APPLIED THEORY

SUMMARY

- **Provides the historical and methodological grounding for understanding participatory design as a methodology**
- **Describes its research designs, methods, criteria, and limitations**
- **Provides guidance for applying it to technical communication research**

The Methodology of Participatory Design

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INTRODUCTION

Technical communicators have begun writing quite a bit about participatory design, sometimes with a fervor that rivals that with which we used to write about T-units or think-aloud protocols. The terms *participatory design* and *user-centered design* are being broadly applied in the philosophical and pedagogical work of technical communication (Blythe 2001; Henry 1998; Johnson 1998; Salvo 2001; Spinuzzi 2003); methods associated with those terms are being applied in technical communication research (Mirel 1988, 2003; Smart 2003; Smart and Whiting 2002; Smart, Whiting, and DeTienne 2002; Spinuzzi 2002a, 2002c, in press; Wixon and Ramey 1996); and prototypes in particular are often presented as a vital part of iterative usability (see, for example, Barnum 2002, Chapter 4; Smart and Whiting 2002). But that breadth of application has often come at the price of imprecision. It's hard to find a good *methodological* explanation of participatory design.

That lack of a strong methodological explanation is not just technical communication's problem, though. Participatory design is often discussed in human-computer interaction, computer-supported cooperative work, and related fields as a *research orientation* or even a *field* (see Muller 2002, p. 1,052) rather than a methodology. The distinction may be important in principle, but in practice, it has become an escape hatch that allows practitioners to label their work "participatory design" without being accountable to established, grounded precedent.

By looking at that established precedent, I argue, we *can* define participatory design as a methodology, even if it's a loose one. And I believe it's time we did: Without such a definition, we can't hold ourselves accountable to participatory design or build on a coherent body of knowledge. Consequently, we have trouble applying participatory design rigorously to our technical communication projects, and we tend to think of participatory design as an approach to design rather than a rigorous research methodology.

In this article, I discuss participatory design as a research methodology, characterizing it as a way to understand *knowledge by doing*: the traditional, tacit, and often invisible (in the sense of Nardi and Engeström 1999; Muller 1999) ways that people perform their everyday activities and how those activities might be shaped productively. I first define and describe *what* participatory design research is. I describe participatory design research in terms of its paradigm, methodology, research design, and methods. With this definition and description as a framework, I next discuss *why* we should pursue participatory design studies. In this section, I discuss the benefits of knowledge by doing and provide evaluative criteria to use as guidelines for creating and assessing participatory design research. Finally, I explore the implications of understanding participatory design as a research methodology, and I discuss some practical applications.

WHAT IS PARTICIPATORY DESIGN RESEARCH?

Participatory design *is* research. Although it has sometimes been seen as a design approach characterized by user involvement (Johnson 1998), participatory design has its own highly articulated methodological orientation, methods, and techniques, just as does participatory action research, the approach on which it is based (Glesne 1998). Implementations of participatory design do vary in their attention to rigor and validity (Spinuzzi in press), but they all reflect a commitment to sustained, methodical investigation according to grounded methodological principles, as we'll see below.

Participatory design is rather different from most research conducted by technical communicators, though it

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turns out to be a good match for the work we do. As the name implies, the approach is just as much about *design*—producing artifacts, systems, work organizations, and practical or tacit knowledge—as it is about *research*. In this methodology, design *is* research. That is, although participatory design draws on various research methods (such as ethnographic observations, interviews, analysis of artifacts, and sometimes protocol analysis), these methods are always used to iteratively construct the emerging design, which itself simultaneously constitutes and elicits the research results as co-interpreted by the designer-researchers and the participants who will use the design.

Like member checks in ethnographic research, participatory design's many methods ensure that participants' interpretations are taken into account in the research. Unlike member checks, however, these methods are shot through the entire research project; the goal is not just to empirically understand the activity, but also to simultaneously envision, shape, and transcend it in ways the workers find to be positive. In participatory design, participants' cointerpretation of the research is not just confirmatory but an essential part of the process.

Participatory design started in Scandinavia through a partnership between academics and trade unions. Since that time it has worked its way across the Atlantic, becoming an important approach for researchers interested in human-computer interaction, computer-supported cooperative work, and related fields. From there, it has begun to influence writing studies, particularly through technical communication as well as computers and composition (for example, Sullivan and Porter 1997; Johnson 1998; see Spinuzzi 2002b for an overview).

