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The diversity of participatory design research practice at PDC 2002–2012 ☆

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ABSTRACT

We investigate the diversity of participatory design research practice, based on a review of ten years of participatory design research published as full research papers at the Participatory Design Conferences (PDC) 2002–2012, and relate this body of research to five fundamental aspects of PD from classic participatory design literature. We identify five main categories of research contributions: *Participatory Design in new domains*, *Participatory Design methods*, *Participatory Design and new technology*, *Theoretical contributions to Participatory Design*, and *Basic concepts in Participatory Design*. Moreover, we identify how participation is defined, and how participation is conducted in experimental design cases, with a particular focus on interpretation, planning, and decision-making in the design process.

1. Introduction

Participatory design (PD) emerged about 25 years ago as a distinct set of design and research practices rooted in a Scandinavian approach to systems design, commonly classed under the label of 'cooperative design', which emphasized designers and users actively working together in a process aimed at improving the quality of working life. As Human Computer Interaction (HCI) expands its borders (Rogers, 2012), participation has become of crucial interest to HCI research in general; and participatory design, in particular, has stimulated increased interest beyond the participatory design community established around the Participatory Design Conference (PDC) series. At the same time, as members of that community, we have also experienced and been motivated by our own need to come to grips with the way in which contemporary PD is understood and practised within this community. Moreover, the term 'participation' is commonly used within a wide range of academic disciplines and public policy areas, including participatory art, participatory action research, participatory democracy, participatory culture, and participatory journalism, which motivated us to further uncover what is meant by 'participation' in participatory design. As noted above, research into participation in general has recently attracted increasing interest, for example, as reflected by discussions in the CHI 2012-invited SIG, 'Participation and HCI: Why Involve People in Design?' In the summary report, Vines et al. (2012) identify five key issues that urgently need to be addressed: mapping definitions of participation; identifying aspects of best practice across contexts; reflection on participant experience and researcher self-reflection; intellectual ownership in participatory design/art/community informatics; transparency of reasons for choosing users.

We address two of the foregoing issues identified by Vines et al. (2012): mapping definitions of participation, and clarifying the role of users in participatory projects. First, regarding the challenge of mapping definitions of participation, our work highlights key contributions and definitions used in participatory design research, as presented over the past decade at the PDC series. Second, we provide a critical survey of the role of users, emphasizing the way in which users are involved in various phases of the design process, thus addressing Vines et al. (2012, 2013)'s calls for clarifying how users are involved, why they are chosen, and what their contributions are. Specifically, we investigate how themes and understandings of PD research practice have been discussed in recent years at PDC, in order to provide a comprehensive resource for participatory design research, and HCI research in general.

In a publication based on the PDC 2006 papers ($N=15$), Bergvall-Kåreborn and Ståhlbrost (2008) examined the concept of participation with respect to the rationale for participation, type of

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participation, and level of participation. Their findings point to a broadness in the definitions and aims of PD, with the aim of pointing forwards to new issues, as well as pointing out the waning interest in explicitly political issues. Our paper has a broader scope, and is based on a longer period of PD research.

Thus, this paper serves the two-fold purpose of providing a critical overview of the field, and providing a platform for both core PD researchers and HCI researchers in general, enabling them to position and discuss their research in relation to participatory design.

The core of this paper comprises a literature review of the last ten years of PDC conferences (2002 to 2012), outlining different categories of research published within the field, and a more comprehensive overview of how participation is conducted and defined in the research papers.

A prominent driver of our research is the desire to examine what is meant by 'participation' in the PD community, and how the way people define 'participation' relates to the way participation actually unfolds in researchers' own experimental research projects. This research is then contrasted with an account of fundamental aspects of PD as identified by core PD literature, allowing us to discuss and contrast classic and contemporary issues. By outlining and discussing the diverse definitions and practices within the PD community, this paper provides a platform for further participatory research, highlighting which themes and issues may be drawn from PD research.

The paper is organized in the following way. First, we present our research method, followed by the identification of five categories of research contributions addressed between 2002 and 2012: *Participatory Design in new domains*, *Participatory Design methods*, *Participatory Design and new technology*, *Theoretical contributions to Participatory Design*, and *Basic concepts in Participatory Design*. Then, we critically examine how participation is defined, and how participation is conducted in experimental design cases. Last we provide an overview of the history of participatory design, going back to the first PDC conference, which we use as a platform for discussing our findings from the review of the contemporary PDC research.

2. Research method and material

In this section, we present our research method and material, and discuss the strengths and limitations of our study. The material examined comprises all 102 PDC research papers published from 2002 to 2012. Our initial research question was 'What has characterized participatory design research in the last ten years?' With this in mind, we focused on the research contributions as presented by the authors, as well as on the definition and practice of participation. We started from the thesis that all research papers at the PDC contribute to PD research based on a particular definition and/or implementation of 'participation'. Furthermore, we initially worked with the premise that the use of methods, technology, users, and domain would be important characteristics of the individual research projects. In addition to these specific areas of interest, we also wanted our reading to be open to emergent issues and key themes. In this way, we conducted a thematic analysis (Flick, 2009; Guest et al., 2011) guided by the initial research question, remaining open to emergent connections and other themes. Hence, our initial framing and reading took seven areas of interest as points of departure: research contribution, definition of participation, methods, technology, users, domain, and key themes.

At a practical level, we downloaded all the papers in PDF format from the ACM Digital Library and from a website hosting PDC proceedings through the years (Participatory Design

