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PARTICIPATORY DESIGN: THE THIRD SPACE IN HCI

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INTRODUCTION

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 workers' domain, nor in the software professionals' domain, but in an "in-between" region that shares attributes of both the workers' space and the software professionals' space. 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 with new insights and plans for action, to inform the needs of their organizations, institutions, products, and services. Important attributes of third space experiences include challenging assumptions, learning reciprocally, and creating new ideas, which emerge through negotiation and cocreation 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 (a) site-selection of PD work; (b) workshops; (c) story collecting and story telling through text, photography, and drama; (d) games for analysis and design; and (e) the cocreation of descriptive and functional prototypes.

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 & Kyng, 1991; Muller & Kuhn, 1993; Schuler & Namioka, 1993). The field is extraordinarily diverse, drawing on fields such as (a) user-centered design, (b) graphic design, (c) software engineering, (d) architecture, (e) public policy, (f) psychology, (g) anthropology, (h) sociology, (i) labor studies, (j) communication studies, and (k) political science. This diversity has not lent itself to a single theory or paradigm of study or approach to practice (Slater, 1998). 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 software design and development, or of other institutional settings (e.g., workers in companies, corporations, universities, hospitals, governments). 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), in the improvement of internal processes, and in the combination of diverse knowledges to make better services and products.

PD began in an explicitly political context, as part of the Scandinavian workplace democracy movement (e.g., Nygaard, 1975; Bjerknes, Ehn, & Kyng, 1987; Ehn & Kyng, 1987; Floyd, Mehl, Reisin, Schmidt, & Wolf, 1989; more recently, see Bjerknes & Bratteteig, 1995; Beck, 1996; Kyng & 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; Levinger, 1998).

Subsequent work focused on combining complex and distinct knowledges for realistic design problems. Fowles (2000), for example, 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. Similarly, Holmström (1995) analyzed a "gap in rationalities" among developers and users. I 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 coconstruct 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.

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 & Holtzblatt, 1998; Bødker, Kensing, & Simonsen, 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. Participator 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.

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).

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

Two more mature approaches have been offered by Beyer and Holtzblatt (1998) and Bødker and colleagues (2004).

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

I should also say that my concern is for methods that have been *shown to work in real situations*—for example, those that address real problems in work life, education, home life, leisure, and so forth—in which the outcomes were of consequence, and in which the participants could freely choose whether to be involved in the work. I have, therefore, omitted many promising methods that have so far been explored only as in-laboratory university exercises, apparently as part of assigned coursework. I look forward more realistic explorations of these new methods, and I hope to include them in later revisions of this survey.

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

Five important conference series have made major contributions to PD:

1. **Critical Computing.** Four conferences have been held, at 10-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 & Matthiessen, 1997).
2. **IRIS Conference (Information systems Systems Research iIn Scandinavia).** The annual IRIS conference series often include sessions and individual contributions on participatory topics. *Proceedings* may be available through the IRIS Association, or online.[2]
3. **Participatory Design Conference.** The Participatory Design Conference has met on even-numbered years since 1990. *Proceedings* are published by Computer Professionals for Social Responsibility (CPSR).[3] 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.[4]
4. **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, Ciborra, & Schneider [1983]; Clement, Kolm, Wagner [1994]; Docherty, Fuchs-Kittowski, Kolm, & Matthiessen [1987]; Gärtner & Wagner [1995]; and van den Besselaar, Clement, & Jaervinen [1991]).[5]
5. **Nordic Conferences on Human-Computer Interaction.** The NORDCHI conference series (sometimes also called NORDICHI) 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,[6]), and in *Proceedings* of the Usability Professionals' Association[7] conference series, of the INTERACT conference series, and of the Human Factors and Ergonomics Society conference series. Several papers at the Co-Designing 2000 Conference[8] addressed participatory themes (Scrivener, Ball, & Woodcock, 2000).

Books

In addition to the books cited above, major collections of papers and/or chapters related to participatory design appeared in Carroll's (1995) volume on scenarios in user interaction (see also Carroll, 2000), Greenbaum and Kyng's (1991) *Design at Work*, and Wixon and Ramey's (1996) collection of papers on field-oriented methods (1996). Individual books that have been influential in the field include Bødker's (1990) application of activity theory to issues of participation, Ehn's (1988) account of work-oriented design, Suchman's (1987) discussion of situated action, and Beyer's and Holtzblatt's (1998) presentation of contextual inquiry and contextual design (see also Holtzblatt, chapter 49, this volume). A recent volume by Bødker and colleagues (2004) may broaden the impact of PD among information technology departments. 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

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

[3]www.cpsr.org.