Participatory design has undergone many changes—for instance, later variations have moved away from the Marxist underpinnings of the earlier work—but its core has remained more or less constant. It attempts to examine the tacit, invisible aspects of human activity; assumes that these aspects can be productively and ethically examined through design partnerships with participants, partnerships in which researcher-designers and participants cooperatively design artifacts, workflow, and work environments; and argues that this partnership must be conducted iteratively so that researcher-designers and participants can develop and refine their understanding of the activity. The result of the research typically consists of designed artifacts, work arrangements, or work environments.

As Pelle Ehn suggests, participatory design attempts to steer a course "between tradition and transcendence" (1989, p. 28)—that is, between participants' tacit knowledge and researchers' more abstract, analytical knowledge. The developers of participatory design believed that politically and ethically, the two types of knowledge must be bridged, with each being valued by all involved in the research. That's especially true in studies of workers, for which participatory design was initially designed, but also in studies of end users and students.

History

Participatory design originated in Scandinavia in the 1970s and 1980s. This early Scandinavian work was motivated by a Marxist commitment to democratically empowering workers and fostering democracy in the workplace. This avowedly political research aimed to form partnerships with labor unions that would allow workers to determine the shape and scope of new technologies introduced into the workplace. Up to that point, labor unions had little experience with computer technologies and had been forced to accept systems developed by management, systems that represented a sharp break from workers' traditional ways of working; exerted a greater and greater control over increasingly fine details of their work; and automated large swathes of the workflow, putting people out of work (see Ehn, 1990; Zuboff, 1989).

Since they did not know how to design computer technologies themselves, workers were put into the position of accepting these disempowering technologies or simply rejecting them. Some Scandinavian researchers set out to develop a third way, an approach that provided a set of "language games" (Ehn and Kyng 1991, pp. 176–177) that would allow software developers and workers to collaboratively develop and refine new technologies—allowing workers to retain control over their work.

These researchers turned to *action research*, in which ethnographic methods are linked to positive change for the research participants (see Glesne 1998 for an overview). Clement and van den Besselaar explain that

> *Unlike conventional research, which is directed primarily at producing results of interest to those beyond the immediate research site, an essential goal of action research is to achieve practical or political improvements in the participants' lives (e.g., less routine work, greater autonomy, more effective tools). The researcher becomes directly involved in the ongoing work and feeds results back to the participants. (1993, p. 33)*

Action research involves alternating between *practical work* to support changes (such as design activities) on one hand, and *systematic data collection and analysis* on the other hand (p. 33; see also Bertelsen 2000). In early participatory design studies, workers tried to describe computer systems that could automate work while still valuing their craft skills and upholding their autonomy. But because workers had no experience in systems design, they could not begin to speculate on how to build such a system. So in the UTOPIA project, researchers joined with

a workers' union to experiment with a range of research techniques, including mockups and other low-fidelity prototypes, future workshops, and organizational toolkits (Bødker and colleagues 1987). Although the project failed to produce a working system, it did produce a design approach and a range of techniques for participatory design work. Based on UTOPIA and other projects that came after it, the Scandinavians issued the "Scandinavian challenge": to develop and use design approaches that encourage industrial democracy (Bjerknes, Ehn, and Kyng 1987). This call resulted in many approaches and techniques under the umbrella of participatory design, such as CARD, PICTIVE, cooperative interactive storyboard prototyping, and contextual design (see Muller, Wildman, and White 1993 for an exhaustive taxonomy). Some of these, such as contextual design, have become complex enough to be categorized on their own and, arguably, differentiated enough that they are no longer participatory design in the strictest sense of the term (see Spinuzzi 2002c). In the United States, because of relatively weak labor unions and a focus on functionality rather than workplace democracy (see Spinuzzi in press), participatory design has tended to be implemented through *nonintrusive* methods: workplace microethnographies rather than walkthroughs and workshops (Blomberg and colleagues 1993; Blomberg, Suchman, and Trigg 1997), small-scale card-matching exercises rather than large-scale organizational games (Muller and Carr 1996), and one-on-one prototyping sessions that focus on confirming developed ideas rather than group prototyping sessions that emphasize exploration (Beyer and Holtzblatt 1998; Spinuzzi 2005). But the basic methodological principles of participatory design remained. What distinguishes participatory design from related approaches such as user-centered design is that the latter supposes only that the research and design work is done on *behalf* of the users; in participatory design, this work must be done *with* the users (Iivari 2004).