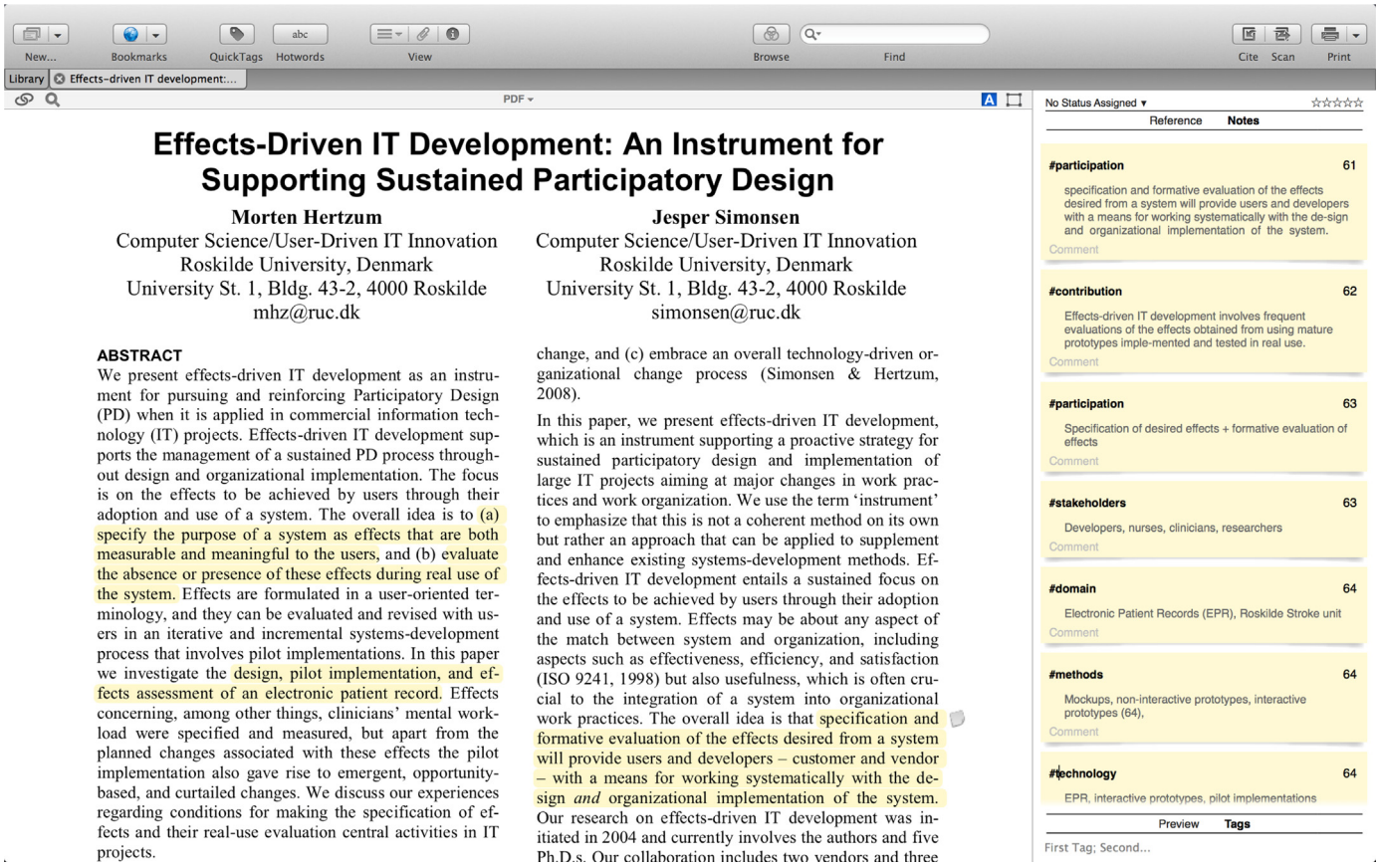

Fig. 1. Sente software, with an example of an annotated paper.

Proceedings—Welcome Page, 2013), and entered the papers into the Sente (Sente Academic Reference Manager for Mac OS, 2014) bibliography software, which allowed us to track standard metadata for reference work. Sente also allowed us to highlight text in the PDF files, and to associate the highlighted passages with keywords corresponding to the seven areas of interest outlined above (Fig. 1). This made it possible to annotate the digital versions of the papers by highlighting examples, facilitating a repository of key passages for easy reference during the writing of this paper. In this way, we established links among the seven areas of interest (research contribution, definition of participation, methods, technology, users, domain, and key themes) and the individual papers. Sente saves PDF files, metadata, and annotations in the About SQLite (2013) database format, providing a smooth way to extract specific points of interest. For example, we could extract all annotations with the key term 'research contribution', grouped by author and year of publication.

Understandably, our study has a specific focus, with respect to scope and time frame. With regard to the scope of our study, we focus on the research papers from the PDCs. Within the field of participatory design, PDC is the most prestigious and oldest, and a highly-ranked conference according to the Danish national publication ranking system. As the prominent participatory design conferences, we consider PDCs to be appropriately selected as the starting point for discussing what constitutes participatory design.

We limited our study to research papers. Workshop and short papers present valuable research, but by focusing on research papers, our analysis covers those works that present the most significant contributions to the PDC discourse, and are subject to the most rigorous review by the PDC programme committee. Workshop and short papers might challenge points made in this paper. However, according to the ACM library, all ten PDC papers with the greatest impact are research papers, which suggests that the full-length papers represent the most influential research of the PDC community.

With regard to time frame, we recognize the value of examining the entire 1990 to 2012 period of the conference series, but have chosen to make a detailed study of a shorter time period, instead of a longer study that pays less detail to each paper. The period encompasses the general transition to 'third-wave HCI' (also reflected in the many new domains introduced in the papers), and apart from Muller and Druin (2012)'s more general discussion of PD in HCI, there has been limited review work covering this time period. Also, we are mainly interested in contemporary framings of PD, as opposed to providing a more longitudinal account, hence the focus on the last six conferences.

It might also be interesting to consider the categories of papers and domains that are unrepresented at the PDCs. The PDC series does not represent the entire range of PD research, and one way to advance the work started here would be to do comparative studies involving other disciplines, such as HCI, the CHI or DIS conference series, or specific journals, such as *Journal of CoDesign*. Doing so would supplement the work started here, and contribute to the ongoing discussion of the nature and concerns of PD research. However, the advantages of focusing on the PDC series are manifold. Primarily, it offers a comparable and consistent body of research. For instance, all the papers examined are roughly the same length, and judged by a consistent and international panel of reviewers, making it feasible to compare themes and issues across the entire body of work.

With our focus on a specific time frame and the scope of publications established, we consider our chosen dataset a strong and consistent body of research that allows themes and issues to be applied for the purpose of shedding light on the diversity of contemporary PD research. This means that our analysis and discussion, below, are valuable in establishing the way in which issues of participation are addressed and discussed in contemporary PD research. As we will return to later, there exists a rich body of work covering the early days of the PD movement, but there is a need for offering an overview of contemporary PD research.

Our analysis of the papers is a theory-informed approach, in that we had a preconceived understanding of the PD research fields, and used this knowledge to guide our analysis. Through our analysis, it became clear that, individually, the seven areas of interest comprising our initial framework would not lend themselves well to analysis, as separate themes. In almost all the papers, two or more of the areas are interrelated, for instance, the use of a specific method in a specific new domain. In other words, isolating and reporting on methods used in research cases would convey a simplified picture of contemporary PD research. Instead, in the following, we focus on *research contributions* and *participation as defined and practised*, informed by the five other areas of interest.