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

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

[6]www.acm.org

[7]www.upassoc.org

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

approach, involving participation and quality programs, which has been influential around the Pacific Rim. For a historical PD bibliography, see the CPSR website

Journals

Three journals have carried the greatest number of PD papers: (a) Scandinavian Journal of Information Systems,[9] (b) Computer Supported Cooperative Work: The Journal of Collaborative Computing,[10] and (c) Human Computer Interaction.[11]

Websites

Computer Professionals for Social Responsibility maintains a set of PD resources at http://www.cpsr.org/prevsite/program/workplace/PD.html#resources.

HYBRIDITY AND THE THIRD SPACE

This chapter is concerned with participatory methods that occur in the hybrid space between software professionals and end users. Why is this hybrid space important?

Bhabha (1994) made an influential argument that the border or boundary region between two domains, or two spaces, is often a region of overlap or hybridity—for instance, 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).

Bhabha's (1994) 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."

TABLE 54.1. 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

A summary of the claims relating to third spaces (or hybridity) appears in Table 54.1.

Hybridity and HCI

Within HCI, Suchman (2002) recently renewed her call for dialogue across boundaries between the partial perspectives of end users and developers. 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.

The approach in this chapter begins with a similar recognition of diverse perspectives. Unlike Suchman's (2002) emphasis on the boundary *between* these perspectives, however, 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, who sees each participant as located *within* a par-

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

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

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

ticular perspective and interest, for example, "Organizations comprise multiple constituencies each with their own professional identities and views of others." By contrast, the methods in this chapter allow for the creation of new perspectives and new locations, and they 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 & Kyng, 1987), Suchman focuses on opposing interests that meet across a designated divide. This chapter instead pursues the polyvocal polity that I 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, Ehn, Kyng, Kammersgaard, & Sundblad, 1987; Bødker, Knudsen, Kyng, Ehn, & Madsen,1988; Druin, 1999; Druin et al., 2000; Ehn & Sjögren, 1991; Floyd, 1987; Kensing & Madsen, 1991; Lanzara, 1983; Mogensen & Trigg, 1992; Muller, 1997a; Muller, Wildman, & White, 1994; Mumford, 1983; Törpel & 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, Simoff, & Gabriel (2000) described the creation of virtual design spaces for sharing diverse perspectives. Merkel and colleagues (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). 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 and colleagues (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, Constantine, Karat, & Muller, 2001). Fanderclai (1995, 1996) captured a strong sense of possible new dynamics and new learnings in a hybrid online 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, I extend the HCI analyses surveyed in the preceding paragraphs, and apply Bhabha's (1994) perspective to the HCI problem of methods to bridge between two spaces—the world of the software professionals, 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. 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.

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; for example, we analyze the requirements *from* the users, we deliver a system *to* the users, and 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—*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 and colleagues (1988) made specific references to "the mutual validation of diverse perspectives." 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., Fowles, 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). 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).

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. I 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 about 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).[12] Muller and colleagues (Muller, White, & Wildman,1993; Muller et al., 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?"). At the *abstract* end of the continuum, the users have to enter the world of the software professionals in order to participate—e.g., rapid prototyping (Grønbæk, 1989) and quality improvement (Braa, 1996). At the *concrete* end of the continuum, the software professionals have to enter the world of the users in order to participate; for example, ethnography (Blomberg, Giacomi, Mosher, & Swenton-Wall, 1993; Crabtree, 1998; Orr & Crowfoot, 1992; Suchman & Trigg, 1991; see also Blomberg et al., chapter ••, this volume)), on-going tailoring during usage (Henderson & Kyng, 1991; MacLean, Carter, Lovstrand, & Moran, 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 software professionals or the end users (e.g., 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 54.1.

THIRD SPACE: NEGOTIATION, SHARED CONSTRUCTION, AND COLLECTIVE DISCOVERY IN PD AND HCI

In the remaining sections of the chapter, I 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 my theme is hybridity, I 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 54.1). In several cases, a single report may fall into several categories. For example, Ehn and Sjögren (1991) conducted a workshop (see "Workshops" in this chapter) in which a storytelling method (see "Stories" in this chapter) provided a space in which people negotiated the naming and defining of workplace activities (see "Language" in this chapter). I 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) said, "There are two approaches to participatory design: (1). Bring the designers to the workplace. (2). Bring the workers to the design room" (p. •••). This binary choice reflects the taxonomic distinctions that I previously reviewed; however, even within the binary choice, the selection of the site can be important. Fowles (2000), in a discussion of participatory architectural practice, provided 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, agreed (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 our study of telephone operators' work, 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, we had 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) who became adjunct members of the core analysis team for the duration of those meetings, *and* 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 became authors of our report (Muller et al., 1995a).

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

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.