Defining users' knowledge

Participatory design's object of study is the *tacit knowledge* developed and used by those who work with technologies. It's important to understand this focus because tacit knowledge, which is typically difficult to formalize and describe, has tended to be ignored by the theory of cognition that has tended to dominate human-computer interaction: information processing cognitive science (Winograd and Flores 1986; Nardi 1996; Nardi and Engeström 1999).

In practice, this theory tends to lead to a rationalist approach to design, which generally assumes that there is one best way to perform any activity—an assumption it shares with Taylorism. This rationalist approach was something to which early participatory designers reacted strongly. They were heavily influenced by Marxist critiques of Taylorism, such as Harry Braverman's argument that Taylorism seeks to effect managerial control through "*the dictation to the worker of the precise manner in which work is to be performed*" (1974, p. 90, emphasis his). That is, rather than allowing workers to determine how to accomplish their tasks—and develop their own tacit craft skills and knowledge not possessed by management—the Taylorist manager examines the work, then breaks it into discrete, formal tasks that can be optimized, regulated, and taught to new workers. All discretion and all decisions are taken away from the workers. Knowledge is made explicit, formalized, and regulated; workers' craft traditions are judged inferior. (See Muller 1997, 1999 for discussions of this tendency in U.S. corporations and a response from the perspective of participatory design.)

Participatory design opposes this notion of knowledge on both political and theoretical grounds. Politically, this notion of knowledge as wholly consisting of optimized tasks spells the death of workplace democracy: if it is accepted, workers cannot have a say in their own work because only trained researchers can determine the best way of performing that work. Theoretically, participatory design is founded on constructivism, a theory that explicitly resists the notion that knowledge can be completely formalized and classified. (For overviews of the constructivist argument in writing studies, see Mirel 1998; Spinuzzi 2003).

Knowledge is situated in a complex of artifacts, practices, and interactions; it is essentially interpretive, and therefore it cannot be decontextualized and broken into discrete tasks, nor totally described and optimized. In the constructivist view, participants' knowledge is valorized rather than deprecated, and their perspectives therefore become invaluable when researching their activity and designing new ways to enact that activity. "Knowing and learning," as Barbara Mirel says, "take place in a dynamic system of people, practices, artifacts, communities, and institutional practices" (1998, p. 13).

When we think of *knowledge,* we often think of explicit forms of knowledge: things that are written down, defined, categorized, systematized, or quantified. But to understand knowledge-making in participatory design, we have to understand that much knowledge tends to be *tacit.* Tacit knowledge is implicit rather than explicit, holistic rather than bounded and systematized; it is what people know without being able to articulate. As Ehn argues, participatory design takes a Heideggerian approach to knowledge in which "the fundamental *difference between involved, practical understanding and detached theoretical reflection* is stressed" (1989, p. 28). This pragmatic approach involves alternating between the two by discovering tacit knowledge, then critically reflecting on it.

Since practical tacit knowledge was a main goal of early participatory design research, researchers adopted

the *tool perspective*, the idea that "computer support is designed as a collection of tools for the skilled worker to use. The tool perspective takes the work process as its origin rather than data or information flow. This means: *not* detailed analysis, description, and formalization of qualifications, but the development of professional education based on the skills of professionals; *not* information flow analysis and systems description but specification of tools" (Bødker and colleagues 1987, p. 261).

The tool perspective allowed researchers to recognize and leverage the workers' craft knowledge, allowing them to develop new tools that would support rather than disrupt that work: "a tool is developed as an extension of the accumulated knowledge of tools and materials within a domain" (Bødker and colleagues 1987, p. 261; see also Ehn 1989, pp. 339–40). In contrast to design approaches favored by management that served Tayloristic goals (deskilling, work intensification), the tool perspective involved building "computer-based tools by which the craftsman can still apply and develop original skills" (p. 261; see Ehn 1989, p. 34; Ehn and Kyng 1987, pp. 34–38).

This tacit or craft knowledge is linked to *metis*: "Metis, or what is also called cunning intelligence, is the ability to act quickly, effectively, and prudently within ever-changing contexts" (Johnson 1998, p. 53). These ever-changing contexts are what Mirel points to when she talks about complex tasks (1998, 2004). In participatory design, tacit knowledge is not only explored, it is in many cases made material, as we saw with the tool perspective that participatory designers adopted. Workers find unconventional ways to use the tools that have been supplied to them, learn how to construct their own ad hoc tools (Spinuzzi 2003), and—if they are allowed the time and freedom to do so—eventually stabilize new tools and the ways they interact with them.

