Participatory Design: The Third Space in HCI

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Abstract

This chapter surveys methods, techniques, and practices in Participatory Design (PD) that can lead to hybrid experiences – that is, practices that take place neither in the users' domain, nor in the technology developers' domain, but in an "in-between" region that shares attributes of both spaces. Recent work in cultural theory claims that this "in-between" region, or "third space," is a fertile environment in which participants can combine diverse knowledges into new insights and plans for action. This can include articulating, clarifying, and informing the needs of themselves as individuals, and of the people they are connected to or responsible for – e.g., depending on who the user is, their organizations, institutions, products, and services, or their classmates, playmates, families, and schools, or other people with similar situations, circumstances, challenges, or who face similar kinds of social stigma. Important attributes of third space experiences include challenging assumptions, learning reciprocally, and creating new ideas, which emerge through negotiation and co-creation of identities, working languages, understandings, and relationships, and polyvocal (many-voiced) discussions across and through differences. The chapter focuses on participatory practices that share these attributes, including: site-selection of PD work; workshops; story-collecting and story-telling through text, photography, and drama; games for analysis and design; and the co-creation of descriptive and functional prototypes.

Introduction: Just Add Users and Stir?

In a discussion of integrating women's perspectives into a male-dominated curriculum, Bunch (1987) noted that "you can't just added women and stir" (p.140). It takes work, and new ways of thinking, and new kinds and methods of openness, to bring substantively new voices into a conversation. Similarly, to bring users' knowledges and perspectives directly into computer specification and design, it is necessary to do more than "just add users and stir." This chapter surveys methods that go beyond merely adding users – methods to create new settings and experiences that can assist computer professionals to work in partnership with diverse users in improving both computer technology and the understandings that make computer technologies successful in real use.

Participatory design (PD) is a set of theories, practices, and studies related to end-users as full participants in activities leading to software and hardware computer products and computer-based activities (Greenbaum and Kyng, 1991; Muller and Kuhn, 1993; Schuler and Namioka, 1993). The field is extraordinarily diverse, drawing on fields such as user-centered design, graphic design, software engineering, architecture, public policy, psychology, anthropology, sociology, labor studies, communication studies, and political science, and from localized experiences in diverse national and cultural contexts (Gregory, 2003). This diversity has not lent itself to a single theory or paradigm of study or approach to practice (Beck, 1996; Bjerknes & Bratteteig, 1995; Clement & Van den Besselaar, 1993; Kensing & Blomberg, 1998a; Slater, 1998; Suchman, 2002). Researchers and practitioners are brought together – but are not necessarily brought into unity – by a pervasive concern for the knowledges, voices, and/or rights of end-users, often within the context of technology design and development, or of other institutional settings (e.g., workers in companies, corporations, universities, hospitals, governments) (Bødker, 1990; Bødker et al., 1988; Gregory, 2003) or of other experiences in life (e.g., children, older adults, people with disabilities) (Druin 2002; Guha & Druin, 2008; Hornof, 2008; Xie et al., In Press; see also the chapter by Hanson in this volume) . Many researchers and practitioners in PD (but not all) are motivated in part by a belief in the value of democracy to civic, educational, and commercial settings – a value that can be seen in the strengthening of disempowered groups including workers, children, older adults, in the improvement of internal processes, and in the combination of diverse knowledges to make better services and products (Beyer & Holtzblatt, 1998; Béguin, 2003; Bjerknes et al., 1987; Braa, 1996; Briefs et al., 1983; Bødker et al., 2004; Carroll, 1995, 2000; Checkland, 1981; Clement et al., 1994; Docherty et al., 1987; Druin, 2002; Ehn, 1993, 1998; Floyd, 1993; Floyd et al., 1989; Gasson, 1995; Gregory, 2003; Greenbaum & Kyng, 1991; Kensing & Blomberg, 1998b; Klær & Madsen, 1995; Kyng & Matthiessen, 1997; Madsen, 1999; McLagan &

Nel, 1995; Muller & Kuhn, 1993; Mumford, 1983; Mumford & Henshall, 1979/1983; Noro & Imada, 1991; Nygaard, 1975; Scrivener et al., 2000; Schuler & Namioka, 1993; Spencer, 1989; Suchman, 1995, 2002; Van den Besselaar et al., 1991; Xie et al., In Press; Wixon & Ramey, 1996).

PD began in an explicitly political context, as part of the Scandinavian workplace democracy movement (e.g., Nygaard, 1975; Bjerknes, Ehn, and Bratteteig, 1987; Ehn and Kyng, 1987; Floyd et al., 1989; more recently, see Bjerknes and Bratteteig, 1995; Beck, 1996, 2001; Gregory, 2003; Kyng and Matthiessen, 1997; Aarhus Conference, 2005; Winner, 1994). Early work took the form of experiments conducted by university researchers in alliances with organized labor (for historical overviews, see Ehn, 1993; Gregory, 2003; Levinger, 1998). More recent work has more explicitly considered additional social justice issues, such as inclusive design (Light & Luckin, 2008), women's needs (Balka, 1995' Greenbaum, 1991; Nisonen, 1994), cultural sensitivity (Druin et al, 2009; Kam et al., 2006), disabilities challenges (Hornof, 2008), and more general issues of exclusion related to race, age, gender, and/or class (DiSalvo et al., 2010; Druin 2002).

Subsequent work focused on combining complex and distinct knowledges for realistic design problems. Segalowitz & Brereton (2009) described three attributes of new knowledge that could lead to difficulties in participation: novelty, difference, and dependence. Winters and Mor (2008) discussed the need for a methodology of interdisciplinary knowledge exchanges to support participation design. Fowles (2000) wrote of transforming the "symmetry of ignorance" (mutual incomprehension between designers and users) into a complementary "symmetry of knowledge" through symmetries of participation and symmetries of learning. Nielsen & Bødker (2009) recently updated this analysis for the current context of virtual collaborations with users. Similarly, Holmström (1995) analyzed a "gap in rationalities" among developers and users, and Béguin (2003) argued for the need to close this gap through mutual learning among designers and end-users. Reymen et al. (2005) considered the diverse knowledges that are needed in design (see also Badke-Schaub, 2004), and Louridas (1999) provided an influential analysis of the similar thought-patterns that are used with different conceptual vocabularies by professional vs. non-professional designers.

In view of these different conceptual vocabularies, one of us wrote about the need for translations among the co-equal worlds of users and of software professionals, and the need to foster a polyvocal polity in which these various interested parties could co-construct new concepts, meanings, and alliances (Muller, 1997a, 1997b). Suchman (2002) described her historical practice of PD as "working for the presence of multiple voices not only in knowledge

production, but in the production of technologies as knowledges objectified in a particular way." Bødker and Buur (2002) noted the need to support the "many-voiced nature of design." These acknowledgements of the integrity and rationality of multiple voices and multiple knowledges (e.g., users and software professionals) are a crucial aspect of the argument of this chapter, concerning the creation of hybrid spaces between and among those diverse perspectives.

However, the integrity of including multiple voices in design has been questioned. Reyman et al. (2005) summarize the problem from the perspective of professional designers, whose newly-won strength in systems design is challenged by the claims of users' knowledge as a crucial component of design. They note that "designers have their own expertise," and "it is not yet clear which kind of user involvement is most appropriate." Luck (2003) explored issues of disagreement, even among the users. Druin, this chapter's second author, suggested there are four roles children can play in the design process: user, tester, informant, and design partner (Druin, 2002). With each role there is a spectrum of user involvement, at differing points in the design of new technology. Jönsson and colleagues (n.d.) listed a series of design constraints for working with seniors (see also Demirbilek and Demirkan, 2004). Yamauchi (2009) suggested that best role for users was as "peripheral designers," working with assigned detailed problems rather than whole-system design.

Light and Luckin called into question a simplified view of involving everyone in design projects without methods and techniques to enfranchise diverse participants:

> "Believing in the potential of everyone to design is more egalitarian than believing in exclusive talents and specialised roles. However, this is not the same as involving every potential user in every design project, or at all stages, or in the same way as the next person." (Light & Luckin, 2008, p. 16).

In effect, the observation by Light and Luckin returns us to our opening theme, "you can't just 'add users and stir.'" People's needs differ by work roles and their relationship to the design task, by life stage, by physical or cognitive condition, and by other attributes and dimensions as well. People need different design affordances and degrees of safety, depending on their circumstances, their identities, and their relationship to the design task and its social or organizational setting. These issues help to motivate this chapter's survey of participatory methods, and particularly our focus on new "hybrid" spaces for mutual learning and reciprocal validation of diverse perspectives.

Recently, PD has achieved a status as a useful commercial tool in some settings (e.g., McLagan & Nel, 1995), with several major and influential

consultancies forming their business identities around participatory methods,[1] and an increasing number of textbooks for design or IT governance based on participatory principles (Beyer and Holtzblatt, 1998; Bødker et al., 2004) This overall corporate and managerial "mainstreaming" of PD has been greeted by some with enthusiasm, and by others with dismay. Participatory work in the United States has sometimes been criticized as too friendly to management or too limited by the users' experience. Participatory work on the Pacific Rim (e.g., Noro & Imada, 1991) appears to have grown out of the quality movement, and focuses much more on solving problems, and much less on changing workplace power relations. On the other hand, PD has gained growing acceptance in the world of research, particularly from academic professionals in Europe and North America focused on developing new technologies for children (e.g., Druin, 1999/2002; Garzotto, 2008; Hornof, 2008; Jones et al., 2003; Kam et al., 2006; Large et al., 2007; Mazzone et al., 2008; Robertson, 2002; Taxen, 2004). Adapting the notions of changing the "power structures," researchers have sought to give children a voice in the design of new technologies with the belief that more appropriate solutions can be found.

Historically, as summarized by Gregory (2003; see also Kensing & Blomberg, 1998a), participatory design has included both a "conflict-perspective," such as the Collective Resource tradition (Ehn & Kyng, 1987), as well as approaches that are more integrated into conventional work processes (e.g., Beyer & Holtzblatt, 1998; Noro & Imada, 1991; Sanders, 2000; and perhaps Bødker et al, 2004). The integrationist approaches (including those practiced by one of us) have been critiqued as an insufficient "harmony perspective" by, e.g., Ehn (1993) and Kyng (1998).

Indeed, several definitions of conflict have been fruitful for PD. The concept of breakdowns in anticipated working practices was explored in an influential treatment by Bødker (1990) within the theoretical frame of activity theory. In this approach, the conflict is between expectation and initial outcomes, giving motivation and direction to a need for changes. The concept of class conflict has also been useful, especially in the Scandinavian context (Beck, 1996, 2001; Bjerknes & Bratteteig,1995; Bjerknes et al., 1987; Gregory, 2003), where it has served as the organizing principle for work with trade unions as powerful stakeholders and allies in those countries.

Elsewhere, a more muted approach of identifying problems and gaps between the present and the future has informed participatory work where the labor

[1] In the interest of fairness to other consultancies, we will not provide the names of commercial ventures.

movement is weaker (Beyer & Holtzblatt, 1998; Carroll, 1995, 2000; Checkland, 1981; Lafreniére, 1996; Muller et al., 1995b; Mumford, 1983; Mumford & Henshall, 1979/1983; Noro & Imada, 1991), where the conflict is between history and current needs (Best et al., 2009; Cameron, 1998; Carmien et al., 2003; Davies et al., 2004; Enquist & Tollmar, 2008; Fowles, 2000; Hirsch, 2009; Moffatt et al., 2004; Nisonen, 1994; Pecknold, 2009; Salvador & Howells, 1998; Salvador & Sato, 1998; Taylor & Cheyerst, 2009; Wu et al., 2004, 2005), or in projects in which the focus is on design rather than on workplace (e.g., Béguin, 2003; Binder, 1999; Brandt & Messter, 2004; Buur et al., 2000; Carter & Mankoff, 2005; Dandavate et al., 2000; Druin, 1999; Druin et al., 2000/2009; Hornecker, 2010; Howard et al., 2002; Iacucci et al., 2002; Iacucci & Kuutti, 2002; Kankainen et al., 2005; Kantola et al., 2007; Kuutti et al., 2002; Merkel et al., 2004; Nielsen & Bødker, 2009; Pedersen & Buur, 2000; Sanders, 2000, 2006; Sanders & Branaghan, 1998; Sanders & Nutter, 1994; Tschudy et al., 1996; Vaajakallio & Mattelmäki, 2007; Wakkary & Tanenbaum, 2009).