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*. The use of *common design practices across sites*, however, 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 et al., 2003). Brandt and Grunnet (2000), Pedersen and Buur (2000), and Muller and colleagues (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 and Colleagues (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 & Madsen, 1991; see also Bødker et al., 2004; McPhail, Costantino, Bruckmann, Barclay, & Clement, 1998; Mørch, Engen, & Åsand, 2004), Based in German civic planning (Jungk & Mullert, 1987), a Future Workshop proceeds through three stages: (a) *Critiquing* the present, (b) *Envisioning* the future, and (c) *Implementing*, or 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 and colleagues (2004) noted 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) described a family of "generative tools," activities that are selectively combined into Strategic Design Workshops, under an overall conceptual 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 story telling (see "Stories" and "Making Descriptive Artifacts," following). Dandavate, Steiner, and William (2000) provided a case study of Sanders' method.

In a different setting, Buur, Binder, & Brandt (2000) developed a workshop in which workers carried a mock-up of a proposed new device (see the following section, "Making Non-Functional Artifacts") through an industrial plant, recording how it would be used. They then acted out a five-minute video scenario (see "Dramas," following), 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.

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)—invited community members to contribute their domain expertise as people who lived with

safety issues on an everyday 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.

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:

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

Finally, Bødker, and colleagues (2004) described a repertoire of workshops. One subset of workshops was differentiated largely in terms of the artifact that was cocreated 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 *In* participants collaboratively drew *In* 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 and colleagues (2004) 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., T. Buzan & B. Buzan, 1996, for nonworkshop 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 (1992) Braindraw technique, to bring people with different design concepts into communication with one another.

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 & 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 & Madsen, 1991; Sanders, 2000) or for community action (Cameron, 1998).
- **Engagement** of the interested parties ("stakeholders") in the process and outcome of the workshop.
- **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).

NARRATIVE STRUCTURES

Stories

Stories and story telling 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 & Burrell, chapter 50, this volume). Stories have also had an important history in HCI (see Carroll, 1995; Erickson, 1996; Muller, 1999a). I will not attempt to review these areas. Rather, I 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 three ways.[13] First, they may be used as triggers for conversation, analysis, or feedback (Salvador & Howells, 1998; Salvador &

[13]For a survey of story genres that may be used in participatory work, see Karasti, Baker, & Bowker (2002).

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., 1996). Third, they may be used by design teams 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 (Druin, 1999; Druin et al., 2000; Ehn & Kyng, 1991; Ehn & Sjögren, 1986, 1991; Gruen, 2001; Muller et al., 1994; Sanders, 2000).

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 reuse 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 (e.g., 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 another's 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 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).

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, Muller, Dayton, and Root (1993), later developed into a more general tool in Muller and colleagues (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. Tschudy et al. (1996) 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 (e.g., 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 story board, 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 Sanders, 2000; Sanders & Nutter, 1994). Their purpose was to envision new technologies and practices in children's use of computers and related devices. They used both online 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; however, 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. 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 space—e.g., 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 (2000) created new software environments and new devices to craft and implement stories of futuristic technologies. Finally, Gruen (2000, 2001) 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 storytelling practices are diverse, and serve multiple purposes. A brief sum-

mary 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., 1996).
- **Co-creation of new ideas** and children's articulation and self-advocacy (Druin, 1999; Druin et al., 2000).

Photographs

Stories can be told in many ways. One approach that has informed recent PD work is end-user photography. Patton (2000) noted 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.

In an exploration of products for mobile knowledge workers, Dandavate and colleagues (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 reusing 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 and colleagues 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 and colleagues then 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 (e.g., 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, Mattelmäki, Virtanen, & Keinonen, 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.[14]

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 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 photonarratives (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, Kuutti, & Vainamo, 2004, following).

Claimed benefits. The use of end-user photographs 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.

[14]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.

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 nonprofessional 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 nonprofessional 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 just described ("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 Brandt and Grunnet's 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," following), 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 et al., 2004). Isomursu and colleagues (2004) used more informal user-produced videos based on cell-phone video recordings. These 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, G. Iacucci, C. Iacucci, and Kuutti (2002) described a projective series of improvisations with an innovative technology idea—the "magic thing"—in users' homes or workplaces (G. Iacucci & Kuutti, 2002; Kuutti, G. Iacucci, & C. Iacucci, 2002; see also Buur & Bødker, 2002; Bødker & 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, Carroll, Murphy, & Peck (2002) described the role of professional actors and directors in dramatizing attributes of proposed new products.

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 (1974/1992) 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 and colleagues (1994). At the opposite extreme are video documentaries, which of course are difficult to change as a result of 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 software developers, 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 software professionals 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. Similar 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," following). 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 (e.g., 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 & Kyng, 1991; Ehn & Sjögren, 1986, 1991). In this view, part of the work of a heterogeneous group is to understand how to communicate with one another; 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 and colleagues (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.[15] 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.
>
> 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, Grønbæk, & Kyng, 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.
- **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, Joroff, Porter, & Schön, 1998; Klær & Madsen, 1995; and most recently Brandt & 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.

