understanding of the role of the specific of the PD practice in PD research. The goal of PD can be described as promoting, with principles, methods, tools and techniques, the situated design of overall more viable and sustainable socio-technical configurations for the parties involved. The concrete innovation with respect to technology, its usage and the design process depends on the specificity and situatedness of the design process.

We developed the notion of PD research as an epistemic practice that aims at unfolding the notion of what PD practice might become. PD research develops knowledge on how to promote PD by abducting from situated innovation in specific projects, confronting existing knowledge and experience with specific choices, interpretations, and also radical innovations both regarding the outcome and the design process. The results of PD research are theories as well as methods, toolkits and guidelines, that need to be understood as intermediary representations, opening up for new practices that in turn require a further unfolding of what PD practice is and how it can be promoted. Likewise, the concepts we have developed in our discussions are here shared in order to be further developed and elaborated as well as contested in future discourse.

As the PD practices that are at the heart of PD research are themselves epistemic practices, the interaction of PD researchers with these practices and the innovation in these practices are crucial for PD research. This interaction can take place with the researcher acting as designer, and also with the researcher participating in the PD design in other roles. Furthermore, the understanding that PD practice is an open ended, future oriented practice that each time unfolds the object of design in an innovative way, answering situated contingencies in an ever developing socio-technical context, means that we as PD researchers need to embrace PD coming about in new flavours, be it 'PD in the Wild' (Dittrich et al. 2002), PD as part of infrastructure development (Balka et al. 2012) or PD in differing socio-economical or cultural settings (Winschiers Theophilus 2006; Eriksén et al. forthcoming; Gonsalves et al. 2012). We here provide additional support for including research on PD practice in new contexts such as development of large scale infrastructures, continuous design and use of e-services, or as part of software product development as argued by Kyng (2010) and Balka (2010). Researching an epistemic practice means to be open to the research object unfolding in unexpected ways. This is the core of the importance of specific PD practices for PD research. The discussion of what PD can, might or should be needs to become again part of the conferences and journals based on specific projects unfolding PD practice as an epistemic object.

As PD practices change, the ways in which PD practices are researched need to change. At the same time as we develop a way to conceptualise the epistemological anchoring of PD research in specific and concrete PD practice, we unfold what PD research might be in the future. Maybe due to the success of PD research in developing teachable guidelines, methods and tools, we will see more and more PD practices take place independent of PD research and they might

even be applied in projects that are too big for even a research group to take on this role. To learn from these kinds of situated innovation, we need to negotiate new roles in the respective design constituencies and negotiate our contributions with the other actors in the process. We here do not argue for one specific research approach, such as action research, design research, or observational studies, but rather that the understanding of PD research as ‘learning through situated innovation’ requires reflexivity in the implementation and the reporting of the research. However, in which so ever way it comes about, the interaction with the specific of the PD practices is and will remain crucial for PD research.

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