A more recent trend has been the maturing of lifecycle approaches to participatory work. Early and somewhat experimental lifecycle models were offered by Mumford (1983) and Floyd (1993), anticipated in some ways by Checkland (1981). Two more mature approaches have been offered by Beyer and Holtzblatt (1998) and Bødker et al. (2004). A further incorporation of participatory methods into large-scale conventional processes was explored in Pew and Mavor (2007).

Finally, we note that, according to some researchers in the field of end-user innovation and user appropriation studies, new technologies have become so complex that ordinary users will have to modify those technologies in order to "domesticate them" and make them fit for use (e.g., Aune, 1996; Cook & Light, 2006; von Hippel, 2002; Light and Luckin, 2008; Silverstone & Haddon, 1998; Wakkary & Tanenbaum, 2009). This rich area of research and practice is regrettably beyond the scope of this chapter.

This chapter primarily addresses methods, techniques, and practices in participatory design, with modest anchoring of those practices in theory. We will not repeat our earlier encyclopedic survey of participatory practices (Muller, Haslwanter, and Dayton, 1997). Rather, we will pursue a trend within those practices that has shown the most growth during the past years, and we will motivate our interest in that trend through recent advances in the domain of cultural studies. We will focus on participatory practices that fall in the hybrid realm between the two distinct work domains of (a) technology developers/researchers and (b) end-users.

We should also say that our concern is for methods that have been *shown to work in real situations* – i.e., that address real problems in work life, education,

home life, leisure, etc. – and in which the outcomes were of consequence, and in which the participants could freely choose whether to be involved in the work. We have therefore omitted many promising methods that have so far been explored only as in-laboratory university exercises, apparently as part of assigned coursework. Instead we look toward more realistic explorations of these new methods.

In this third edition of the *Handbook*, we have also expanded the domains in which we report participatory methods and techniques. Previous editions have focused on work and workers, usually in face-to-face settings. In our new version of this chapter, we also include participatory work with children and with people with disabilities, and we bring in methods from the emerging subfield of Distributed Participatory Design (as practiced among *non*-colocated collaborators) where appropriate, and participatory methods as used in the special circumstances of the developing world. Our expanded scope may be seen as a further dilution of the labor orientation to participatory design. In response, we hope that this broadened sense of *who matters in design* will ultimately lead to greater enfranchisement and new alliances for change.

Major Bibliographic Sources for Participatory Design

Theory, practice, and experience in participatory design have been published in a series of conference proceedings and several major books.

Conference Series

Seven important conference series have made major contributions to PD:

- **Critical Computing.** Four conferences have been held, at ten-year intervals, in the Critical Computing series, most recently in 2005 (Aarhus Conference, 2005). Major papers from the conferences have appeared as two influential books (Bjerknes et al., 1987; Kyng and Matthiessen, 1997).
- **IRIS Conference (Information systems Research In Scandinavia).** The annual IRIS conference series often include sessions and individual contributions on participatory topics. *Proceedings* may be available through the IRIS Association, or on-line[2].
- **Participatory Design Conference.** The Participatory Design Conference has met on even-numbered years since 1990. Earlier *Proceedings* were published by Computer Professionals for Social Responsibility (CPSR)[3]; more recent

[2] http://iris.informatik.gu.se/

[3] www.cpsr.org.

Proceedings were publish by the Association for Computing Machinery[4]. Selected papers from several conferences have appeared in edited volumes or special journal issues (e.g., Kensing & Blomberg, 1998; Muller & Kuhn, 1993; Schuler & Namioka, 1993). Papers from recent conference years are available through the ACM Digital Library.[5]

- **Include Conferences.** The Helen Hamlyn Center[6] has sponsored a series of conferences on inclusive design since 2003, and provides additional materials in this area. The concept of inclusive design emphasizes enfranchising as broad a range of people as possible, usually with a focus on removing barriers related to physical, cognitive, and emotional disabilities. The Include conferences have explicitly included emphases on home, civic life, and *workplace* within this broader agenda, and with themes of participatory work with people of diverse backgrounds and abilities.
- **IFIP Conferences.** A number of conferences and workshops (sponsored by IFIP Technical Committee (TC) 9 have focused on selected topics within participatory design – e.g., Briefs et al. (1983); Clement et al. (1994); Docherty et al. (1987); Gärtner and Wagner (1995); and van den Besselaar et al. (1991).[7]
- **Nordic Conferences on Human-Computer Interaction.** The NORDCHI conference series meets on even-numbered years, with a strong emphasis on participatory work within a broader Scandinavian context (Nordichi, 2006). Papers from 2002 and 2004 are available through the ACM Digital Library.
- Major papers, panels, and tutorials on participatory design have also appeared in the CHI, CSCW, ECSCW, and DIS conference series, beginning as early as 1988 (*Proceedings* available through the Association for Computing Machinery, or through Springer for the ECSCW conference series), and in *Proceedings* of the Usability Professionals' Association[8] conference series, of the INTERACT conference series, and of the Human Factors and Ergonomics

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[4] www.acm.org

[5] http://portal.acm.org/dl.cfm

[6] http://www.hhc.rca.ac.uk/

[7] http://www.ifip.or.at/. For TC 9, see http://www.ifip.or.at/bulletin/bulltcs/memtc09.htm.

[8] www.upassoc.org

Society conference series. Several papers at the Co-Designing 2000 Conference[9] addressed participatory themes (Scrivener et al., 2000).

- **Interaction Design and Children (IDC).** From this yearly conference's inception in 2002, researchers world-wide have published and presented papers where a surprising number discuss design methods that are inclusive of children in the development/research process (*Proceedings* are also available through the Association for Computing Machinery[10]). With conference venues routinely in both Europe and the United States, a strong Scandinavian influence has been seen with the embracing of PD methods in this research area concerning children.

Books

In addition to the books cited above, major collections of papers and/or chapters related to participatory design appeared in Carroll's volume on scenarios in user interaction (1995; see also Carroll, 2000), Greenbaum's and Kyng's *Design at Work* (1991), and Wixon's and Ramey's collection of papers on field-oriented methods (1996). Individual books that have been influential in the field include Bødker's application of activity theory to issues of participation (1990), Ehn's account of work-oriented design (1988), Suchman's discussion of situated action (1987), and Beyer's and Holtzblatt's presentation of contextual inquiry and contextual design (1998; see also Holtzblatt's chapter in this book). A recent volume by Bødker et al. (2004) may broaden the impact of PD among information technology departments.[11] Earlier influential works include a series of books on socio-technical theory and practice by Mumford (e.g., 1983; Mumford & Henshall, 1979/1983), as well as Checkland's (1981) soft systems methodology. Noro and Imada (1991) developed a hybrid ergonomic approach, involving participation and quality programs, which has been influential around the Pacific rim. For a historical PD bibliography, see the CPSR website.

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[9] http://vide.coventry.ac.uk/codesigning/

[10] www.acm.org

[11] In addition, Pew and Mavor (2007) included participatory design among their proposed "new look" at large-systems development. However, the influence of this work has not yet been determined.

Journals

Three journals have carried the greatest number of PD papers: *Scandinavian Journal of Information Systems*[12]*, Computer Supported Cooperative Work: The Journal of Collaborative Computing*[13]*,* and *Human Computer Interaction*[14].

Websites

Computer Professionals for Social Responsibility maintains a set of PD resources at http://www.cpsr.org/issues/pd/ .

The group of researchers working on Distributed Participatory Design (DPD), or participation at-a-distance, has created a website that includes *Proceedings* from their 2006 and 2008 conference workshops, at http://extra.shu.ac.uk/paperchaste/dpd/index.html .

Hybridity and the Third Space

This chapter is concerned with participatory methods that occur in the hybrid space between technology developers/researchers and end-users. Why is this hybrid space important?

Bhabha (1994) made an influential argument that the border or boundary region between two domains – two spaces – is often a region of overlap or hybridity – i.e., a "third space" that contains an unpredictable and changing combination of attributes of each of the two bordering spaces. His area of concern was colonization, in which some native people find themselves caught in between their own traditional culture and the newly imposed culture of the colonizers (see also Dingawaney & Maier, 1994; Karttunen, 1994;). Their continual negotiation and creation of their identities, as efforts of survival, creates a new hybrid or third culture (Bhabha, 1994; see also Lyotard, 1984) and even a third language (Anzaldúa, 1999; Bachmann-Medick, 1996). In such a hybrid space, enhanced knowledge exchange is possible, precisely because of those questions, challenges, reinterpretations, and renegotiations (Bachmann-Medick, 1996). These dialogues across differences and – more importantly – *within differences* are stronger when engaged in by groups, emphasizing not only a shift from assumptions to reflections, but also from individuals to collectives (Carrillo, 2000).

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[12] http://www.cs.auc.dk/~sjis/

[13] http://www.wkap.nl/journalhome.htm/

[14] http://hci-journal.com/

Bhabha's conception has become highly influential. Bachmann-Medick (1996) applied the concepts to translation theory. Grenfell (1998) interpreted concepts of hybridity in a study of living-at-the-border in multicultural education settings. Evanoff (2000) surveyed a number of theoretical applications of hybridity, from evolutionary biology to constructivist perspectives in sociology to democratic responses to intercultural ethical disagreements. He explored formulations from multiple disciplines, involving "third culture" in intercultural ethics, "third perspective" involving "dynamic inbetweenness" in Asian-Western exchanges, and a psychological "third area" in the development of a "multicultural personality."

A summary of the claims relating to third spaces (or hybridity) appears in Table 1.

Table 1. Summary of Claims Relating to Third Spaces

Overlap between two (or more) different regions or fields (inbetweenness) Marginal to reference fields Novel to reference fields Not "owned" by any reference field Partaking of selected attributes of reference fields Potential site of conflicts between/among reference fields
Questioning and challenging of assumptions Mutual learning Synthesis of new ideas
Negotiation and (co-)creation of… Identities Working language Working assumptions and dynamics Understandings Relationships Collective actions
Dialogues across and within differences (disciplines) Polyvocality What is considered to be data? What are the rules of evidence? How are conclusions drawn?
Reduced emphasis on authority – increased emphasis on interpretation Reduced emphasis on individualism – increased emphasis on collectivism Heterogeneity as the norm

Hybridity and HCI

Within HCI, Suchman recently renewed her call for dialogue across boundaries between the partial perspectives of end-users and developers (Suchman, 2002; see also Badke-Schaub, 2004; Bødker and Buur, 2002; Fowles, 2000; Holmström, 1995; Kyng, 1998; Light & Luckin, 2008; Nygaard & Sørgaard, 1987). Suchman argued for boundary-crossing and mutual learning between these different standpoints, and appealed in part to recent developments in feminist epistemologies which argue that objectivity is the constructive outcome of an on-going dialogue among multiple perspectives (e.g., Haraway, 1991; Harding, 1991; Hartsock, 1983; see also Brereton, 2009). These concerns become more pressing when we consider the new obstacles encountered in Distributed Participatory Design (Naghsh et al., 2008), especially when design work also spans the boundaries between the developed world and the developing world (e.g., Best et al., 2009; Bidwell & Hardy, 2009; Bidwell et al., 2010). Titlestad et al. (2009) explained:

> "A key PD principle is to bridge and blur the user-designer distinction from both directions, through mutual learning processes… Effective methods to achieve this usually rely on prototyping and intensive face-to-face iteration… In the Global South, computerized information systems are still few and far between… a significant threshold hindering participation… "

In partial agreement with Suchman, Warr (2006) argues that the solution is not to remove distance entirely, but rather to *preserve the situated nature of each participant's own world* while creating a common space for mutual learning, creation, and problem solving.