One goal of participatory design is to preserve tacit knowledge so that technologies can *fit into* the existing web of tacit knowledge, workflow, and work tools, rather than doing away with them. In contrast to rationalist studies that assume workers' tasks can be broken down into their components, formalized, and made more efficient, participatory design assumes that tacit knowledge cannot be completely formalized; the task-and-efficiency orientation typical in many user-centered design methods such as GOMS (Card, Moran, and Newell 1983; Muller 1999) and usability testing (Barnum 2002; Rubin 1994) can actually get in the way of the holistic activity.

Certainly, some tacit knowledge can be made explicit and formalized, but

> *attempts at explication of such tacit knowledge must always be incomplete. The knowledge is too layered and subtle to be fully articulated. That is why action-centered skill has always been learned through experience (on-the-job training, apprenticeships, sports practice, and so forth). Actions work better than words when it comes to learning and communicating these skills. (Zuboff 1988, p. 188)*

So tacit knowledge often remains *invisible*: since it is not made systematic or quantifiable, it passes unnoticed and often undervalued. (See Nardi and Engestrom 1999 for a collection of essays on this theme.) In particular, low-level workers are often not valued by management because their skills are invisible: the complexity, difficulty, and interconnectedness of their work are not recognized. One example is Blomberg, Suchman, and Trigg's (1994) study in which document analysts (temporary workers who coded legal documents) were found to perform complex interpretive work. The attorneys who employed these workers did not recognize the work as being complex or interpretive, and consequently planned to outsource the work to lower paid workers in another country. Like others working in the participatory design tradition, Blomberg, Suchman, and Trigg attempted to demonstrate to management the tacit knowledge that workers brought to the activity, knowledge that had remained invisible up to that point, yet was vital to the continued success of the activity.

Describing users' knowledge

Since users' tacit knowledge is highly valued, participatory design focuses on exploring that tacit knowledge and taking it into account when building new systems. This task is accomplished with a strong political or ethical orientation: users' knowledge is described so that it can be used to design new tools and workflows that empower the users. (What is meant by *empowerment* is sometimes different in the different strands of participatory design.) In this section, I describe the paradigm that underpins participatory design, its methodology, research design, and methods.

Paradigm Participatory design's paradigm is *constructivist* in Mirel's sense (1998). That is, it sees knowledge-making as occurring through the interaction among people, practices, and artifacts—knowledge doesn't just reside in the head; it's a condition of a certain context. One of the most distinct and influential notions of participatory design is that of the *language game* (Ehn 1989, p. 17): bridging the worlds of researcher-designers and users by finding a common "language" or mode of interaction with which both parties feel comfortable.

Methodology Participatory design's methodology is derived from participatory action research or, as Ehn calls it, "practice research": "Practical interventionistic investigations (as opposed to gathering of data) and parallel theo-

retical reflection (as opposed to detached theoretical reflections *a posteriori*)" (Ehn 1989, p. 13). As discussed above, this activist brand of research has an explicit political-ethical orientation: to empower workers to take control over their work. Unlike Donald Norman—who argues that the designer should be a *dictator* (Grossman 2002)—participatory designers see themselves as *facilitators* who attempt to empower users in making their own decisions (Clement 1994).

To achieve that goal, participatory design emphasizes co-research and co-design: researcher-designers must come to conclusions in conjunction with users. So participatory design involves redesigning workplaces and work organization as well as work tools. And it is iterative, allowing workers and researchers to critically examine the impacts of these incremental redesigns in progress.

Research design Participatory design is still developing and consequently its research design tends to be quite flexible. For instance, the early Scandinavian work tended to rely on union-sponsored workshops and games involving heavy direct interaction between designers and users, while later work in the U.S. has tended to supplement targeted interaction with less intrusive methods such as observation and artifact analysis. But three basic stages are present in almost all participatory design research:

- **Stage 1: Initial exploration of work**
  In this stage, designers meet the users and familiarize themselves with the ways in which the users work together. This exploration includes the technologies used, but also includes workflow and work procedures, routines, teamwork, and other aspects of the work.
- **Stage 2: Discovery processes**
  In this stage, designers and users employ various techniques to understand and prioritize work organization and envision the future workplace. This stage allows designers and users to clarify the users' goals and values and to agree on the desired outcome of the project. This stage is often conducted on site or in a conference room, and usually involves several users.
- **Stage 3: Prototyping**
  In this stage, designers and users iteratively shape technological artifacts to fit into the workplace envisioned in Stage 2. Prototyping can be conducted on site or in a lab; involves one or more users; and can be conducted on-the-job if the prototype is a working prototype.