3. Contemporary participatory design research

In the following we first address research contributions and then turn to participation as defined and practised.

3.1. Research contributions

Investigating the kinds of contributions made at the PDCs between 2002 and 2012 enables us to offer an overview of the participatory design research field. After completing the groundwork of collecting, reading, and annotating the papers, we were able to group the different categories of contributions by identifying similarities and differences leading us to categorize the contributions submitted at PDCs with respect to: participatory design in new domains; participatory design methods; participatory design and new technology; Theoretical contributions to participatory design; and Basic concepts in participatory design. Table 1 provides an overview of the material organized by year and area of contribution.

We next present a qualitative investigation of the papers, illuminating the broader issues addressed at the PDCs. We identify each category of contribution, then offer examples of how we arrived at these particular groupings, giving examples of clear candidates for each grouping.

3.1.1. Participatory design in new domains

The original tenets of PD were applied in a workplace context, but over the years, PD has expanded into new domains and contexts, partly owing to technological developments.

Similar to the development of HCI (Rogers, 2012), PD is expanding its borders, extending to new domains of application and use. The largest category in our literature review consists of the contributions that discuss how PD is used in a domain that is

Table 1
The five categories of contribution.

	2002	2004	2006	2008	2010	2012	Total
Participatory Design in new domains	2	10	4	5	5	6	32
Participatory Design methods	7	8	4	2	1	3	25
Participatory Design and new technology		3	2	1	2	1	9
Theoretical contributions to Participatory Design	4	1	2	3	4		14
Basic concepts in Participatory Design	5	2	3	4	3	4	21

new or very uncommon to PD, thus contributing to the field by implementing PD techniques, or questioning prevailing assumptions. Such contributions seem to be technologically and organizationally tied to societal developments. Indeed, many contributions address specific challenges met by PD when venturing into new areas, where conditions differ from previous ones. A good example of this is Mainsah and Morrison (2012) discussion of how social media may be used for civic engagement with youths, raising questions about technology (social media), society (civic engagement) and users (youths). Similarly, Taxén (2004) discusses how a set of participatory methodologies was introduced to, and adapted for museum exhibition design.

In the category of PD in new domains, the healthcare sector is another prominent domain, where Kelly and Matthews (2010) provide a discussion of involving 'pre-users' of medical technology in the design process, as a way of preparing them for their use of necessary insulin injectors, for instance. Also in the field of healthcare, Björgvinsson and Hillgren (2004) elaborate on the combination of ethnography and 'on the spot experiments' that facilitate learning for hospital personnel and patients. This category of PD in new domains also has a strong focus on the challenges of and potential for using PD outside the original geographical focus on the Western world. For instance, Braa et al. (2004) report on experiences of applying PD in hospitals in Cuba, and the challenges of designing within these highly hierarchical settings. Elovaara et al. (2006) conducted a comparative study of implementing PD in Tanzania and Sweden, and discuss how concepts and ideas of PD are adopted in such domains (Table 2).

Examples such as the foregoing are instructive; they emphasize the challenges PD researchers face when going beyond the workplace to wider areas of use. The papers presented at the PDCs demonstrate that PD is also changing cultures of use, which generates new areas of research. This is consistent with Muller and Druin (2012)'s work, which foregrounds healthcare, developing countries, and designing for children, as new, burgeoning areas for PD. In the papers examined, we did not find many specifically concerned with designing for children—however, we attribute this to the success of the IDC conference, which also has a strong focus on issues of empowerment and ethics. Going through the many papers concerning different domains in PD throughout the years, it is interesting to note how new issues and technologies evolve and are tackled over time. In some of the earlier papers, we find examples such as that of Hepsø and Botnevik (2002), who report on the use of telecommunications in the Norwegian crane industry, whereas some of the later papers address social media and strategies for long-term user involvement (Johnson and Hyysalo, 2012). Thus, although later categories of contributions on issues in PD generally question the nature of participation, these types of contributions often address more *pragmatic* issues (Greenbaum and Madsen, 1993).

3.1.2. Participatory design methods

A second kind of PD paper investigates specific methods: how well-established methods translate into new contexts, how they are modified to fit specific purposes by changing, applying, or creating a new method. We identified 25 papers as explicitly concerned with methods, and it is important to note that, although almost all the papers from the PDCs mention methods, this category comprises those in which the role, form, or use of methods is their primary focus. Examples of this include: Hemmings et al. (2002), who conducted a comparative study of probes used for information and inspiration; Isomursu et al. (2004), who discuss the Experience clip technique, an approach to evaluating mobile concepts through user participation; and Bødker et al. (2012), who provide a discussion of research-based personas in user participation from an eGov project, to investigate how personas help designers engage with users (Table 3).

Included in this category is also papers which reveal a concern for the interplay between method and enactment of methods, for instance, by Sarkkinen (2004), who addresses how the theoretical concept of 'frames' may be applied as a control strategy, and uses this to analyse how an IT manager uses a white board to control the planning phases of an IT project. Similarly Light and Akama (2012) discuss their study of agency and practitioner roles in relation to methods, as they are enacted. Such approaches seem to be valued within the PDC community as they argue for relatedness between method and practitioner, thus emphasizing how PD may be considered an interplay between a method and its enactment.

3.1.3. Participatory design and new technology

This category of paper examines PD research with respect to new technology, specifically, the challenges participatory design encounters in light of technological developments, establishing new

Table 2
Examples of the *Participatory Design in new domains* category.

First Author	Year	Contribution
Mainsah	2012	How social media may be used for civic engagement with youths, raising questions about technology (social media), society (civic engagement) and users (youths)
Johnson	2012	PD with social media and strategies for long-term user involvement
Kelly	2010	Involving 'pre-users' of medical technology in the design process, preparing them for the experience of needing insulin injectors.
Elovaara	2006	Comparative study of doing PD in Tanzania and Sweden, highlighting differences and similarities
Taxén	2004	How participatory methodologies have been introduced to and adopted for museum exhibition design.
Björgvinsson	2004	Combines ethnography with 'on the spot experiments' to facilitate learning for hospital personnel and patients
Braa	2004	Investigates PD in hospitals in Cuba, and the challenges of designing within such highly hierarchical settings
Hepsø	2002	In-depth study of implementing telecommunication in the crane industry in Norway

Table 3
Examples of the *Participatory Design methods* category.