The approach in this chapter begins with a similar recognition of diverse perspectives. However, unlike Suchman's and Titlestad et al.'s emphasis on the boundary *between* these perspectives, this chapter is concerned with creating regions of overlap where the perspectives can come into mutual knowledge and, potentially, alliance – with the creation of the hybrid spaces in which objectivity can emerge through constructive discussion, dialogue, negotiation, and mutual learning. Similarly, this chapter pursues a different solution from the located accountability recommended by Suchman. Suchman sees each participant as located *within* a particular perspective and interest – e.g., "Organizations comprise multiple constituencies each with their own professional identities and views of others" (see also the geographic limits discussed by Titlestad et al., 2009). By contrast, the methods in this chapter enable the creation of new perspectives and new locations, and acknowledge the possibility that each participant can make different choices at different moments about where to locate her or his perspective, standpoint, and thus accountability. In keeping with the

origins of PD in class struggle (e.g., Ehn and Kyng, 1987; see also Gregory, 2003, for a review of "conflict perspective" approaches), Suchman focuses on opposing interests that meet across a designated boundary. This chapter proposes to reach toward the next step—i.e., to pursue the polyvocal polity that one of us proposed (Muller, 1997a) and the need identified by Bødker and Buur (2002; see also Buur & Bødker, 2000) to create a "meeting ground" for a "widen[ed]… circle of participants" that can "support the many voices being brought forth in order to create the new, and to find ways of supporting this multivoicedness."

There have been many calls within HCI for mutual or reciprocal learning in hybrid spaces (e.g., Bødker et al., 1987, 1988; Druin, 1999/2002; Druin et al., 2000; Ehn & Sjögren, 1991; Floyd, 1987; Kensing & Madsen, 1991; Lanzara, 1983; Mogensen & Trigg, 1992; Muller, 1997a; Muller et al., 1994; Mumford, 1983; Törpel and Poschen, 2002; Tscheligi et al., 1995). Beeson and Miskelly (2000) appealed to the notion of hybridity ("heterotopia") in describing workers who, like colonized peoples, deal "in a space which is not their own," (p. 2) taking limited and opportunistic actions to preserve "plurality, dissent, and moral space" (p.1). Maher et al. (2000) described the creation of virtual design spaces for sharing diverse perspectives. Merkel et al. (2004) described a need for "a new set of skills and competencies that go beyond technical design skills… to create conditions that encourage a collaborative design process and active reflection… for working with groups… that push on the traditional boundaries between users and designers" (pp. 7-8). Light and Luckin (2008) discussed hybrid methods of enfranchisement for people with diverse backgrounds. In an early formulation, Lanzara (1983) suggested that

> [A] large part of the design process, especially in large-scale projects and organizations involving several actors, is not dedicated to analytical work to achieve a solution but mostly to efforts at reconciling conflicting [conceptual] frames or at translating one frame into another. Much work of the designer is… concerned with… defining collectively what is the relevant problem, how to see it.

Tscheligi et al. (1995), in a panel on prototyping, considered that the "products" of prototyping include not only artifacts, but also understandings, communications, and relationships – a theme that was echoed in a more recent panel on modeling (Kaindl et al., 2001). Fanderclai (1995, 1996) captured a strong sense of possible new dynamics and new learnings in a hybrid on-line space. Finally, Thackara (2000) based part of his plenary address at CHI 2000 on the concept of the third space, providing a needed hybridity to HCI studies.

Participatory Design as the Third Space in HCI

In this chapter, we extend the HCI analyses surveyed in the preceding paragraphs, and apply Bhabha's perspective to the HCI problem of methods to bridge between two spaces – the world of technology developers/researchers, and the world of the end-users (see also Muller, 1997a, 1997b). As noted by Suchman (2002), each world has its own knowledges and practices; each world has well-defined boundaries. Movement from one world to the other is known to be difficult (Dewulf & Van Meel, 2002; Kensing & Blomberg, 1998a; Kujala, 2003; Luck, 2003; Olsson, 2004; Reymen et al., 2005; Yamauchi, 2009). We can see this difficulty manifested in our elaborate methods for requirements analysis, design, and evaluation – and in the frequent failures to achieve products and services that meet users' needs and/or are successful in the marketplace.

Much of traditional scientific practice in HCI has focused on instruments and interventions that can aid in transferring information between the users' world and the software world. Most of the traditional methods are relatively one-directional – e.g., we analyze the requirements *from* the users; we deliver a system *to* the users; we collect usability data *from* the users. While there are many specific practices for performing these operations, relatively few of them involve two-way discussions, and fewer still afford opportunities for the software professionals to be surprised – i.e., *to learn something that we didn't know we needed to know*.

The PD tradition has, from the outset, emphasized mutuality and reciprocity – often in a hybrid space that enabled new relationships and understandings. Bødker et al. (1988) made specific references to "the mutual validation of diverse perspectives" (see also Badke-Schaub, 2004; Béguin, 2003; Bødker and Buur, 2002; Fowles, 2000; Holmström, 1995; Kyng, 1998; Light and Luckin, 2008; Louridas, 1999; Reymen et al., 2005; Suchman, 2002). Floyd (1987) analyzed software practices into two paradigms, which she termed product-oriented (focused on the computer artifact as an end in itself) and process-oriented (focused on the human work process, with the computer artifact as means to a human goal). In her advocacy of balancing these two paradigms, Floyd noted that the process-oriented paradigm required mutual learning among users and developers (see also Segall & Snelling, 1996). Most of PD theories and practices require the combination of multiple perspectives – in part, because complex human problems require multiple disciplines (e.g., software expertise and work-domain expertise) for good solutions (e.g., ; Pew & Mavor, 2007, 2000; Holmström, 1995), and in part because the workplace democracy tradition reminds us that all of the interested parties (in the States, we would say "stakeholders") should have a voice in constructing solutions (e.g., Ehn & Kyng, 1987; Kyng, 1998). In a related development, there are increasing calls for critical reflection in design, based on combining perspectives across disciplines,

including the recent Aarhus Conference on Critical Computing (Aarhus Conference, 2005).

Finally, the hybridity theme of novelty and creativity is echoed in participatory goals and practices. Participatory design has often emphasized change – change in technology, change in working practices, and change in working relationships (Bratteteig & Gregory, 2001; Gregory, 2003; Kensing & Blomberg, 1998a). The earliest projects, such as DEMOS, DUE, FLORENCE, and UTOPIA were concerned with anticipating and co-determining change that was mandated for various workplaces (Ehn & Sanberg, 1979; Kyng & Mattiassen; Bjerknes & Bratteteig, 1987; Bødker et al, 1987). Some of this early work took a critical stance with regard to managerial agendas; other projects specifically explored alternative designs (Bjerknes & Bratteteig, 1987; Bødker et al, 1987; Ehn, 1993), and more recent work (detailed below) is more directly concerned with *creating* new alternatives. This is very much the case in the extensive "co-design" work of researchers and children (Druin et al., 2009). Many of the participatory projects – and even the names of the methods – reflect an orientation toward the future – e.g., future workshops (Jungk & Mullert, 1987), "evoking the future (Brandt & Grunnet, 2000), "anticipating future behavior of office workers" (de Jong et al., 2009), "hands-on the future" (Ehn & Kyng, 1991), "envisioning future practices" (Vaajakallio & Mattelmäki, 2007), and "evaluation of future concepts" (Hultcrantz & Ibrahim, 2002). Through careful control of design attributes such as clarity and ambiguity, formality and informality, and the judicious use of different disciplinary languages, PD practitioners create new hybrid spaces to encourage innovation and to support creativity.

Participatory Design Contains Its Own Third Space

The preceding argument – that PD serves as a kind of third space to HCI – might be interesting, but is hardly worth a chapter in a handbook. We now turn to the question of hybridity in methods within the field of PD itself.

In their "tools for the toolbox" approach, Kensing and Munk-Madsen (1993) developed a taxonomy to analyze thirty participatory methods (see also Kensing, Simonsen, & Bødker, 1996; and, in independent convergences on the same attribute, see Gjersvik & Hepsø, 1998; Luck, 2000; Reid & Reed, 2000). The first dimension of their taxonomy contrasted *abstract* methods (suitable for a software professional's organization) with *concrete* methods (suitable for work with end-users).[15] Muller et al. (1993, 1997) elaborated on this taxonomic dimension by asking *whose work domain served as the basis for the method* (in the States, we would call this a matter of "turf," as in "on whose turf did the work take place?").

[15] Their second dimension was of less interest for the purposes of this chapter.

At the *abstract* end of the continuum, the users have to enter the world of the technology developers/researchers in order to participate – e.g., rapid prototyping (Grønbæk, 1989) and quality improvement (Braa, 1996). At the *concrete* end of the continuum, the technology developers/researchers have to enter the world of the users in order to participate – e.g., ethnography (Blomberg et al., 1993; Crabtree, 1998; Orr and Crowfoot, 1992; Suchman & Trigg, 1991; see also Blomberg and Burrell. in this volume), on-going tailoring during usage (Henderson & Kyng, 1991; MacLean et al., 1990), and end-user "design" by purchasing software for small companies (Krabbel & Wetzel, 1998; Robertson, 1996, 1998).

For the purposes of this chapter, we can now ask: What about the practices that did not occur at the *abstract* or *concrete* end-points of the continuum? *What about the practices in between?* These practices turn out to occur in an uncertain, ambiguous, overlapping disciplinary domain that does not "belong" to either the technology developer/researcher or the end-users (i.e., these practices occur in neither the users' turf nor the software professionals' turf). The practices in between the extremes are hybrid practices, and constitute the third space of participatory design. As we explore hybrid methods that occur in this third space, we can look for HCI analogies of the attributes and advantages that were listed for Third Space studies in Table 1.

Third Space: Negotiation, Shared Construction, and Collective Discovery in PD and HCI

In the remaining sections of the chapter, we will describe a diversity of participatory design techniques, methods, and practices that provide hybrid experiences or that operate in intermediate, third spaces in HCI. Because our theme is hybridity, we have organized these descriptions in terms strategies and moves that introduce novelty, ambiguity, and renewed awareness of possibilities, occurring at the margins of existing fields or disciplines (see Table 1). In several cases, a single report may fall into several categories. For example, Ehn and Sjögren (1991) conducted a workshop (see "Workshops") in which a story-telling method (see "Stories") provided a space in which people negotiated the naming and defining of workplace activities (see "Language"). We hope that the strategies and moves of the PD practitioners and researchers will become clear, despite the multiple views onto individual reports.

Spaces and Places

Sitings

One of the simplest parameters that can be manipulated to influence hybridity is the site of the work. At first, this appears to be a simple issue. As Robins

(1999) says, "There are two approaches to participatory design: 1. Bring the designers to the workplace. 2. Bring the workers to the design room." This binary choice reflects the taxonomic distinctions that we reviewed above. However, even within the binary choice, the selection of the site can be important. Fowles (2000), in a discussion of participatory architectural practice, provides an insight that can apply as well for HCI: "If possible[,] design workshops should be located in the locality of the participating group and in the School of Architecture. Bringing the public into the School helps to de-mystify the profession, and taking students in the community furthers their understanding of the problem and its context" (p. 65). Pedersen and Buur (2000), in their work on industrial sites, agree (italics in the original):

> When collaborating with users *in our design environment* (e.g., a meeting space at the company), we can invite a number of users from different plants and learn from hearing them exchange work experiences… Being in a foreign environment (and with other users), users will tend to take a more general view of things.
>
> When collaborating with users *in their work context*, users tend to feel more at ease as they are on their home ground – we are the visitors. Tools and environment are physically present and easy to refer to. This makes for a conversation grounded in concrete and specific work experiences.
>
> The idea was born to create a type of design event with activities in both environments and with two sets of resources to support design collaboration.