The stages can be (and usually should be) iterated several times. Together, they provide an iterative co-exploration by designers and users.

Methods Methods are grouped by stage.

- **Stage 1: Initial exploration of work**
  Since initial exploration tends to involve examining technology use on site, Stage 1 draws from ethnographic methods such as observations, interviews, walkthroughs and organizational visits, and examinations of artifacts. This stage is typically conducted on site, during the normal work day. In the earlier Scandinavian iterations, this initial exploration tended to be highly interactive and intrusive: the researchers generally aligned themselves with relatively powerful workers' unions that believed in the projects and could insist on the sorts of disruptions caused by walkthroughs and organizational visits (see Bødker, Grønbaek, and Kyng 1993 for an overview).

  In North America, unions were much weaker and workers were not in a position to force participation, nor were they terribly interested in such projects. So researchers turned to less intrusive ethnographic and ethnomethodological techniques such as observations and interviews (see Wall and Mosher 1994 for an overview). Although the methods draw from ethnography, they are oriented toward design as well as description, so they tend to be focused and enacted differently, with more interaction in mind (see Beyer and Holtzblatt 1998 for one example, and Spinuzzi 2002c and in press for critiques). Much of that interaction takes place during the second stage, in discovery processes.
- **Stage 2: Discovery processes**
  Stage 2 is where researchers and users interact most heavily, and it also typically involves group interactions. Again, discovery processes tended to be more interactive and intrusive in the earlier Scandinavian iterations than in the later North American iterations, but in all implementations they are more interactive than traditional ethnographies. Because of participatory design's orientation toward design, the goal is to cooperatively make meaning out of the work rather than to simply describe it. Methods used during this stage include organizational games (Bødker, Grønbaek, and Kyng 1993, pp. 166–167), role-playing games (Iacucci, Kuutti and Ranta 2000), organizational toolkits (Tudor, Muller, and Dayton 1993; Ehn and Sjögren 1991; Bødker and colleagues 1987), future workshops (Bødker, Grønbaek, and Kyng 1993, p. 164; Bertelsen 1996), storyboarding (Madsen and Aiken 1993), and workflow models and interpretation sessions (Beyer and Holtzblatt 1998).
- **Stage 3: Prototyping**
  Finally, this stage involves a variety of techniques for iteratively shaping artifacts. These techniques include mockups (Ehn 1989; Ehn and Kyng 1991; Bødker

and colleagues 1987), paper prototyping (Novick 2000), cooperative prototyping (Bødker and Grønbaek 1991; Grønbaek and Mogensen 1994); and PICTIVE (Muller 1991b, 1993), among many others.

Finally, and just as importantly, results are disseminated in forms that users can understand and share—a continuation of the "language games" that allow researchers and users to collaborate, and a way to continue to support the empowerment and participation of users. The tone for this dissemination was set early on, in the UTOPIA project: results were discussed in everyday language in a union publication called *Graffitti* (Ehn 1989, pp. 350–352). Another example is contextual design's practice of "walking" through affinity diagrams and consolidated models with participants and of providing a room with diagrams and prototypes posted on the walls so that workers, managers, engineers, marketing people, and customers can see the state of the project in progress (Beyer and Holtzblatt 1998, chapter 10).

CRITICALLY EXAMINING PARTICIPATORY DESIGN STUDIES

Despite its advantages, participatory design has some rather sharp limitations as well as some criteria for success that are not immediately obvious. Below, I review some of the limitations of participatory design and discuss criteria for evaluating participatory design studies.

Limitations of participatory design

Participatory design has strengths, but as with other research approaches, those strengths come with tradeoffs.

Limitations of methodology Since participatory design aims to ground changes in traditional craft skills as a way of empowering workers, some argue that participatory design does not lend itself to radical change of the sort that sometimes must characterize new systems (Beyer and Holtzblatt 1998). In fact, participatory designers have been cautioned to think of their work as "evolution, not revolution" (Sumner and Stolze 1997). This gradualist tendency can lead to tunnel vision, in which particular stakeholders are served while others are left to fend for themselves (Bjerknes and Bratteteig 1995; Bødker 1996). In response, some participatory designers have worked to bring in new accounts of stakeholders that can support more complex projects (Bødker 1996; Muller 2003).