First Author	Year	Contribution
Hemmings	2002	Comparative study of probes as used for information and inspiration
Isomursu	2004	Experience clip technique, an approach to evaluating mobile concepts through user participation
Bødker	2012	How research-based personas can help designers engage with users.
Light	2012	Agency and practitioner role in relation to the enactment of methods
Sarkkinen	2004	Analysis of how an IT manager uses the control of a whiteboard to control ideation and planning

domains and settings. There is a subtle difference between these papers and the previous category on PD in new domains, in that these papers are more specifically focused on the technology as such, rather than the specific questions of domain. A typical example is that of Kolko et al. (2012), who report on the Hackademia project, which aims to provide students without technical education with the ability to communicate with those who do have these skills. By so doing, Kolko et al. (ibid) note that the skills gained by students during the Hackademia project facilitate a greater degree of multi-disciplinarity and collaboration on technical issues, leading to creative solutions and innovation. Here, the role of technology is actually the core of the problems investigated: For example, how do we enable students without technical skills to achieve a level of expertise in programming that enables them to collaborate with computer scientists and engineers? (Table 4).

Hornecker et al. (2006) provide another strong example by examining challenges for PD when engaging with and mediating stakeholder values, trust, and partnerships, in an 'opportunity space' created by ubiquitous computing. Last, we mention Fischer (2004), who contributes a discussion of a long series of projects for overcoming barriers to social creativity, by creating socio-technical environments that turn barriers into opportunities for enhancing the social creativity of design communities. Examples include a social network for caregivers sharing experiences, and a software system for discussing architectural design rationales.

3.1.4. Theoretical contributions to participatory design

This category includes papers that explicitly introduce or establish theoretical approaches, models, or concepts. We identified 14 papers for this category, and it is important to note that although theory is applied and developed in some form throughout the entire body of PDC proceedings from 2002 to 2012, these papers differ in being explicitly concerned with advancing a theoretical concept, model, or framework (Table 5).

A prominent example is Hertzum and Simonsen (2010)'s introduction of the concept of 'Effects-Driven IT development,' which sets out to better evaluate the results of design work, by frequently evaluating the effects obtained by using mature prototypes implemented and tested in real settings. Based on their case study, they introduce a model and conceptualization that advances the PD field by helping others to understand their own work through this model and its conceptualization.

Another strong example of a contribution of theoretical concepts in PD is the work of Iversen and Dindler (2008), who introduce the concept of 'Aesthetic Inquiry' as a way of understanding their method, 'Fictional Inquiry,' an approach for, in their own words, "tipping the scales towards transcendence." From the earliest part of the period we examine, we find an effort to create Pattern Languages for design (Dearden et al., 2002; Schuler, 2002), and (Hansen, 2006) introduces a theory for exploring design as a series of socio-technical experiments. Hansen (ibid) draws on Latour's philosophy, to create a set of concepts for understanding and working with three specific challenges (socio-technical, multidisciplinary, and translation challenges).

3.1.5. Basic concepts in participatory design

The contributions under this heading consist of papers that specifically discuss the general nature of participatory design, Participation, or related concepts, in order to illuminate these issues within the field. The contributions in this category specifically set out to identify core aspects of participatory design in various ways, rather than address a specific method, new domain or technology, or specifically advance a theoretical concept or framework. For example, Iversen et al. (2010) discuss the way in which values may be seen as the main driver of the PD process; Ehn (2008) offers a discussion of the PD process as Latourian 'things'; Bossen (2006) discusses the relation between PD methods and emancipatory aims from a critical perspective; and Ehn and Badham (2002) consider PD as a post-utopian approach. These papers primarily explore what PD and participation are, in contrast to the other four categories (Table 6).

We also include comparisons of related fields: for example, Dearden and Rizvi (2008) compare the similar domains of participatory interactive systems design and participatory approaches to international development. Likewise, Pekkola et al. (2006) and Rittenbruch et al. (2002) contribute discussions of different systems development methods, and how these may be informed by PD, or vice versa. Last, we include discussions of specific concepts within participatory design (a good example being Kanstrup, 2012's article, which discusses who the designer and the user are, in participatory design) and issues of power relations in PD (Bratteteig and Wagner, 2012; Büscher et al., 2002). Such contributions explore and question issues of politics in participatory design.

Having provided an overview of the main areas of *research contributions*, we now turn to how *participation is defined and practised*.

3.2. Participation as defined and practised

Unsurprisingly, PDC papers use the term 'participation' frequently, but exactly how users were involved, and what is meant

Table 4
Examples of the *Participatory design and new technology* category.

First Author	Year	Contribution
Kolko	2012	Hackademia project, aimed at providing students without technical skills with the ability to 'hack' and communicate with those that do have these skills
Hornecker	2006	Challenges for PD in an opportunity space created by ubiquitous computing
Fischer	2004	Websites as socio-technical environments creating opportunities for the social creativity of design communities

Table 5
Examples of the *Theoretical contributions to Participatory Design* category.

First Author	Year	Contribution
Hertzum	2010	'Effects-Driven IT development', evaluating results by using mature prototypes implemented and tested in real use
Iversen	2008	'Aesthetic Inquiry' a way of understanding fiction in design
Schuler	2002	Pattern Languages for design
Hansen	2006	A model of design as a series of socio-technical experiments

Table 6
Examples of the *Basic concepts in Participatory Design* category.

First Author	Year	Contribution
Kanstrup	2012	End user design in a PD project exploring user-driven innovation as a perspective and method for PD
Bratteteig	2012	Analysis of the complexity of design decisions through an urban planning case
Iversen	2010	Values as main driver in PD
Ehn	2008	PD as a Latourian 'Thing'
Dearden	2008	Comparison of PD and participatory approaches to international development
Bossen	2006	Relationship between PD methods and emancipatory aims from a critical perspective
Pekkola	2006	Compares and combines information systems development methods with PD
Ehn	2002	PD as a post-utopian approach
Rittenbruch	2002	Integration of extreme programming and participatory design
Büscher	2002	Analysis of strategies to navigate settings—PD as ameliorating differences to a degree

by 'participation' differs from paper to paper. It is important to note, that our mission or goal is not promote a specific PD standard; rather, we are interested in providing insight into how the PDC research community understands the concept of 'participation', which we will subsequently use as the basis for a more critical examination of the relationship between what is defined as participation, and the practical way in which participation unfolds in specific PD research cases.

3.2.1. *Definitions of participation*

Our literature review reveals diverse definitions of 'participation', ranging from the goal of 'involving users', without further qualification, to more elaborate discussions of the idea of participation as a core aspect of PD. We have identified three general definitions—based on an understanding of participation as (1) implicit, (2) users' points of view, and (3) mutual learning—which we address below.