In a study of telephone operators' work conducted by one of us, we held our sessions at operator service offices and in research offices (Muller et al., 1995a). The work site meetings had the advantages of easy access to equipment on which we could demonstrate or experiment. During those meetings, there was a sense of being strongly tied to practice. The research site meetings were less tied to specific practices, and had a tendency to lead to more innovative ideas. Perhaps more subtly, the two different sites enfranchised different marginal participants. At the work site, it was easy to bring in additional work-domain experts (mostly trainers and procedures experts): They became adjunct members of the core analysis team for the duration of those meetings, *and* they became resources for the core team afterwards. At the research site, it was easy to bring in more technology experts, as well as the graduate students who later performed data analysis. The research site meetings became an occasion of enfranchisement, contribution, and early commitment for these additional actors. Both core and adjunct members from both sites became co-authors of our report (Muller et al., 1995a).

Brandt and Grunnet (2000) also considered site selection in their Smart Tool and Dynabook projects, which were concerned with working conditions in the office and in the home, respectively. In the Smart Tool case, they conducted dramatic scenarios in the project designers' environment. In the Dynabook case, they asked people at home to create and enact scenarios in their own living areas.

When University of Maryland researchers co-design with children, neither the school environment nor a traditional computer science lab is regularly used for ongoing PD projects that range from developing new digital libraries for children (Druin, 2005) to creating new mobile storytelling devices (Fails et al., 2010). An afterschool program that takes place twice a week during the school year and two weeks during the summer occurs in a lab that is specially carpeted for extensive use of the floor for designing. There are special windows that enable doors to be shut without concerns for safety or privacy. While it is a lab that sits on a college campus, it is a third space where children and researchers can work together in a hybrid setting.

Brereton (2009; Segalowitz & Brereton, 2009) takes an even stronger position, which combines traditional ethnography with action research. In her embedded research paradigm, the researcher lives as a member of the users community for an extended period of time.

In addition, we note a related trend in Community-Based Participatory Research (CRPR), in which it is assumed that community members hold key knowledge and discernment about local needs, and that they can use this knowledge to help to solve both local and regional problems (Shallwani & Mohammed, 2007). This approach has been used to frame technology and planning explorations for community needs (e.g., Corburn, 2003; Shilton et al. (2008). Füller et al. (2006) used a variant of this idea which they called "Community-Based Innovation" (CBI) to community-sourcing of design ideas and design critiques from end-users in an automotive design case.

Third Space. In terms of hybridity, the selection of site can be a deliberate strategy to introduce new experiences and perspectives to one or more parties in the design process – a de-centering move that can bring people into positions of ambiguity, renegotiation of assumptions, and increased exposure to heterogeneity. Returning to Bhabha's original argument, site selection initially appears to be a matter of *moving across the boundary* between different work cultures, rather than *living within the boundary*. However, the use of *common design practices across sites* makes those practices (and the membership of the design group) into a kind of movable third space. The practices and the group membership become stable features that persist across multiple sites. At the same time, the practices, and even the membership, grow and evolve with exposure to new sites and new

understandings. In these ways, the practices become an evolutionary embodiment of the knowledge of the learnings of the group (e.g., Floyd, 1987; Muller, 1997a).

Claimed Benefits. What have practitioners gained through site selection, within this deliberately hybrid-oriented work area? Several themes emerge:

- **Improved learning and understanding.** Fowles (2000) described a move from a "symmetry of ignorance" toward a "symmetry of knowledge" as diverse parties educated one another through a "symmetry of learning" – and even a kind of "transformation" through exposure to new ideas (see also Carmien, 2003). Brandt and Grunnet (2000), Pedersen and Buur (2000), Druin (2005), and Muller et al. (1995b) also claimed that the selection of site led to the strengthening of the voices that were comfortable at each site.
- **Greater ownership.** Petersen and Buur (2000) noted that their procedures strengthened user involvement in their project. Fowles (2000) and Muller (1995b; see also Muller et al. 1994) make specific reference to increases in commitment and ownership of the evolving knowledge and design of the group.

Workshops

Workshops may serve as another alternative to the two "standard" sites that most of us think about. In PD, workshops are usually held to help diverse parties ("interested parties" or "stakeholders") communicate and commit to shared goals, strategies, and outcomes (e.g., analyses, designs, and evaluations, as well as workplace-change objectives). Workshops are often held at sites that are in a sense neutral – they are not part of the software professionals' workplace, and they are not part of the workers' workplace.

More importantly, workshops usually introduce novel procedures that are not part of conventional working practices. These novel procedures take people outside of their familiar knowledges and activities, and must be negotiated and collectively defined by the participants. Workshops are thus a kind of hybrid or third space, in which diverse parties communicate in a mutuality of unfamiliarity, and must create shared knowledges and even the procedures for developing those shared knowledges.

The best-known workshop format in PD is the Future Workshop (e.g., Kensing and Madsen, 1991; see also Bødker et al., 2004; McPhail et al., 1998; Mørch et al., 2004), Based in German civic planning (Jungk & Mullert, 1987), a Future Workshop proceeds through three stages: **Critiquing** the present; **Envisioning** the future; **Implementing** – moving from the present to the future. These three activities involve participants in new perspectives on their work, and help to develop new concepts and new initiatives.

A number of workshops have focused on simple materials and informal diagrams, rather than on formal notations. Bødker et al. (2004) note that, "The tools are simple diagrams or drawings with no special formalisms… because staff members participating in the workshops, as well as those to whom the results are later presented, typically have no experience with technical descriptions using [Information Technology]-originated formalisms" (p. 252).

Sanders (2000, 2006) described a family of "generative tools," activities that are selectively combined into Strategic Design Workshops, under an overall conceptual "say-do-make" strategy that combines market research ("what people say"), ethnography ("what people do"), and participatory design ("what people make"). Activities include the construction of collages focused on thinking (e.g., "how do you expect your work to change in the future?"), mapping (e.g., laying out an envisioned work area on paper), feeling ("use pictures and words to show a health-related experience in your past"), and storytelling (see "Stories" and "Making Descriptive Artifacts," below). Dandavate, Steiner, and William (2000) and Vaajakallio & Mattelmäki (2007) provided case studies of Sanders' method.

Sanders' *say-do-make* framework can also be used, in an analytic decomposition, to describe participatory opportunities in more challenging design settings. Of course, ethnography is a prime example of the "see" strategy (see the chapter by Blomberg and Burrell in this volume). O'Connor et al. (2006) explored a case in which, in effect, the *"do"* aspect of Sanders' method was the only means of communication for a co-designer with severe physical and speech disabilities. Cohene et al. (2005) explored some aspects of the *"make"* strategy in work with a co-designer who had Alzhiemer's disease, and her family and caregivers. While neither of these papers was written with Sanders' analysis in mind, the framework provided by Sanders helps us to understand the range of possibilities, and the creative responses of the researchers to co-designing under constrained circumstances.

In a different setting, Buur et al. (2000) developed a workshop in which workers carried a mock-up of a proposed new device (see "Making Non-Functional Artifacts," below) through an industrial plant, recording how it would be used. They then acted out a five-minute video scenario (see "Dramas," below), which they subsequently presented to other, similar worker teams in a workshop. Hultcrantz and Ibrahim (2002) used a similar method to concretize workshops similar to focus groups that were held with family members in their own homes. Pedell (2004) described a lower-tech storyboarding workshop format in which people created narratives using photographs, putting them in sequences and in many cases altering (typically through the addition of speech bubbles to show what people were thinking or doing). Monk and Howard (1998) used a similar

method, with less emphasis on photographs, to develop a "rich picture" of a work domain.

A novel workshop solution was needed when bringing older adults together with children, ages 7-11 (Xie et al., In Press) – two historically under-represented constituencies in the design of new technologies. A community center facility was used for its familiarity and availability to the children and the elders. Because of the diversity of participants, we faced challenges of both putting the two groups at ease, and also of developing design methods that could accommodate active children and less-active adults. Previous work had hybridized the design session by encouraging children to treat the entire floor as a design area (Druin et al,, 2009). This was no longer possible if the children wanted their elderly design partners to engage in the design experience. Instead, this two-day workshop began with "getting to know you" experiences, followed by "low-tech prototyping," a technique widely used in PD with adults (see "Prototyping," below). Once this blue-sky brainstorming was completed, separate discussions with both stake-holders nurtured ideas to be further refined. This age-bridging work provides an example of suiting a workshop setting and dynamics to the needs of diverse participants.

Cameron (1998), too, faced a different setting and problem, and chose a workshop solution. This project dealt with safety issues in urban design in Baltimore and – like the METRAC program in Toronto (Nisonen, 1994; see also Önder and Der, 2007) – invited community members to contribute their domain expertise as people who lived with safety issues on an every-day basis. Cameron provided a manual, based on a professionally-developed set of safety guidelines. Community members became community organizers, bringing the project topic and the proposed guidelines to their own constituencies. Two additional workshops refined the safety audit information from the constituencies, selected priority issues to fix, and adopted an action plan. Cameron observed that,

> One of the successful aspects of the Design for Safety workshop is that it provided a forum for a diverse group of people to productively discuss common problems and work through shared solutions and consensus. The workshops also showed that crime and safety were not solely the responsibility of the police, but that public works employees, traffic engineers, and especially residents must work together to envision as well as carry out the plan… Requiring that residents share the workshop information at community association meetings further assisted the transfer of responsibility from the workshop into the neighborhood.

Related work is being done in the area of community-based participatory research (e.g., (Shallwani & Mohammed, 2007; Shilton et al. (2008), as discussed above.

Several other groups have developed repertoires of multiple workshops, from which they can select the type of workshop that is needed for a particular situation, site, or problem. Svanæs and Seland (2004) described six workshops; I list four formats that they considered successful here:

- Workshop 1. Theatre, modeling clay, "design by accident," and improvisation with teenagers to explore "our mobile future"
- Workshop 2. Theatre, brainstorming, and improvisation with a much more structured set of props (no modeling clay) for a different telecommunications project
- Workshops 4 and 5. Theatre with audience-critique of performance (similar to Boal's Theatre of the Oppressed, described below), sometimes using structured props as well as "designing on the spot" for new concepts, for a hospital communication project
- Workshop 6. Videotaped field data as a point of common reference, before theatrical work similar to workshops 4 and 5.

Bødker et al. (2004) described a repertoire of workshops. One subset of workshops was differentiated largely in terms of the artifact that was co-created by the participants, such as freehand drawing (see also Monk & Howard, 1998), collages (see also Pedell, 2004; Sanders, 2000), affinity diagrams (see also Beyer & Holtzblatt, 1998), and timelines. Dray (1992) also used free-hand drawing technique, but in a round-robin brainstorming "BrainDraw" format in which *n* participants collaboratively drew *n* drawings, rotating the drawings throughout the group so that each drawing contained ideas created by each of the members of the group.

Less familiar artifacts were also used to define and differentiate workshops in the Bødker et al. survey. "Dead Sea Scrolls" are textual descriptions of the history of a business process. "Roll lists" are brief textual descriptions of all of the interested parties related to a business activity or a technology artifact. "Mapping" (also called "mind mapping" – see e.g., Buzan & Buzan, 1996, for non-workshop use of this technique) is the description of a problem area, business process, function, or other matter of interest in terms of a number of briefly-stated concepts, connected by lines or arcs. A special version of mapping constructs a "communication map" among persons or roles. Finally, "Prompted Reflections" can be used similarly to Dray's Braindraw technique (Dray, 1992), to bring people with different design concepts into communication with one another.

In the domain of Distributed Participatory Design (DPD), researchers have adapted old and new web technologies to support hybrid workshop-like activities. Heß et al. (2008) reported on the use of community servers to work with two configurations of end users – the "parliament community" and the "central committee" community. These two user forums provided guidance on the development of mulitimedia software for linking televisions and computers. Costabile and colleagues have developed a set of virtual workshops called "Software Shaping Workshops," in which medical staff from diverse roles in a hospital can collaborate with software technologists in design of tailored user interfaces that meet the work needs of each role or discipline on the hospital staff (Costabile et al., 2006, 2007).