Another limitation is that some strains of participatory design—particularly later work that emphasizes functional empowerment over democratic empowerment, such as cooperative prototyping (Bødker and Grønbæk 1991)—have a tendency to focus too narrowly on artifacts rather than overall workflow, presuming that fine-tuning the artifact will necessarily result in empowering changes to the overall work activity (Spinuzzi 2002c). Finally, as participatory design has migrated across socioeconomic borders, from Scandinavia to North America, researchers have had difficulty maintaining its methodological tenets, particularly its focus on democratic empowerment (Muller 1991a; Spinuzzi 2002b, in press).

Limitations of method If more rigorous methods can be described as "measure twice, cut once," participatory design methods can be described as "explore, approximate, then refine." This essentially dissimilar methodological orientation—related to action research's juggling act between the traditional researcher's role of collecting and analyzing data *versus* the activist's role of initiating and sustaining significant change at the research site—tends to alter how researcher-designers apply established methods. For instance, participatory design researchers often draw on ethnographic methods to develop knowledge about the participants' work, tools, and craft traditions. But these researchers, who often come from backgrounds in systems design, human-computer interaction, or technical communication, tend to apply these methods quite loosely in the eyes of trained ethnographers.

Diana Forsythe, for instance, scathingly critiques these applications as "do-it-yourself ethnography" and complains that "superficial social research may confer the illusion of increased understanding when in fact no such understanding has been achieved." She specifically takes to task a contextual design project "in which brief exercises in shadowing, observation, and interviewing have been undertaken from a common sense stance without engaging the questions that define ethnography as anthropologists understand it," and warns that "such an exercise can result in a cognitive hall of mirrors. Without addressing basic issues such as the problem of perspective, researchers have no way of knowing whether they have really understood anything of their informants' world view or have simply projected and then 'discovered' their own assumptions in the data" (1999, p. 136; see also Cooper and colleagues 1995; Nyce and Lowgren, 1995).

Forsythe's critique is valid if the aim of research is to extract knowledge in the mode of traditional research, pulling the data into another domain where it can be abstracted, analyzed, and used apart from the site. But participatory design research, properly done, continually brings the analysis back to the domain and shares it with the participants, who cointerpret it, co-analyze it, and co-design responses to it. That is, the traditional methods are—at least in the best examples—re-networked or reconfigured to meet the design orientation.

The "same" methods can be enacted differently and take rather different shapes as they are attached to different methodologies and paradigms. In this case, the resulting research and designs do give up traditional research rigor,

but they do so to gain reflexivity and agreement. (In the earlier, highly politicized Scandinavian work, that agreement took the shape of political representation; in later work, the focus shifted to ethical concerns in giving workers the tools needed to do their jobs, and agreement took the shape of consensus among representative users.) This tradeoff resembles "rolling" member checks.

For example, Muller (1999) describes using the participatory design technique CARD to study the work of telephone operators. CARD, he says, has less rigor and predictive power than more narrowly defined analytical techniques such as GOMS, but on the other hand it brings in benefits that are more important to participatory designers:.

> *Its strengths lie in its ability to capture diverse information . . . , its openness to the disconfirmation of assumptions . . . , and its extensibility in the face of new information. Underlying all of these attributes is CARD's enfranchisement of multiple stakeholders with differing disciplines, perspectives, and positions. (p. 54; see also Bertelsen 2000)*

Rigor is difficult to achieve because researchers cede considerable control to their participants and share a "design language" with those participants which must by its nature be imprecise. On the other hand, the proof is in the pudding, so to speak—the design artifact both *encapsulates* the research results (as the material trace left by the design efforts) and *elicits* them (both during design sessions and afterwards, as it is introduced into the environment to be used as a stable work artifact). Wall and Mosher demonstrate that the same design artifacts can be used as records of a field study; tools for analysis; communication tools for a language game in which researcher-designers and users participate; and focal artifacts for co-design and co-development (1994). Rigor becomes something different in participatory design research: a desirable goal, but subordinated to users' control and aims.