Pedersen 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?" (pp. 96–98)

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

Buur and colleagues (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

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

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 nongame technique, see affinity diagramming in Beyer & Holtzblatt, 1998).

We took the concept of games 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," previously).
- **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).

Our 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.

Recently, Brandt and Messeter (2004; see also Johansson, Fröst, Brandt, Binder, & Messeter, 2002) developed a strong sequence of games. Their User Game is based on the video-collage methods of Buur and colleagues (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 video recording, both for documentary purposes and to generate further video material for another cycle of the four games.

Third space. Each of these ten 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 software professionals 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 software professionals into unfamiliar and ambiguous "third space" settings. In this section, I focus on the collaborative construction of various concrete artifacts:

- **Physical reflections of a cocreated 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

The preceding section noted Ehn's (1988) theoretical work on *PD as language games*. Ehn's interest converges with Bhabha (1994) "third space" argument: Part of the characterization of hybridity was the negotiation and cocreation 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). 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, Schuchardt, Myers, and Gracio (2000), working with a community of physical scientists who were not software professionals, introduced software-like flowcharts to their clients (see Kensing & 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 cocreation:

> 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. (p. 32)

Third space. Common to all of these projects was the cocreation 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 (1994).

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 cocreation of language include the following:

- **Enhanced understandings** of one another's 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, I 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, I 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 nonstandard 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 54.1—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) claimed 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 (chapter 52, this volume) have provided a chapter on prototyping—including participatory

prototyping—in this volume; therefore, I 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, Bevan, & Thomas, 1999; Rettig, 1994).

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).

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. Our experiences with PICTIVE almost always involved mutual education. Understanding and changing the artifact become important arenas for people to explore their understandings of one another's positions, to question one another's 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.
- **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 video documentaries.
- **Enhanced working relations** through a sense of shared ownership of the resulting design.
- **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, I am relying on Beaudouin-Lafon and Mackay's chapter 15 in this volume to cover prototyping in greater depth and breadth. I include this brief overview for completeness of my 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, such as, (a) a resource of documents for librarians (Anderson & Crocca, 1993), (b) an online event checklist that served as the crucial coordination point for the work of diverse contributions (Bertelson, 1996), or (c) a database supporting funding work in a nonprofit 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.

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," previously). 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, ultimately, 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 another's 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

My 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. I considered eight trends in PD—(a) selection of sites of shared work, (b) workshops, (c) stories, (d) end-user photography, (e) dramas, (f) creation of shared languages, (g) descriptive artifacts (low-tech prototypes), and (h) working prototypes—and I 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 54.2 summarizes the discussion of hybridity in PD, using the criteria derived from cultural studies (Table 54.1) and the experiences described in the eight areas of practice. Table 54.2 shows different patterns of hybridity for different methods, techniques, and practices.

Certain attributes are relatively common across practices, such as inbetweenness, questioning assumptions, negotiation, and heterogeneity as the norm. Other attributes are relatively rare, such as, 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, Davidson, & Harootunian, 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. I 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,

TABLE 54.2. Hybridity in Participatory Practices

Attribute	Sitings	Workshops	Stories	Photos	Dramas	Games	Language	Descriptive	Prototypes
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

1996; van den Besselaar, Greenbaum, & Mambrey, 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. 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). I have been unable to discover any formal experiments comparing participatory methods with nonparticipatory methods in a credible workplace context. Indeed, such studies 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).
- **Universal usability and "universal participation?"** Nearly all of the practices described in this chapter (and in the longer set of methods in Muller et al., 1997) are strongly visual and require hands-on manipulation of materials. These approaches violate the emerging requirements of universal usability for people with visual or motor disabilities (see, e.g., Universal Usability Fellows, 2000 and the *Proceedings of the Conference on Universal Usability*[16]; see also chapters in this volume by Vanderheiden [chapter] Czaja [chapter 39]; Marcus [chapter 18]; Newell, Carmichael, Gregor, Alm, & Waller [chapter 41]; Sears [chapter 42]; and Jacko, Leonard, & Scott [chapter 43]). In the previous edition of this book, I noted the irony that participatory design appeared to have failed in its inclusiveness with regard to people with disabilities. Happily, that problem is being addressed in at least three countries through the research and methodologies of Carmien, DePaula, Gorman, and Kintsch (2003); Davies, Marcella, McGrenere, and Purves (2004); Moffatt, McGrenere, Purves, and Klawe (2004); and Wu and colleagues (Wu, Richards, & Baecker,2004; Wu, Baecker, & Richards, 2005).

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

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[17]For a more general PD bibliography, see http://www.cpsr.org/prevsite/program/workplace/PD-history.html

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