Third Space. The various workshop approaches have several commonalities. Each workshop brings together diverse participants to do common work, to produce common outcomes (especially Bødker et al., 2004), and to develop a plan of joint action (especially Kensing and Madsen, 1991; Bødker et al., 2004; McPhail et al., 1998; Mørch et al., 2004). They are thus opportunities that require mutual education, negotiation, creation of understanding, and development of shared commitments. Each workshop takes place in an atmosphere and (often) in a site that is not "native" to any of the participants. Thus, all of the participants are at a disadvantage of being outside of their own familiar settings, and they must work together to define their new circumstances and relationships. The combination of diverse voices leads to syntheses of perspectives and knowledges.

Claimed Benefits. Advantages claimed for these experiences in hybridity include:

- **Development of new concepts** that have direct, practical value for product design (Dandavate, Steiner, & William, 2000; Kensing and Madsen, 1991; Sanders, 2000) or for community action (Cameron, 1998)
- **Engagement** of the interested parties ("stakeholders") in the process and outcome of the workshop (Xie et al., In Press).
- **Combinations of different people's ideas** into unified concepts
- **Production of artifacts** that are the expected and useful "inputs" to the next stage of the development process (Bødker et al., 2004; Svanæs & Seland, 2004; Xie et al., In Press).

Narrative Structures

Stories

Stories and storytelling have played a major role in ethnographic work since before there was a field called "HCI" (for review, see Crabtree, 1998; Suchman &

Trigg, 1991; see also Blomberg and Burrell, in this volume). Stories have also had an important history in HCI (see Carroll, 1995; Erickson, 1996; Muller, 1999a; see also Rosson's and Carroll's chapter in this book). We will not attempt to review these areas. Rather, we will focus on those aspects of story-collecting and story-telling that involve the construction of third spaces and hybridity.

Stories in participatory work may function in at least four ways.[16] First, they may be used as triggers for conversation, analysis, or feedback (Salvador and Howells, 1998; Salvador & Sato, 1998, 1999). Second, they may be told by end-users as part of their contribution to the knowledges required for understanding product or service opportunities and for specifying what products or services should do (Brandt & Grunnet, 2000; Lafreniére, 1996; Muller, 2001; Muller et al., 1995b; Noble & Robinson, 2000; Patton, 2000; Sanders, 2000; Tschudy et al 1994; Yu & Liu, 2006). Third, they may be used by heterogeneous design teams (i.e., including users) to present their concept of what a designed service or product will do, how it will be used, and what changes will occur as a result (Demirbilek & Demirkan, 2004; Druin, 1999; Druin et al., 2000; Ehn & Kyng, 1991; Ehn & Sjögren, 1986, 1991; Gruen, 2001; Muller et al. 1994; Sanders, 2000). Fourth, they made be constructed by designers to stand as proxies for real users (e.g., Triantafyllakos et al., 2010).

Beeson and Miskelly (1998, 2000) used hypermedia technologies to enable communities to tell their own stories, with the intention that "plurality, dissent, and moral space can be preserved" (Beeson & Miskelly, 2000, p. 1). They were concerned to allow multiple authors to re-use community materials selectively, telling different stories within a common context. The different accounts were organized according to themes, and laid out spatially on the image of a fictitious island for navigation by end-users.

Their work entered several areas or aspects of hybridity. First, the authors of the stories (i.e., community members) were using hypermedia technology for the first time, and were thus in the role of learners, even while they were the owners of the stories, and were thus in the role of experts. Second, the authors wrote from their own perspectives, which were sometimes in strong conflict with one another. Third, the authors could make use of one anothers' materials, effectively moving away from single-author narratives and into a kind of collaborative collage of materials, which conveyed interlinked stories. Fourth, just as the community members were negotiating and defining their roles as learner-experts, the software professionals/researchers were negotiating and defining their roles as experts/facilitators/students. Törpel and Poschen (2002) described a related

[16] For a survey of story genres that may be used in participatory work, see Karasti et al. (2002).

method of Narrative Transformation, emphasizing workers' roles as story-creators, story-analysts, and originators of new concepts that could be pursued through other methods in this chapter (e.g., low-tech prototyping, see below).

A second line of practice and research has emphasized end-users telling their stories using a system of paper-and-pencil, card-like templates. The earliest version was the Collaborative Analysis of Requirements and Design (CARD) technique of Tudor et al. (1993), later developed into a more general tool in Muller et al. (1995b) and further refined in Muller (2001). Lafreniére (1996) developed a related practice, Collaborative Users' Task Analysis (CUTA), repairing some of the deficits of CARD for his settings. Halskov & Dalsgård (2006) specialized the method to focus on combinations of "domain cards" with "technology cards" (see also Davis, 2010). Tschudy, Dykstra-Erickson, and Holloway (1994) developed their own highly visual version, PictureCARD, for a setting in which they had no language in common with the users whose stories they wished to understand.

The card-based practices used pieces of cardboard about the size of playing cards. Each card represented a component of the user's work or life activities, including user interface events (i.e., screen shots), social events (conversations, meetings) and cognitive, motivational, and affective events (e.g., the application of skill, the formation of goals or strategies, surprises and breakdowns, evaluations of work practices). The cards were used by diverse teams in analysis, design, and evaluation of work and technology. Because the cards were novel object to all the participants, they occasioned third-space questionings and negotiations, resulting in new shared understandings and co-constructions. Often, teams used the cards to prepare a kind of storyboard poster, narrating the flow of work and technology use and annotating or innovating cards to describe that work. The resulting posters formed narratives of the work that were demonstrated to be understandable to end-users, corporate officers, and software professionals, and which led to insights and decisions of large commercial value (see Sanders, 2000, for a differently-constructed example of storyboard posters to describe work).

Druin (1999; Druin et al., 2000) pursued a third line of storytelling research and practice, with children as design partners in a team that also included computer scientists, graphic designers, and psychologists (for other participatory work with children, see e.g., Sanders, 2000;Hornof, 2008; Kam et al., 2006; Large et al., 2007; Taxen, 2004).). Their purpose was to envision new technologies and practices in children's use of computers and related devices. They used both on-line storyboarding techniques and the construction of prototypes of spaces in which the jointly-authored stories could be performed. This work kept everyone learning from everyone else – children learning about technologies and the

storyboarding environment, adults learning about children's views and other adults' expertises, and everyone negotiating the meaning of new technological and narrative ideas, as well as their implementations.

So far, this section has addressed primarily the acquisition of stories. But stories are also for telling to others. Sanders (2000) described the construction of storyboards based on users' experiences. Gruen (2000, 2001) described guidelines and practices through which a diverse team could begin with a concept, and then could craft a convincing and engaging story around it. Demirkbilek and Demirkan (2004) used stories initiated by seniors in Turkey to redesign household items for greater usability by elder people. Massimi and Baecker (2006) similarly used seniors' stories for the redesign of mobile telephones.

Triantafyllakos et al. (2010) described a method for creating rich characters around whom designers could consider design alternatives – an approach similar to the "personas" approach of Cooper et al. (2007).[17] Best et al. (2009) present a contrasting case, in which members of a diaspora community (i.e., citizens living outside of their own country) served as a proxy for their less well-traveled citizens at home, with results that in some ways showed the weakness of using proxies for actual users.

Going further in the direction of contextualized knowledge, Brereton advocates for a participatory approach that she called "embedded research," in which the researcher lives as a member of the users' community for an extended period of time (2009; Segalowitz & Brereton, 2009). In general, the problem of "designing for the 'other'" (Nielsen & Bødker, 2009; see also Hirsch, 2009) remains an open question in participatory design, as in all of user-centered design (Stappers et al., 2009). That is, how can people speak for themselves if they are not even present? How can designer verify their knowledge of the users if the users are not available to discuss their needs?

Sanders' and Gruen's procedures led to hybrid experiences, in the sense that few software professionals or end-users think in terms of story-construction or rubrics for effective fictions. Irestig and Timpka (2002) described a method for sharing stories from small working groups with a larger audience of decision-makers.

Third Space. Story-collecting and story-telling generally require a kind of third space in which to occur. Beeson and Miskelly (1998, 2000) were specifically concerned to create a new space for story-writing and story-reading, and to maintain some of the most important aspects of third spaces in that new

[17] See also critiques of the personas approach such as in Adlin et al. (2006).

space – i.e., preservation and expression of new meanings, relationships, conflicts, multiple perspectives, and "heterotopia." The three card-based practices use unfamiliar media (the cards), and made those media central to the team's activities, thus requiring conscious attention to shared conceptualizing and defining of those media, as well as the creation of new media when needed. Druin and colleagues created new software environments and new devices to craft and implement stories of futuristic technologies. Finally, Gruen engaged diverse teams in new roles as story-writers, guided by expert-derived guidelines, in the writing of professionally-structured and professionally-paced stories for organizational or commercial use.

Claimed Benefits. The story-collecting and story-telling practices are diverse, and serve multiple purposes. A brief summary of the claims of their value to projects and products is as follows:

- **Articulation** and preservation of a diverse community's views (Beeson & Miskelly, 1998, 2000)
- **Practical application** to work analysis, task analysis, new technology innovation, and usability evaluation in commercially important products and services (Gruen, 2000, 2001; Lafreniére, 1996; Muller, 2001; Muller et al., 1995b; Sanders, 2000; Tudor et al., 1993; Tschudy et al., 1994)
- **Co-creation of new ideas** and children's articulation and self-advocacy (Druin, 1999; Druin et al., 2000)

Photographs

There are many ways to tell stories. One approach that has informed recent PD work is end-user photography. Patton (2000) notes that both (a) taking pictures and (b) organizing pictures into albums are, of course, familiar activities to most people in affluent countries. These activities allow end-users to enter into a kind of native ethnography, documenting their own lives. In keeping with the issues raised in the preceding "Stories" section, it is important that the informants themselves (the end-users) control both the camera and the selection of images (see Bolton, 1989, for a set of discussions of the uses and abuses of documentary photography). They thus become both authors and subjects of photographic accounts of their activities. This dual role leads to one kind of hybridity, in which the photographic activities partake of both the world of common social life, and the world of documenting and reporting on working conditions.

To address the problem that "rural women are often neither seen nor heard," Wang et al. (1996) in collaboration with the Yunnan Women's Health and Development Program, invited Chinese village women to articulate their lives through *photo novellas* created with cameras that the women controlled, with the

goal of influencing policy-makers. In an exploration of products for mobile knowledge workers, Dandavate, Steiner, and William (2000) similarly asked their informants to take pictures as part of a documentation of the working lives. In their study, informants were also invited to construct collages of their working lives, selectively re-using the photographs (among other graphical items) in those collages. The collages were, in effect, one type of interpretation by the photographers of their own photographs. Similarly to Patton's work, Dandavate et al. asked their informants to go out of their conventional professional roles as office workers (but well within their roles as members of an affluent culture) in the activity of taking the photographs. Dandavate et al. asked their informants to go even further out of role, through the construction of the collages based on their photographs, and the interpretation of the collages. The activities were thus marginal, partaking of attributes of informal life and professional life, of familiar and unfamiliar activities. They concluded that the photographic work led to new learnings and understandings that had not been accessible through observational studies, as well as a stronger sense of ownership by their informants in the outcome of the study.

Noble and Robinson (2000) formed an alliance between an undergraduate design class at Massey University and a union of low-status service workers, developing photodocumentaries of service work. The photographs served as a kind of hybrid boundary object (Star & Griesemer, 1989) – for the students, the photographs were composed artifacts of design, while for the union members, the photographs were common and casually-produced snapshots. Discussions between union members and students were rich, conflicted, and productive, as they negotiated the status and meaning of these hybrid objects. These discussions – and the exhibits and posters that they produced (i.e., the collective actions of the students and the union members) – could not have been successful without mutual learning and construction of new understandings. Photodocumentaries were used by Kwok (2004) as a means of providing familiar, concrete artifacts to enable design collaborations. Mattelmäki and Batarbee (2002; see also Hulkko et al., 2004) used photodocumentaries as one component of a set of user-composed diary techniques, with a subsequent user-created collages to serve as a rich source of discussions.[18] Taylor & Cheyerst (2009) further pursued themes of lay photography and group reflection through a community-scaled photo display device.

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[18] It is noteworthy that, in the studies reviewed here, the informants made their own decisions about what was important, and therefore what they should photograph. For a discussion of issues in more conventional, researcher-directed photographic diary studies, see Carter and Mankoff, 2005.