A few of the papers state that users were part of the design process, but leave the exact conception of participation unclear (e.g. Clement et al., 2008; Herrmann et al., 2004; Pekkola et al., 2006). For instance, Pekkola et al. (2006) report on blending PD and an iterative systems development approach in an attempt to have the two inform one another, but it is unclear how 'participation' is defined. Failing to define precisely how one understands participation is problematic; however, PD is a well-established field of research in which the concept of participation might be taken for granted, possibly making discussions of what is meant by 'participation' seem superfluous. For example, Johannessen and Ellingsen (2008) discuss concrete aspects of particular PD methods in the specific organizational context of the implementation of large-scale health systems, without addressing what is meant by participation. It is also worth noting that many papers may not explicitly discuss their conceptions of participation, but actually do cite some of the key publications in the field, for instance *Design at Work: Cooperative Design of Computer Systems* (Greenbaum and Kyng, 1991a), underscoring the previous point about taking the definition of 'participation' for granted.

Explicitly defining participation as concerned with the users' points of view is another approach, indicated, for instance, by terms or statements such as 'user-driven process' (Dalsgaard, 2010), 'people as experts in their own lives' (Campbell, 2004; Guest et al., 2011), or formulations such as 'maintain the power of the artists to express a certain vision of the work, but equally to ensure the power of the audience to create their own experience of it' ((Robertson et al., 2006) p. 39). Describing participation in such ways reflects a concern for the user's point of view, which is clearly a major concern that goes beyond merely involving them in the design process. Furthermore, this concern for the user's point of view is extended to include what users know to be important, and also suggests that they are best equipped to make decisions based on this knowledge. A clear example of this is offered by Hornecker et al. (2006), who address the use of different PD techniques as a way of engaging with the 'opportunity space' created by the use of ubiquitous computing technology, when designing for visitor experiences at a historic country estate in England. Here, the aim of participation is explicitly expressed from the different stakeholders' points of view, and the core of the paper addresses how these different points of view were reconciled through a series of workshops with the designers. Thus, the paper is concerned with a specific aspect of participation, namely, reconciling stakeholder perspectives.

The last approach emphasizes 'mutual learning' (e.g. Björgvinsson and Hillgren, 2004; Cederman-Haysom and Brereton, 2006; Dearden et al., 2006; Winschiers-Theophilus et al., 2010)). One might argue that most participatory design processes involve mutual learning, and such a definition of participation does recognize the value of the user's point of view. One might call this a sort of a 'middle ground', in that it is unclear from the definition alone whether the purpose of PD is the transfer of knowledge among users and designers, or whether it also implies that the users are best equipped to make decisions for themselves.

In Björgvinsson and Hillgren (2004)'s article, the importance of mutual learning is demonstrated through the creation of small videos of work situations, which are made available to other workers for their education on, and rapid implementation of various hospital artefacts. This means that mutual learning occurs at two levels, both between designers and users, and among users, through the video clips. However, the definition of participation provided leaves the extent to which users influenced the design process unclear.

We must emphasize that we are not stating that papers that do not explicitly define participation fail to value user perspectives, but that we often find it difficult to determine whether this is the case. When the authors did not define what they meant by 'participation', we had to investigate whether anything that the authors did indicated a concern for what participation is, and its contributions. Similarly, in the cases where the papers defined participation as 'mutual learning', we had to investigate how this mutual learning actually took place.

Summing up, the many papers from a decade of PDCs reveal a plethora of definitions of 'participation'. This is hardly surprising, given that the PDCs address a wide range of subjects and ways of approaching participatory design. Thus, another question relates to how participation actually unfolds, which we address in the next section.

3.2.2. *Participation as practised*

In most of the material examined, the authors report on how they conducted the explorative design projects on which their research is based, enabling us to examine how the many

definitions of participation develop in specific cases. We do this to highlight the diversity of ways participation is practised, diversity that in many ways reflects the multiple definitions of participation discussed above.

Commonly, different design techniques are used in different stages of the design process. For instance, ethnographic methods are usually used in the early stages of the design process, whereas various kinds of prototyping are used later in the process, although each design process involves specific conditions: for instance, ethnography may be required late in the process, or perhaps not at all.

When the design process moves from one activity to another, one activity – for instance, creating a mock-up (Ehn and Kyng, 1991) – does not pick up precisely where the previous activity – for instance, ethnographic studies – left off. An act of interpretation is always involved, the selection of what may be relevantly carried over from one activity to the next. Furthermore, every design event involves planning, when the next design activity is scheduled, and materials for it are prepared. Finally, decisions are made between design events, often regarding what kind of design activity should follow the previous one, or what to carry over from the previous activity. With an understanding of PD processes as a sequence of activities based on different PD techniques, connected by interpretation, planning, and decision-making, we are ready to discuss typical instances of participatory design in the research papers we examined.

Examples of this foregoing structure occur throughout the examined material, and PD in general. One example is the use of ethnographic studies as a way of collecting insights about users (e.g. Cederman-Haysom and Brereton, 2006; Hemmings et al., 2002; Kanstrup and Bertelsen, 2006; Sefyrin, 2010). From these we can identify several different approaches to reporting on how participation was conducted, each with individual strengths and weaknesses.

Some of the papers report design processes consisting of a succession of activities (Buur et al., 2000; Cederman-Haysom and Brereton, 2006; Dalsgaard, 2010; Robertson et al., 2006; Sarkkinen, 2004). One approach is to report on individual design activities, while leaving unclear exactly what happened between these activities. An example is Cederman-Haysom and Brereton (2006)'s research into a participatory design case contextualized in a dental practice. First, the authors make a valuable contribution to PD research, in what was at that time the emergent field of ubiquitous computing, and provide deep and vital insights into the challenges of bringing participatory design to a project spanning technical research interests and commercial objectives, at the same time making demands on the time of skilled professionals. They report on how they used ethnographic methods at both a dental school and a dental practice, which 'provided contrasting insights into work practice, terminology and our understanding of the practitioner's requirements' (ibid p. 12). In turn, they used these insights as springboards for creating low-fidelity prototypes, ultimately experimenting with speech recognition as a way of allowing multimodal interaction. However, from a participatory design research perspective, one could argue that this generally rich and insightful paper leaves open how the researchers bridged the gap between the ethnographic studies and prototyping sessions, including information about who interpreted the results of the ethnography. The authors state that 'all design activities were situated at the practitioner's domain' (ibid p. 12), which supports our previous point about one design activity not picking up precisely where the preceding one left off. Indeed, it seems the researchers did at least some planning and decision-making between each design activity, in order to involve users in the main design activities, for instance, through the use of low-fidelity prototypes.

Buur et al. (2000) exemplify a different approach, addressing who does what in a PD process more directly, in a project concerning the design of pumps for wastewater plants. Here they conducted a number of design events (ethnography, ideation, mock-ups), using videotaped material as a way of involving users in the project. Buur et al. (ibid) describe how they involved the users in both the collection of data and the interpretation of the field studies, through the use of a specific video-card game. In other examples, Buur et al. (ibid) discuss how they used video footage as a tool for interpreting the results of a mock-up test. In this case many of the design activities involved were explicitly designed to support user involvement in interpretation or decision-making. Simonsen and Hertzum (2008)'s paper on the process of designing an Electronic Patient Record (EPR) module for managing the prescription and use of drugs at a hospital's stroke unit is another example that presents the activities between design events quite specifically. Here, the researchers used a functional prototype in real practice, for an extended period of time (a whole week), in order to test it extensively and learn, by establishing a familiarity with the system. We find their approach valuable, as it clarifies the interplay between the prototype and the interpretation of the use of the system. The way users provided input during this process of working with the prototype is described in detail, and was clearly an important part of the design process.

An understanding of the variation in how participation is practised is reflected by Bossen et al. (2010), who, in their discussion of user gain from PD processes, highlight how others have scrutinized the idea of 'participation', yielding several distinctions with regard to the *kinds of people* who participate, the *type of participation*, the *degree of participation*, the *duration of participation*, and the *arena of participation*. This complexity of the term 'participation' is amply reflected in the material examined, as we have discussed above.

To summarize, our analysis of how participation is defined and conducted reveals several salient points. First, there exists a rather wide range of definitions of what is actually meant by 'participation', and sometimes the intended meaning is unclear. Second, we have investigated how participation takes place as described in the individual project.. We have highlighted how PD unfolds through a series of design events, strung together by decisions, interpretation, and planning. Then, through a range of examples, we have demonstrated that there is significant diversity in the practice of participation.

4. A brief overview of the history of participatory design

Our review of the last recent ten years period of PDC conferences has documented a diverse set of research practices and understanding of what constitute PD. New domains, methods, theoretical concepts and technologies have been explored all positioned within the field of PD. This begs the question of how this body of work published from 2002 to 2012 relates to the historical roots of participatory design. In this section we therefore present a brief historical overview of the history of PD, which we subsequently will use as a starting point for comparison and discussion of our findings in the final section.

In our overview we include fundamental aspects of participatory design as presented at the first PDC proceeding (Namioka and Schuler, 1990), and by the three major participatory design anthologies (Greenbaum and Kyng, 1991a; Schuler and Namioka, 1993; Simonsen and Robertson, 2012). We also include a survey by Clement and van den Besselaar (1993). Among the precursors to the Participatory Design Conference series were the 1975 and 1985 Aarhus conferences. Bjerknes et al. (1987) edited an anthology

based on material from the 1985 conference, *Computers and Democracy*, which comprised a collection of articles about practical and theoretical developments in computing in the context of democratizing work. At that time, 'participatory design' was not a well-established term, but an emerging field of research and practice revolving around core values, such as democracy and quality of work life (ibid p. 2), workers acquiring control of computer systems and their use at work, and designing computer support for skilled workers (ibid p. 6).

The core values of the early Scandinavian projects were consistently echoed in the landmark 1991 anthology, *Design at Work: Cooperative Design of Computer Systems* (Greenbaum and Kyng, 1991a), which brought together Scandinavian and US cooperative design researchers. According to the introduction ((Greenbaum and Kyng, 1991b) p. 1–2) they share a set of ideals, namely: the need to design with full user participation; the goal of enhancing workplace skills; seeing computer systems as tools; seeing computer systems as means of improving quality of work; considering the design process as a political process with conflicts; and seeing the use situation as the fundamental starting point for the design process.

Whereas 'cooperative design' and the 'Scandinavian approach' to systems design were the original descriptors for design activities, emphasizing designers and users actively working together, 'participatory design' became the label for such activities, as cooperative design became widespread in North America and other parts of the world.

The first PDC established participatory design as a defined field of research. PDC 1990 was held in Seattle, Washington, and was sponsored by the Computers in the Workplace Project of Computer Professionals for Social Responsibility (CPSR). The conference was the first major venue where researchers and practitioners joined forces to address concerns regarding "systems that are difficult for workers to master, poorly suited for their tasks, and perceived by them as job-threatening or job-degrading." The 1990 proceedings stated that participatory design (PD) represented a new approach, emphasizing (Namioka and Schuler, 1990): providing workers with better tools to support their work; users as experts at improving their own work and work life; regarding users' perceptions of technology as important to success; and the importance of viewing computer-based applications in context.

Using PDC 1990 as their basis, Schuler and Namioka (1993) emphasize that PD differs from traditional systems design, in considering users as experts in their work lives, by viewing user perceptions of technology as important, and lastly by viewing computer-based applications in context. Moreover, Schuler and Namioka emphasize the fundamental idea of democracy – "People who are affected by a decision or event should have an opportunity to influence it" (ibid p. xii) – and that participation is essential to good design.

Clement and van den Besselaar (1993) presented one of the early reviews of the PD field in 1993, based on their study of an overview of PD projects presented in 1983 at The IFIP WG 9.1 conference, *Systems Design For, With and By the User* (Briefs et al., 1983). Starting from a broad definition of PD, they identified 25 projects, 16 of which were supplemented by additional insights via a questionnaire. Among the projects, we find those conducted at the Norwegian Computing Centre in the 1970s, the DUE (Demokrati, Udvikling og EDB, Eng. Democracy, Development, and Computers) (Sandberg, 1979) project, the UTOPIA project (Bødker et al., 1987; Ehn, 1988), and the Florence project (Bjerknes and Bratteteig, 1987). Several of the projects were conducted in industrial settings, and almost invariably, on the initiative of researchers, but in close collaboration with trade unions. Clement and van den Besselaar (1993) identify five elements crucial to a PD project: access to relevant information; having an independent voice in decision-making; user-controlled development resources; appropriate development methods; and lastly organizational/technical flexibility meaning room for alternatives. According to Clement and van den Besselaar the overarching, core element of PD is identified as "the empowerment of workers so that they can codetermine the development of information systems and their workplace" (Clement and van den Besselaar, 1993) p. 29.