Pecknold (2009) developed a novel mixture of photography, drawing, and "probes" in order to conduct remote design dialogues between her university in Canada and her informants in Rwanda. Women answered a prepared set of questions through photographs and drawings, and labeled self-selected photos and drawings to correspond to further questions about hopes and desires. Like the tailoring of the workshop setting for elders and children (see "Workshops," above), this is another example of suiting a previously well-understood set of participatory methods to the special circumstances and special needs of a new group of participants.

Third Space. End-user photography is an interesting case of hybridity and the production of third spaces. Photography is a good example of an "in-between" medium – one that is part of many people's informal lives (Dandavate et al., 2000; Noble & Robinson, 2000; Patton, 2000), but that is also an intensively studied medium of communication and argumentation (Bolton, 1989; Noble & Robinson, 2000). Photography occurs at the margin of most people's work, and yet can easily be incorporated into their work.

The resulting photographs and drawings in these projects have attributes of their dual worlds – they are partially informal and quotidian, and partially formal and documentary. Discussions around the photographs, and combination of the photographs into photo-narratives (Kwok, 2004; Patton, 2000) or collages (Dandavate et al., 2000; Hulkko et al., 2004; Mattelmäki & Batarbee, 2002) can lead to mutual learning and new ideas, particularly through the inclusion of the voices of the photographers, the viewers, and especially the people depicted in the photographs (Noble & Robinson, 2000; see also discussion of Isomursu et al., 2004, below). Because photographs are often thought of as denotative media (i.e., documenting what *is*), Pecknold's approach of supplementing photographs with more connotative drawings is very promising for helping people to express and communicate their hopes and desires about possible futures (Pecknold, 2009).

Claimed Benefits. The use of end-user photographs and drawings appears to be new and experimental, and there are few strongly-supported claims of benefits. Informal claims of success and contribution include the following:

- **Richer, contextualized communication medium** between end-users and designers (in some cases, the designers were not, themselves, software professionals)
- **Stronger engagement** of designers with end-users' worlds
- **Enhanced sharing** of views and needs among end-users, leading to stronger articulation by them as a collective voice

- **Expression** of emotions and other connotative concepts, as well as documentation of more denotative, fact-like information

Dramas and Videos

Drama provides another way to tell stories – in the form of theatre or of video. One of the important tensions with regard to drama in PD is the question of whether the drama is considered a finished piece, or a changeable work-in-progress.

Many PD drama-practitioners make reference to Boal's Theatre of the Oppressed (Boal, 1974/1992). Boal described theatrical techniques whose purpose was explicitly to help a group or a community find its voice(s) and articulate its position(s). The most influential of Boal's ideas was his Forum Theatre, in which a group of non-professional actors performs a skit in front of an audience of interested parties. The outcome of the skit is consistent with current events and trends – often to the dissatisfaction of the audience. The audience is then invited to become authors and directors of the drama, changing it until they approve of the outcome.

A second technique of interest involves the staging of a tableau (or a "frozen image," in Brandt & Grunnet, 2000), in which a group of non-professional actors positions its members as if they had been stopped in the middle of a play. Each member can tell what s/he is doing, thinking, planning, and hoping.

Forum Theatre was used informally in the UTOPIA project and other early Scandinavian research efforts (Ehn & Kyng, 1991; Ehn & Sjögren, 1991), addressing the question of new technologies in newspaper production. Changes in work patterns and work-group relations were acted out by software professionals in the end-users' workplace, using cardboard and plywood prototypes, in anticipation of new technologies. The workers served as the audience, and critiqued the envisioned work activities and working arrangements. The drama was carried out iteratively, with changes, until it was more supportive of the skilled work of the people in the affected job titles. The researchers made repeated visits with more detailed prototypes, again using the vehicle of a changeable drama, to continue the design dialogue with the workers. This work was widely credited with protecting skilled work from inappropriate automation, leading to a product that increased productivity while taking full advantage of workers' skills.

Brandt and Grunnet (2000) made a more formal use of Boal's Forum Theatre and "frozen images" in the two projects described above ("Sitings"). Working with refrigeration technicians in the "Smart Tool" project, they and the technicians enacted work dramas and tableaux around four fictitious workers, leading to insights about the technicians' work and the technological possibilities

for enhanced support of that work. Here is a description of one use of Forum Theatre:

> [T]he stage was constructed of cardboard boxes which in a stylized way served as… the different locations in the scenario. At first the service mechanics sat as an audience and watched the play. After the first showing of the "performance" the refrigeration technicians were asked to comment and discuss the dramatized scenario critically…
>
> The role of the refrigeration technicians changed from being a passive audience into being directors with an expert knowledge. The users recognized the situations shown in the dramatized scenario... Because of the openness of the scenario there was a lot of "holes" to be filled out. For instance, one… technician explained that he preferred to solve the problems himself instead of calling his boss. This information meant that the Smart Tool should be able to help him solve his problems while being in his car… Another [technician] wanted to have personal information that his boss was not allowed… [to] access... (p. 14)

Incidents were analyzed through tableaux. The designers positioned themselves in the "frozen image" of the work situation, and then led a discussion of (a) the work activities that were captured in the stopped action, and (b) the work relations in which each particular tableau was embedded.

Muller et al. (1994) presented a related tutorial demonstration piece called "Interface Theatre," with the stated goal of engaging a very large number of interested parties in a review of requirements and designs – e.g., in an auditorium. In Interface Theatre, software professionals acted out a user interface "look and feel" using a theatrical stage as the screen, with each actor playing the role of a concrete interface component (e.g., Kim the Cursor, Marty the Menubar, Dana the Dialoguebox).

Pedersen and Buur (2000; see also Buur et al. 2000), following previous work of Binder (1999), collaborated with industrial workers to make videos showing proposed new work practices and technologies. After a collaborative analysis of the work (see "Games," below), workers acted out their new ideas and took control of which action sequences were captured on video for subsequent explanation to other workers and management (see also Björgvinsson & Hillgren, 2004; Mørch at al., 2004). Isomursu et al. (2004) used more informal user-produced videos based on cellphone video-recordings, which included not only lay-ethnographic records of usage, but also user-originated dramas to illustrate hypothesized or desired aspects of usage. In the Situated and Participative

Enactment of Scenarios method, Iacucci et al. described a projective series of improvisations with an innovative technology idea – the "magic thing" – in users' homes or workplaces (Iacucci et al, 2002; Iacucci & Kuutti, 2002; Kuutti et al., 2002; see also Buur and Bødker, 2002; Bødker and Buur, 2002).

Finally, Salvador and Sato (1998, 1999) used acted-out dramas as triggers for questions in a setting similar to a focus group, and Howard et al. (2002) described the role of professional actors and directors in dramatizing attributes of proposed new products. Kantola et al. (2007; Kankainen et al., 2005) similarly used dramatic readings by "role characters" to deepen the understanding of users' situations. Enquist and Tollmar (2008) used role-playing as part of a series of workshops to envision a future health-related memory aid for pregnant women.

While all of these practices are loosely tied together through the use of drama, there are important contrasts. One important dimension of difference is the extent to which the drama is improvised in the situation, or scripted in advance. Boal's techniques make a crucial use of improvisation by the user-audience, to change the action and outcome of the drama. This theme is most clearly seen in the work of Brandt and Grunnet (2000), Ehn and Sjögren (1986, 1991), and Muller et al. (1994). At the opposite extreme are videodocumentaries, which of course are difficult to change in response to discussion and constructive insight.

Third Space. Taken as a somewhat diverse participatory genre, the dramatic approaches provide many of the aspects of hybridity reviewed in the cultural studies introduction to this chapter. Drama brings a strong overlap of the world of end-users and the world of technology developers/researchers, showing concrete projections of ideas from one world into the other world – and, in most uses, allowing modification of those ideas. Drama is marginal to the work domains of most technology developers/researchers and most end-users, and thus moves all parties into an ambiguous area where they must negotiate meaning and collaboratively construct their understandings. Agreements, conflicts, and new ideas can emerge as their multiple voices and perspectives are articulated through this rich communication medium.

Claimed Benefits. Similarly to end-user photography, most of the theatrical work has the feel of experimentation. It is difficult to find clear statements of advantages or benefits of these practices (see "Conclusions," below). In general, practitioners and researchers made the following claims:

- **Building bridges** between the worlds of software professionals and users
- **Enhancing communication** through the use of embodied (i.e., acted-out) experience and through contextualized narratives

- **Engaging small and large audiences** through direct or actor-mediated participation in shaping the drama (influencing the usage and design of the technology)
- **Increasing designers' empathy** for users and their work
- **Simulating use of not-yet-developed tools** and technologies ("dream tools," Brandt & Grunnet, 2000) to explore new possibilities
- **Fuller understanding** by focus group members, leading to a more informed discussion

Games

From theory to practice, the concept of games has had an important influence in participatory methods and techniques. Ehn's theoretical work emphasized the negotiation of language games in the course of bringing diverse perspectives together in participatory design (Ehn, 1988; for applications of this theory, see Ehn and Kyng, 1991; Ehn and Sjögren, 1986, 1991). In this view, part of the work of a heterogeneous group is to understand how to communicate with one another – and of course communication isn't really possible on a strict *vocabulary* basis, but requires an understanding of the *perspectives* and *disciplinary cultures* behind the words (Bachmann-Medick, 1996; Muller, 1997a, 1997b, 1999b). Thus, the work of heterogeneous teams is, in part, the "mutual validation of diverse perspectives" that Bødker et al. (1988) advocated.

Games have also been an important concept in designing practices, with the convergent strategies of enhanced teamwork and democratic work practices within the team.[19] We explained the concepts as follows (Muller et al. 1994):

> When properly chosen, games can serve as levelers, in at least two ways. First, games are generally outside of most workers' jobs and tasks. They are therefore less likely to appear to be "owned" by one worker, at the expense of the alienation of the non-owners. Second,… [PD] games… are likely to be novel to most or all of the participants. Design group members are more likely to learn games at the same rate, without large differences in learning due to rank, authority, or background… This in turn can lead to greater sharing of ideas…

[19] For an example of games used to teach *design experiences* among students, see Iversen and Buur (2002).

> In addition, games… can help groups of people to cohere together [and] communicate better. One of the purposes of games is enjoyment -- of self and others -- and this can both leaven a project and build commitment among project personnel. (pp. 62-63)

Derived from Ehn's (1988) theoretical foundation, Ehn and Sjögren (1986, 1991; see also Bødker et al. 1993) adopted a "design-by-playing" approach, introducing several games into PD practice:

- **Carpentopoly**, a board game concerned with business issues in the carpentry industry.
- **Specification Game**, a scenario-based game based on a set of "situation cards," each of which described a workplace situation. Players (members of the heterogeneous analysis/design team) took turns drawing a card and leading the discussion of the work situation described on the card. Hornecker (2010) used a more restricted approach, in which cards primarily asked questions about designed artifacts.
- **Layout Kit**, a game of floor-plans and equipment symbols, for a workers' view of how the shop floor should be redesigned (see also Bødker & Buur, 2002; Horgan et al. 1998; Klær and Madsen, 1995; and most recently Brandt and Messeter., 2004, reviewed below).
- **Organization Kit and Desktop Publishing Game**, a part of the UTOPIA project (Ehn & Kyng, 1991), in which cards illustrating components of work or outcomes of work were placed on posters, with annotations.

Petersen and Buur (2000) extended the Layout Kit in new ways. Collaborating with workers at Danfoss, they jointly created a board game for laying out new technologies in an industrial plant:

> A map of the plant layout served as the game board… Foam pieces in different colors and shapes worked as game pieces for the team to attach meaning to…. Often, in the beginning of the game, the placement of the piece was only accepted when touched by almost everybody…. The participants were forced to justify the placement, which fostered a fruitful dialogue about goals, intentions, benefits, and effects. People were asking each other such things as… "what if we change this?", "on our plant we do this, because…", "would you benefit from this?".

The games became the foundation of the videos produced in collaboration with the workers (described above in "Dramas").