A recent handbook on participatory design, edited by Simonsen and Robertson (2012) and based on a PDC 2010 workshop, provides an introduction and a reference to core areas of participatory design. In the initial section of the introductory chapter, the authors state that at the heart of participatory design is the idea that those who use information technology play a critical role in its design, and that PD is defined by mutual learning through collective 'reflection in action'. Moreover, a fundamental aspect of PD concerns giving users a voice in design, through interaction with prototypes and such. Last, Simonsen and Robertson briefly mention that PD is a political process. The remainder of their introduction is dedicated to a historical overview of PD, organized around basic concepts such as 'practice', which further elaborate on the foregoing core aspects of PD.

For ease of reference we have summarized the findings from this section in Table 7, which provides an overview of the five fundamental aspects (politics, user, methods, context and product) are – with few exceptions, indicated by empty entries in Table 7 – recurrent in the core literature included in the brief historical overview of this section.

5. Discussion

We opened this article by examining contemporary PD research through a detailed study of the research papers published at the PDC between 2002 and 2012. We identified five categories of contributions, and discussed how participation was defined and practised as described in the publications. We then presented a brief historical overview of PD research, focusing on the early years of the field's development based on a study of core PD literature (see Table 7: Fundamental aspects of PD). The latter was done for two reasons: to situate our review of contemporary PD properly within the larger discourse of participatory design; and because much of the work done in contemporary PD draws on these core PD works.

Based on our analysis and synthesis of the PDC and historical PD literature, we suggest a reformulation of the fundamental aspects of PD (Table 8). Below, we go into each of these aspects, discussing both the original point of departure and the nuances and developments we have drawn from our own study of contemporary PD. After that, we take up the issue of 'participation', which permeates all five aspects of PD presented below.

5.1. Politics

Going through the 2002–2012 PDC proceedings, a focus on politics is challenged in new contexts and constellations of users, which differs from the classic division into workers as users and employees. The political aspect has become subtler, and in Muller and Druin's formulation, more focused on a *polyvoiced* perspective, rather than a *conflict* perspective (Muller and Druin, 2012). Much of the research presented at the recent PDCs focuses on engaging users in design, with either pragmatic or political aims (Greenbaum and Madsen, 1993), and often in domains with complex constellations of user and other kinds of participants: civic engagement, healthcare, or outside of classic Western contexts. In the case of healthcare, we often see PD involving either patients, aimed squarely at improving their quality of life, or healthcare personnel. The latter is a typical

Table 7
Fundamental aspects of PD, as identified in core PD literature.

	Namioka and Schuler (1990)	Greenbaum and Kyng (1991a)	Clement and van den Besselaar (1993)	Schuler and Namioka (1993)	Simonsen and Robertson (2012)
Politics		The design process as a political process with conflicts	Access to relevant information User-controlled development resources	People who are affected by a decision or event should have an opportunity to influence it	Participatory design is a political process (p. 3)
User	Users as experts in how to improve their own work and work life		An independent voice in decision-making	Considering users experts in their work life	Users play a critical role in design (p. 2 top) Users learn about technological means to achieve their aims
Methods	Viewing users' perceptions of technology as important to success	The need for designing with full user participation	Appropriate development methods	Viewing users' perception of technology as important	Mutual learning through collective reflection in action Prototypes etc. enable users to have a voice in design
Context	The importance of viewing computer-based applications in context	The use situation as the fundamental starting point for the design process		Viewing computer-based applications in context	Designers strive to learn about the users' situation
Product	Providing workers with better tools to support their work	The goal of enhancing workplace skills Computer systems as tools Computer systems as means to improve quality	Organizational/technical flexibility (i.e. room for alternatives)	Participation can improve quality (p. xii)	Designing to respond to human need (p. xix)

Table 8
Fundamental aspects of participatory design.

Politics	People who are affected by a decision should have an opportunity to influence it
People	People play critical roles in design by being experts in their own lives
Context	The use situation is the fundamental starting point for the design process
Methods	Methods are means for users to gain influence in design processes
Product	The goal of participation is to design alternatives, improving quality of life

example of politics at play, in that, although aimed at designing with healthcare personnel, to improve the quality of their work life, it is also focused on providing benefits for the recipient of their work: the patient. In the case of designing outside the Western world, we see much work on different standards for participation and political aims: in other historical and cultural norms, such examples serve to question the existing Western political assumptions in PD. Although these nuances mean that what is meant by 'politics' is expanded, we still find politics to be a core issue of PD, although it may be questioned whether this is politics in the sense that Beck (2002) describes. Returning to our investigation of participation as practised, we also identify the importance of the interplay between different activities in the design process, and the political stance: When may a user really be said to have been involved? How much is it feasible to involve a user? Such questions serve to move the issue of participation beyond simplistic definitions of whether or not users were part of the process, towards questioning how, why, and when users were involved in specific parts of the project.

5.2. People

As briefly touched upon above, PD has gone from being concerned with involving users, to involving people in the design process. In our study of contemporary PD, much research focused on complex and dynamic use situations. Projects aimed at social media, on engaging temporary users, on fostering civic engagement and FabLabs, metadesign, and other new developments, challenge the idea of the 'user' by intentionally blurring the distinctions between designers and users. Such examples illustrate one of the important developments of contemporary PD, which is that it has advanced by considering new groups of users, who may not specifically consider themselves users, but merely people. However, this development also presents researchers and designers with new questions, such as whom to involve in a project if the 'users' are not a clearly defined group.

5.3. Context

The use situation remains the fundamental point of departure for PD, but what characterizes use situations is multifarious. The fact that participatory design has entered new domains may be the most significant development in participatory design research, and also has implications for several of the other four fundamental aspects presented in Table 8. But we have also seen several projects that address participatory design in its original domain of workplace contexts, for instance, in the healthcare sector. Furthermore, whereas early PD projects played out in Europe and North America, in the last decade PD has propagated to other parts of the world, with different organizational structures and politics. Moreover, in new domains, users comprise a much less well-defined groups, and instead encompass multiple cohorts of stakeholders with only partially shared interests, which challenges the PD axiom that those affected by a system should have a say in decisions related to it—indeed, what constitutes a use situation, and therefore the context of a system, becomes much harder to define.

The general development of technology during the period under consideration is quite evident in the pool of papers considered, for example, as reflected by ubiquitous computing being a key area of interest, which is connected to research into PD in new domains and contexts. A few papers present the emergent interest in hacker spaces and maker communities, which further challenges the blurred boundaries between design and use, and positions the politics of user-controlled development on the research agenda. To us, this is interesting, as it places the power of defining and reshaping use situations in the hands of the users,

allowing them to transform their own lives, which was originally, and remains, one of the key aims of PD.