Buur et al. (2000) extended the Specification Game, making a game from the outcome of a participatory ethnographic analysis of work at an industrial plant. They first collected video observations from work activities, and developed a set of 60-70 video excerpts for further discussion. They next constructed a set of cards, one for each video excerpt, with a still-frame image from the video displayed on each card. Game participants then grouped these 60-70 cards into thematic clusters, organized their clusters, and analyzed the subsets of actions in each cluster (for a related non-game technique, see affinity diagramming in Beyer & Holtzblatt, 1998). Similar approaches were used by de Jong et al. (2009; Bruyne & de Jong, 2008) for self-reflection by workers on their behaviors in the context of the physical workplace, and to envision future possibilities (see also Maarleveld et al., 2009).

The concept of games was taken in a different direction, for use in non-Scandinavian workplaces, by introducing several new games (Muller et al., 1994):

- **CARD**, a card game for laying out and/or critiquing an existing or proposed work/activity flow (see "Stories," above)
- **PICTIVE**, a paper-and-pencil game for detailed screen design (Muller et al., 1995b)
- **Icon Design Game**, a guessing game for innovating new ideas for icons (this game assumes subsequent refinement by a graphic designer)
- **Interface Theatre**, for design reviews with very large groups of interested parties (see "Dramas," above)

These games emphasized hands-on, highly conversational approaches to discussing both the user interface concept itself and the work processes that it was intended to support. We attempted to foster an informal and even playful tone, for the reasons sketched in the earlier quotation. Similar approaches have been used for design across barriers of disability (Davies et al., 2004) and across barriers of language and culture (Bidwell et al., 2010; Tschudy et al., 1996).

Recently Brandt and Messeter (2004; see also Johansson et al., 2002) developed a strong sequence of games. Their User Game is based on the video-collage methods of Buur et al. (2000), combining brief video clips into person or role descriptions which are then labeled evocatively by the participants. The second game in their sequence, the Landscape Game, places those user constructs into the work environment (as a board game). The Technology Game adds simple shapes that stand for technologies, again playing those shapes onto the work environment in the Landscape Game. Finally, the Scenario Game moves back to the real world, enacting possibilities based on new ideas from the preceding three

games. The enactments may be videorecording, both for documentary purposes and to generate further video material for another cycle of the four games.

The goal of *designing a game* can also serve as an opportunity to create a hybrid space: The design task mixes aspects of software design and implementation with game-based concepts of enjoyment, suspense, and personal outcomes. Kam et al. used this strategy to engage students, their families, and their communities in workshops in a rural Indian village (Kam et al., 2006; see also Antle, 2003).

Third Space. Each of these games took all of its players outside of their familiar disciplines and familiar working practices, but strategically reduced the anxiety and uncertainty of the situation by using the social scaffolding of games. Each game required its players to work together through mutual learning to understand and define the contents of the game, and to interpret those contents to one another in terms of multiple perspectives and disciplines. The conventional authority of the technology developers/researchers was thus replaced with a shared interpretation based on contributions from multiple disciplines and perspectives.

Claimed Benefits. Participatory design work with games has been claimed to lead to the following benefits:

- **Enhanced communication** through the combination of diverse perspectives
- **Enhanced teamwork** through shared enjoyment of working in a game-like setting
- **Greater freedom to experiment and explore new ideas** through flexible rules and redefinition of rules during the game
- **Improved articulation** of the perspectives, knowledges, and requirements of workers
- **New insights** leading to important new analyses and designs with documented commercial value

Constructions

Preceding sections have considered hybridity in participatory activities, such as sitings, workshops, stories, photography, dramas, and games. This section continues the survey of participatory practices that bring users and technology developers/researchers into unfamiliar and ambiguous "third space" settings. In this section, we focus on the collaborative construction of various concrete artifacts:

- **Physical reflections of a co-created language** of analysis and design

- **Descriptions of work** in unfamiliar media
- **Low-tech prototypes** for analysis and design
- **High-tech prototypes** for design and evaluation

Language

An earlier section noted Ehn's theoretical work on *PD as language games* (Ehn, 1988). Ehn's interest converges with Bhabha's "third space" argument (Bhabha, 1984): Part of the characterization of hybridity was the negotiation and co-creation of working language and meaning. This section takes Ehn's position seriously, and considers the role of language creation in participatory practices that lead to hybridity.

Several projects have made physical objects into a kind of vocabulary for work analysis, design, or evaluation. The cards described in the preceding section ("Games") are examples (Buur et al., 2000; Ehn & Sjögren, 1986, 1991; Lafreniére, 1996; Muller, 2001; Muller et al., 1995b; Tschudy et al., 1994; Tudor et al., 1993). In each of these methods, the cards became a kind of "common language" (e.g., Muller et al., 1995b) through which the design team communicated (a) with one another, and (b) with their labor and management clients.

In two of the methods, the cards themselves were acknowledged to be incomplete, and part of the work of the team was to develop and refine the cards so as to reflect their growing understanding and their new insights (Lafreniére, 1996; Muller, 2001). Team members (users and others) were encouraged to disregard, if appropriate, the template of information on each card, up to and including the decision to turn the card over and write on its blank back. In subsequent sessions, the concepts that were written on the blank backs of cards usually became new kinds of cards. The working vocabulary of the team thus grew as the shared understanding of the team grew. This extensibility of the set of cards was observed in nearly all sessions, but was particularly important in sessions that were envisioning future technologies or future work practices. The cards thus became a point of hybridity, where assumptions were questioned and challenged, where extensive and polyvocal dialogue was required for the team to assign meaning to the cards, where conflicts were revealed and resolved, and where the team had to construct its understanding and its language.

Similarly, the board games of Ehn and Sjögren, and especially of Pedersen and Buur (2000), used deliberately ambiguous playing pieces. The analysis team had to assign meaning to the pieces, and did so in a collaborative way.

Chin et al. (2000), working with a community of physical scientists who were not software professionals, introduced software-like flowcharts to their clients

(see Kensing and Munk-Madsen, 1993, for a discussion of the relationship between concrete tools and abstract tools). This work shared, with the other work reviewed in this section, aspects of symbol-ambiguity and language co-creation:

> To attune scientists to the construction of workflow diagrams, we provided them a simple, informal example of how a meteorologist might diagram his [sic] work in collecting and reporting weather conditions.… Although we used circles and arrows in our example, we did not impose any specific symbology or rules on the scientists' construction of workflow diagrams…. At times, the scientists did struggle in developing some diagrams, but the labor was mostly centered on the elucidation of the research processes rather than the mechanics of diagramming.

Third Space. Common to all of these projects was the co-creation of a physically-represented language, both within the team and from the team to its clients and stakeholders. This kind of lay linguistic work requires mutual education and mutual validation for the new language components to have meaning to all of the parties. These negotiations of multiple knowledges are at the heart of the "third space" proposal of Bhabha (1984).

Claimed Benefits. Most of these projects involved a number of activities, and a number of aspects of hybridity. It is difficult to determine how much of their successes were due specifically to the language-related components. Benefits that *may* have resulted from the negotiation and co-creation of language include the following:

- **Enhanced understandings** of one anothers' perspectives and needs
- **Critical examinations of assumptions** underlying the ways that each party expressed its perspective
- **Shared ownership of the language** and its physical manifestation (cards, flowcharts, game pieces)
- **Improved communication** within the team and from the team to interested outsiders (clients, stakeholders)

Making Descriptive Artifacts

Another way of moving end-users into unfamiliar and hence reflective experiences is to ask them to use "projective" or artistic methods to report on their experiences and needs. In one sense, these methods produce another kind of language of expression, and therefore might have been included in the preceding section. Because the outcomes are so distinctively different from the language-

oriented work of the preceding section, we thought it best to review this work in its own section.

Sanders has employed user-created collage in her participatory practice for a number of years (Sanders, 2000; see also Dandavate et al., 2000; Sanders & Branaghan, 1998; Sanders & Nutter, 1994). The choice of collage is of course strategic: Relatively few people make collages as part of their work activities, and relatively few people interpret their collages to one another as part of their work conversations. Yet the content of the collages is strongly anchored in what people know. The collages thus become marginal constructions, not part of any defined workplace field or discipline, but informed by familiar knowledges. The novelty of the collage encourages the challenging of assumptions, and the interpretation and presentation of collages encourages mutual learning across the diversity of experiences and knowledges of the participants.

For completeness, we make reference to the work of Noble and Robinson (2000) on collaborative creation of photo-documentaries, and of Patton (2000) on end-user creation of photo-collages, reviewed in the earlier section on "Photographs." Their work also produced descriptive artifacts that took users and their collaborators into unfamiliar areas.

Third Space. These methods have in common the use of a non-standard medium for making users' needs known, and for developing new insights in a workplace setting. The making of collages may be new for many participants. They are thus in a kind of "third space," between their work culture and the artistic or expressive culture of collages, and they have to reflect on the differences as they construct their approach to making collages of their own experiences.

It is not clear, in Sanders' work, whether the collage work is done collaboratively among end-users, or whether each collage is a solitary production. If the collage-creation is done collaboratively, then it might give rise to some of the other attributes of hybridity in Table 1 – e.g., challenging assumptions, co-creation of meanings and collective actions, dialogues.

Claimed Benefits. Basing her claims on years of practice with collages and related practices, Sanders (2000) claims the following benefits:

- **Using visual ways** of sensing, knowing, remembering, and expressing
- **Giving access and expression to emotional side** of experience
- **Acknowledging the subjective perspective** in people's experiences with technologies

- **Revealing unique personal histories** that contribute to the ways that people shape and respond to technologies

Low-tech Prototypes

Beaudouin-Lafon and Mackay have provided a chapter on prototyping – including participatory prototyping – in this book. Therefore, we have written a very brief account in this chapter so as not to duplicate their efforts.

Low-tech prototypes may lead to "third space" experiences because they bring people into new relationships with technologies – relationships that are "new" in at least two important ways. First, the end-users are often being asked to think about technologies or applications that they have not previously experienced. Second, in *participatory* work with low-tech prototypes, end-users are being asked to use the low-tech materials to reshape the technologies – a "design-by-doing" approach (Bødker et al., 1993). In this way, participatory work with low-tech prototypes involves much more user contribution and user initiative than the more conventional use of "paper prototypes" as surrogates for working systems in usability testing (e.g., Daly-Jones et al., 1999; Rettig, 1994). The general approach of low-tech prototyping for design has been effective in many settings, including with workers (Bødker et al., 1987, 1988, 1993; Ehn & Kyng, 1991; Lafreniére, 1996; Muller, 1991, 1992; Muller et al., 1995b); inter-cultural communication (Bidwell et al., 2010; see also Bidwell & Hardy, 2009) even when there is no common language (Tschudy et al., 1996); with people with disabilities (Moffatt et al., 2004); and with very young users (Druin, 2002; Druin et al., 2009) and very old users (Massimi & Baecker, 2006; Massimi, Baecker, and Wu, 2007; see also literature reviews in Massimi, 2006, 2007).

The UTOPIA project provided impressive demonstrations of the power of low-tech cardboard and plywood prototypes to help a diverse group to think about new technologies, office layouts, and new working relations that might result from them (Bødker et al., 1987, 1988, 1993; Ehn & Kyng, 1991; for other use of low-tech, substitutive prototypes, see Mørch et al., 2004). Subsequent projects to translate this work to North America led to the PICTIVE method of paper-and-pencil constructions of user interface designs by heterogeneous design teams (Muller et al., 1995b); prototyping of consumer appliances using foam-core and hook-and-loop attachments (Sanders & Nutter, 1994); and a more experimental simulation of email, using paper airplanes (Dykstra & Carasik, 1991).

In addition to these methods, many researchers who work with children in PD experiences use low-tech prototyping. The children affectionately call it "bags of stuff" (Druin et al., 2009). The types of materials that are used are intentionally 3-demensional to cut down on the "fear of drawing" and to use these artifacts as a bridge for communication and design. Everything from toilet paper rolls to clay

and cotton balls are used to construct new ideas with children and adults. These artifacts are then presented to a larger group and the highlights of the design ideas are written up on a white board. The ideas are then aggregated to suggest a new design direction for the team (Druin, 2002).

When prototyping takes place among geographically remote participants, the new situation is hybridized almost by definition Moore (2003) proposed an experimental approach to allow end-users to create the appearance of the user interface, and to provide rationales for their designs; it is not clear if this approach has been tested yet.[20] Rashid et al. (2006) took a critique-oriented approach to solve a similar participatory-requirements-analysis problem, providing a web method for users to create annotations with screen shots, which were then conveyed to the development team. Significantly, the Rashid et al. work was done during the design process, so that users were episodically involved in design critiques. Lohmann, Ziegler, and Heim (2008) described a text-plus-gesture method for critiquing designs through web browsers, and conducted preliminary testing of the system with end-users (for related work, see . Lohmann, Dietzold, Heim, and Heino (2009). Also addressing the problem of distributed requirements specification, Janneck and Gumm (2008) described the Commented Case Studies method for collecting end-user information through scenario-based design at-a-distance, sometimes involving a "Mediated Feedback" process to collect and redact user input (Gumm et al., 2006). Heß et al. (2008) described two online forum environments in which a "User Parliament" and a "Central Committee" of users and software professionals provided guidance for the duration of a Community-Driven Development (CDD) process; see also the work of Füller et al. (2006), mentioned above, on Community-Based Innovation (CBI) approaches to software design-at-a-distance.

Work in this newly defined area of Distributed Participatory Design (DPD) is in relatively early stages (Nasghsh et al., 2008). Many of the experiments involve re-purposing of existing Web2.0 technologies to facilitate user feedback (e.g., We look forward to the maturity of this emerging effort.

Third Space. Low-tech prototyping has a reputation for bringing new insights through the combination of diverse perspectives. The UTOPIA project is widely credited with mutual education among shop-floor print workers and computer systems researchers. Experiences with PICTIVE and its variants almost always involved mutual education. Understanding and changing the artifact become

[20] One of us was involved in an earlier experiment called TELEPICTIVE which attempted to support design-at-a-distance. We provided a description of the experimental prototype, and its shortcomings, in Miller et al. (1995) and Muller et al.,

important arenas for people to explore their understandings of one anothers' positions, to question one anothers' approaches, to discover and resolve conflicts, to engage in combinations of views leading to plans for collective action, and to accommodate heterogeneity of views and interests.

Claimed Benefits. The low-tech participatory prototyping approaches have been extraordinarily influential, with adoption on four continents. Claimed benefits include:

- **Enhanced communication and understanding** through grounding discussions in concrete artifacts (Druin, 2002)
- **Enhanced incorporation of new and emergent ideas** through the ability of participants to express their ideas directly via the low-tech materials, and through the construction of artifacts that can be used in other techniques, especially drama and videodocumentaries (above)
- **Enhanced working relations** through a sense of shared ownership of the resulting design (Druin et al., 2009)
- **Practical application with measured successes** in using low-tech design approaches to real product challenges, achieving consequential business goals

Evolutionary Prototyping and Cooperative Prototyping

This last section on participatory methods is concerned with software prototyping. As noted above, we are relying on the chapter by Beaudouin-Lafon and Mackay in this volume to cover prototyping in greater depth and breadth. We include this brief overview for completeness of our chapter's survey of hybridity in participatory practices.

Bødker and Grønbæk (1991) and Madsen and Aiken (1993) explored the potential of cooperative prototyping in several projects, using different technology infrastructures. In general, they found that this approach led to enhanced communication with end-users, improved incorporation of end-user insights into the prototypes, and stronger collective ownership and collective action-planning by the team. They also observed time-consuming breakdowns in the design process itself, when new ideas required significant programming effort.

In a different prototyping approach, a system is delivered to its end-users as series of iterative prototypes, each of which gradually adds functionality (e.g., Anderson & Crocca, 1993; Bertelsen, 1996; Trigg, 2000). What appears to be critical is that the prototype functions as a *crucial artifact* in the end-users' work – e.g., a resource of documents for librarians (Anderson & Crocca, 1993), an on-line event checklist that served as the crucial coordination point for the work of diverse contributions (Bertelson, 1996), or a database supporting funding work in

a non-profit organization (Trigg, 2000). Trigg (2000) provided a series of observations and tactical recommendations about how to engage the users in the evaluations that both they and the software professionals had agreed were needed.

In a rich survey of prototyping practices, Lim et al. (2008) took a different, more philosophically pragmatic approach to prototyping. In their analysis, prototyping has become a means for exploring a design space, and for provoking questions within that space. Critical aspects of the prototype become the ability to *filter*, specifically to highlight the issues to be explored, while ignoring issues that could be distracting. The two case studies in Lim et al. involved conventional unidirectional prototyping – i.e., *from* designer *to* user. Thus, these ideas have not yet been explored in a participatory context. It remains to be seen how these new ways of thinking about prototyping will affect participatory prototyping.

Third Space. This very brief survey of cooperative prototyping and "iterative delivery" approaches shows several aspects of hybridity. In the case of cooperative prototyping, the cooperative work may be done in a physical third space that is neither the end-users' office nor the software developers' office (see "Sitings," above). In the case of the delivery of iterated prototypes, each prototype is presented in the end-users' setting, but is unusual and only partially functional, and thus occasions reflection about its nature, its role in the end-users' work, and thus the work itself. In both cases, the invitation (or perhaps the necessity) of the end-users' actions to help shape the technology becomes an important means of refocusing their attention, as well as the attention of the software developers. The ensuing conversations are concerned with the interlinked feasibility of changes to technology and to work practices, with attributes of hybridity including polyvocal dialogues, challenging one anothers' assumptions, and developing plans for collective actions.

Claimed Benefits. Some of the virtues of the low-tech prototyping approaches have also been claimed for the cooperative prototyping and "iterative delivery" approaches:

- **Enhanced communication and understanding** through grounding discussions in concrete artifacts
- **Enhanced working relations** through a sense of shared ownership of the resulting design

Additional claims for software-based prototypes include:

- **Earlier understanding of constraints** posed by the practical limitations of software
- **Improved contextual grounding of the design** in the end-users work practices

Conclusion

Our theme has been hybridity, and the ways in which selected methods in participatory design may bring useful attributes of hybridity or third space approaches into HCI work. We considered eight trends in PD – selection of sites of shared work, workshops, stories, end-user photography, dramas, creation of shared languages, descriptive artifacts (low-tech prototypes), and working prototypes – and we explored how each of these categories of practice may contribute to hybridity, and what advantages may result. The deliberate and selective use of hybridity has led to powerful methods in PD for increasing communication effectiveness, team coherence, innovation, and quality of outcome. Hybridity is thus at the heart of PD, fostering the critical discussions and reflections necessary to challenge assumptions and to create new knowledges, working practices, and technologies. When we consider HCI as a set of disciplines that lie between the space of work and the space of software development, we see that the hybrid third spaces developed within PD have much to offer HCI in general.

Table 2. Hybridity in Participatory Practices[a]

Attribute	Si-tings	Work-shops	Sto-ries	Pho-tos	Dra-mas	Games	Lan-gua-ge	Des-cript-ive	Proto-types
Overlap / Inbetweenness	?	+	-	+	+	+	+	+	+
Marginality	+	+	-	?	+	+	?	+	?
Novelty	+	+	?	?	+	+	+	+	+
Uncertain/shared	?	+	?	-	+	+	+	-	-
"ownership"	+	?	+	+	-	+	+	-	+
Selected attributes	+	+	+	-	+	-	+	-	+
Conflicts									
Questioning assumptions	+	?	+	+	+	+	+	?	+
Mutual learning	+	+	+	+	+	+	+	?	+
Synthesis of new ideas	?	+	+	+	+	+	?	+	+
Negotiation / (co-)creation	+	+	+	+	+	+	+	+	+
Identities	-	-	+	+	-	?	?	+	?
Working language	-	?	+	+	-	+	+	+	+
Working assumptions and	+	?	+	+	+	+	+	?	+
dynamics	+	+	+	+	+	+	+	+	+
Understandings	?	+	+	+	-	+	?	+	?
Relationships	?	+	?	+	?	?	?	+	+
Collective actions									
Dialogues	+	+	+	+	+	+	+	+	+
Polyvocality	+	+	+	+	+	+	+	+	+
What is considered to be	-	-	-	+	-	-	+	+	-
data?	-	-	-	+	-	-	+	+	-
What are the rules of	-	-	-	?	-	-	+	-	-
evidence?									
How are conclusions									
drawn?									
↓ authority –	+	?	+	+	+	+	+	?	+
↑interpretation	?	+	?	+	?	+	?	?	+
↓ individualism –	+	+	+	+	-	+	+	+	+
↑collectivism									
Heterogeneity as the norm									

[a] Key: + practice includes this attribute of hybridity
- practice does not include this attribute
? not sure

Table 2 summarizes the discussion of hybridity in PD, using the criteria derived from cultural studies (Table 1) and the experiences described in the eight

areas of practice. Table 2 shows different patterns of hybridity for different methods, techniques, and practices.

Certain attributes are relatively common across practices – e.g., inbetweenness, questioning assumptions, negotiation, and heterogeneity as the norm. Other attributes are relatively rare – e.g., considerations of what constitutes legitimate data for analysis or design, how those data are analyzed as evidence, and how conclusions are drawn in each of the several fields that are represented in a team. These are difficult questions in the study of disciplinarity (Chandler et al., 1994; Klein, 1996), so it is perhaps not surprising that there is relatively weak support for their exploration in participatory practices. For projects in which these are pivotal questions, we may need new methods that leverage hybridity in new ways. We hope that this survey of PD practices for creating third spaces will lead to new practices that strengthen these missing attributes. Conversely, I hope that new work in PD and HCI can help to ground some of the cultural studies discussions in new ways.

This chapter would not be complete without a list of unsolved problems in participatory design:

- **Participation by non-organized workforce**. The field of PD has long been concerned about how to engage in meaningful participative activities with workers or others who are not organized into a group with collective bargaining power or other collective representation (e.g., Greenbaum, 1993, 1996; van den Besselaar et al., 1996). This has been a particularly difficult problem when we have tried to compare methods from one country (and political culture) to another (e.g., Muller et al., 1991)
- **Evaluation and metrics.** One of the weaknesses of the literature on participatory practices is the dearth of formal evaluations. While there is general agreement that user involvement is beneficial in many aspects of analysis and design (e.g., Kujala, 2003; see also Beyer & Holtzblatt, 1998; Cross, 2001; Dewulf & Van Meel, 2002, 2003; Garzotto, 2008; Pew and Mavor, 2007; Warr & O'Niell, 2005), the best way to structure and channel that "involvement" has been controversial (Druin, 2002; Luck, 2003; Olsson, 2004; Reyman et al., 2005). There is a small set of papers that have examined software engineering projects across companies, and have found positive outcomes related to end-user participation (Cotton et al., 1988; Saarinen & Saaksjarvi, 1989). We have been unable to discover any formal experiments comparing participatory methods with non-participatory methods in a credible workplace context. While it is possible to conduct design competitions in an academic environment (e.g., Peeters et al., 2008), the problems addressed are usually scaled to a classroom exercise, and the outcomes must be measured at

a very early stage (e.g., *design* outcomes, not product outcomes. Indeed, such studies for real-world products and projects would be difficult to perform, because they would require that a product be implemented and marketed twice (once with participation, and once without). The problem is made more difficult because measurements and metrics of organizational outcomes, user participation, and user satisfaction are currently vexing research issues (e.g., Garrety & Badham, 1998; Kappelman, 1995; for review, see Gasson, 1995).

- **Distributed Participatory Design.** It is already difficult to work across differences. Adding the problem of working across distances as well, makes participatory design more difficult. In this chapter, we have reviewed work in Distributed Participatory Design, and much of it is promising. We hope to see more specific methods and techniques that create new kinds of online spaces to continue this work.

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Note to Editors and Printers: Because we are citing many Scandinavian authors, we have alphabetized our references according to the Scandinavian alphabet: a, b, c… x, y, z, å, æ, ø.

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