5.4. Methods

The extent to which various methods are specifically PD methods has been discussed frequently, as has whether 'methods' is an important area of PD research. Our survey clearly demonstrates that PD researchers remain preoccupied with methods, and our thesis is that research into methods is particularly relevant in relation to the other fundamental aspects of PD (see Table 8), for example, the way in which a certain method enables loosely defined configurations of stakeholders or users to have a say in decision-making in a civic context. However, the development of the aspects in Table 8 also challenges existing methods, since methods are often developed with specific aims and contexts in mind. When the distinction between 'users' and other kinds of 'people' become blurred and 'context' may be temporary or distributed new methods may be required. Our discussion of participation as practised also suggest that methods remains an area that deserves considerable attention in PD research. Questions such as how a specific method translates into a new domain, how it may be used with specific constellations of people, or which methods are challenged by new technological developments, remain valid.

5.5. Product

One of the original aims of PD was the improvement of the quality of life of workers or users through the design of new products or technologies. However, when analysing through the PDC papers, it is notable that the overt focus on the product has become more subtle. In fact, PD has become concerned about improving quality of life in a broad sense. Thus, it is not so much the product of the design process itself that is in focus, but the role it plays within a specific domain. Examples include pleasurable experiences, cultural heritage, designing for healthcare, and civic engagement. However, one might question whether the results of well-intentioned participation actually imply an improved quality of life. We recognize that PD outcomes are not always products only—they may also be a change in mindset among participants, resulting in an improved focus on further collaborative work and projects.

5.6. Participation

The analysis of PDC literature reveals the diversity of 'participation' within the field of PD, and ranges from an implicit understanding to explicit statements about users driving the process forward. We have seen how the issue of participation has been defined variously, and in some instances only loosely or not at all, and have identified three approaches: participation as implicitly defined, discussing the users as full participants in the design process, and the value of mutual learning between users and designer.

Returning to the fundamental aspects of PD (Table 8), this diversity may be seen as both a strength and a weakness. Some variety is not surprising, since the original definition of 'participation' as a democratic and political ideal, although still valid, is being challenged by the multiplicity of new contexts in which PD is currently practised. Thus, the flexibility of PD as an approach, a method, and a political ideal reflects the diversification of domains and technology. However, such flexibility also presents a danger, as highlighted by the multiple meanings of the term 'participation'. By encompassing a broader understanding of participation, or by defining only loosely what it means by the term, the field of PD research risks blurring its borders with other fields, such as User Centred Design and Interaction Design. Although all these fields may contribute to the broader agenda of involving users, this blurring makes it more difficult to reflect on and critique participatory research contributions; in an unbounded field, anything may be called 'participation'.

We are also concerned about the lack of clarity regarding the way in which authors define participatory design, and how it is practised in specific design projects. Although users were undoubtedly involved in all the design projects presented, it was sometimes difficult to gauge either the motivation or the approach, and we argue that it is crucial that researchers be more precise about users' roles when planning design events, selecting methods, interpreting design materials, and making decisions. Questions about who drives the process between sessions, with regard to interpretation, planning, and decision-making in the design process, raise a more general discussion of the structure of most papers, which tend to either report on single design activities, or focus squarely on a select few. In the cases of a paper addressing more than one design activity, it is often unclear how users are involved during the periods between the events discussed. There seems to be untapped potential for analysing how design ideas are transformed over time, and the transitions from one event to another. This leads us to question where, when, and how users were involved.

At our research laboratory, over the past year, we have developed and tested a tool, the Process Reflection Tool (PRT), for documenting and reflecting on design processes. The tool allows project participants to continuously document actions and reflections related to a particular design project, and addresses the need to focus more consciously on documenting the design process (Dalsgaard and Halskov, 2012). We see this as an opportunity to reflect on one's own practice, as well as an opportunity to generate research questions regarding the unfolding of participation in practice.

6. Conclusion

This paper was born from an interest in unravelling the character of contemporary participatory design. We have done so, based on a review of the last decade of PDC literature, of which we discussed all full papers through a thematic analysis. We found that PD is changing and diversifying as it incorporates new methods, people, domains and technologies. At the same time, other fields, such as HCI, are taking note, importing, transforming, and rethinking what participation may be and mean in their other related fields.

Based on the study of core PD literature as well as and the contemporary PDC proceedings we examined, we suggest a condensed and revised version of the five fundamental aspects of PD (see Table 8) as a resource for future research. Reflecting the fact that PD has become concerned with more than a single, well-defined group of users, we have relabelled 'users' as 'people'. Another revision concerns the 'product' of PD, which emphasizes alternatives that improve the quality of life in a broad sense.

All five fundamental aspects of PD in Table 8, with the possible exception of Politics, are addressed by most approaches to designing with users (e.g. Human Computer Interaction, User Centred Design, and Interaction Design), and we would argue that addressing a combination of two or more aspects constitutes a promising avenue of investigation for PD researchers. Although many of the papers examined present valuable research with respect to one aspect (e.g. Context), one way of advancing PD research is to critically examine one's own work, by explicitly addressing the relationship between the fundamental aspects of PD. For instance,

papers in the 'Participatory Design in new contexts' and 'Methods in Participatory Design' categories addressed the shift from the workplace to new contexts, including social media, and discussed the implementation of these methods to fit various kinds of contexts using new technologies.

We see significant potential for addressing the relationship among fundamental aspects of PD throughout an entire design process, explicitly addressing one or more of these aspects. We suggest that being clearer and more explicit about the relationship and coupling of design research projects and these fundamental aspects of PD would help PD researchers to be precise about the nature of participation, when contrasting PD with other design disciplines.

The second part of our analysis of PD research highlighted the diversity of 'participation' within the field of PD, ranging from an implicit understanding, to explicit statements about users driving the process forward. We have seen how the issue of participation has been defined variously, and in some instances, only loosely or not at all, and have identified three approaches: *implicit*, *users as full participants in the design process*, and *mutual learning between users and designer*.

As mentioned previously, our aim here is to provide insight into how the PDC research community understands the concept of 'participation', rather than promoting a specific and rigorous PD standard, thereby providing PD researchers and other researchers with a platform for positioning their own research in relation to the PD field. As such, our discussion highlights three areas for advancing research into participation. First, we address the need for greater clarity in positioning PD research, with regard to the definitions and specific aims of participation. Second, we suggest a more careful examination of the relationships among the five fundamental aspects of PD outlined in the introduction. Finally, we call for more careful longitudinal studies of participatory design processes, in order to illuminate the interplay among different activities and phases of a design process.

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