Practical limitations In addition to the methodological and methodical critiques is the practical one: participatory design research takes an enormous amount of time, resources, and institutional commitment to pull off. That institutional commitment in particular can be hard to come by. From the standpoint of a profit-oriented business, participatory design seems to provide little structure and no deadlines (Wood and Silver 1995, pp. 322–323). Researchers find that they have to cede considerable control to workers, who must be committed to the process and cannot be coerced. For example, Bertelsen (1996) ruefully recounts how some of his participants simply failed to show up for a future workshop, compromising the design developed in the workshop. Finally, unlike ethnographic studies, participatory design studies typically require continuous critical participation by workers. Later participatory design variants such as contextual design (Beyer and Holtzblatt 1998) and customer partnering (Hackos, Hammar, and Elser 1997) have compromised by sharply limiting users' participation.

Evaluating participatory design

Participatory design is usually brought in at major turning points when work is to be automated and tools and workflows are to be changed. Since participatory design projects by definition involve design as well as research, the object of the research tends to be expressed in a *purpose statement* rather than a *research question*:

> *The purpose of this project . . . is to design a number of computer applications for [an organization] and to develop a long-term strategy for decentralizing development and maintenance. (Bodker, Gronbaek and Kyng 1993, p. 161)*

> *The overall object of the project has been to contribute to the development of skill-enhancing tools for graphic workers. (Bodkerand colleagues 1987, p. 254)*

> *The work-oriented design project was originally conceived to explore bringing together the worlds of corporate research, product development, and specific worksites . . . in an effort to design more useful new technologies. (Blomberg, Suchman, and Trigg 1997, p. 269)*

In concert with these types of research statements, participatory design has developed criteria that are also oriented toward development. Participatory design is still a relatively young approach, and at present it is more of a movement or research orientation than a coherent methodology, so it hasn't developed evaluative criteria to the same level that, say, experimental studies have. But we can draw nascent criteria from the methodological principles discussed earlier. They are often difficult to meet. As Blomberg and Henderson (1990) illustrate, it's easy to produce a study that looks like participatory design but that fails at all three of the criteria listed here. Participatory design projects, despite their ceding of power and analysis to users, still must rigorously apply these criteria to have internal integrity.

Criterion #1: Quality of life for workers Most participatory designers would point to this criterion as the most important one. Participatory design is meant to improve workers' quality of life both in terms of demo-

cratic empowerment (that is, workers' control over their own work organization, tools, and processes) and functional empowerment (that is, workers' ability to perform their given tasks with ease; see Blomberg, Suchman, and Trigg 1997; Spinuzzi and colleagues 2003; Spinuzzi in press). In a participatory design study, workers critically reflect on their own practices, work organization, and tools.

In the earlier Scandinavian iterations, this critical reflection usually involved examining ways that workers could better control the terms of their work; in later U.S.-based iterations, critical reflection turned to an examination of tacit knowledge to more effectively meet the goals of the work. Either way, this methodological principle translates into an exploration of tacit knowledge, invisible work, and unstated individual and organizational goals.

To meet this criterion, participatory design studies strive for

- **Reflexivity and agreement** between researchers and users. The two groups interact closely through interviews, focus groups, workshops, organizational games, prototyping sessions, and other techniques to continually reassess the activity under investigation and to synchronize their interpretations.
- **Codetermination** of the project by researchers and users. Specific project criteria are codetermined by researchers and users during the project. This way, researchers do not take total ownership of the project; users are also able to shape the project to reflect their values, goals, and ends.

Criterion #2: Collaborative development Collaborative development is a key part of the effort to improve workers' quality of life. As noted earlier, users' work is often invisible and their knowledge is often tacit. Thus designers of information systems, educational Web sites, and documentation often assume that the work is simple, easily formalized, and (sometimes) easily automated. Collaborative development allows researcher-designers to avoid that trap by inviting participants to be co-researchers and co-developers. Doing so allows researcher-designers to elicit and explore the tacit knowledge and invisible practices that might otherwise have been lost, and simultaneously encourages workers to participate in their own empowerment.

In terms of a study criterion, this methodological principle translates into a requirement for mechanisms to ensure that data collection and analysis be done in conjunction with participants. In ethnographical terms, participatory design uses member checks—but in participatory design, the member checks are continuous since the project is co-owned and co-enacted by the participants. To meet this criterion, participatory design studies strive for

- **Involvement** The successful study will provide mechanisms for participation and produce verifiable changes based on them. Participatory design studies are not a "listening tour" in which researchers hear the concerns of users, then go away and design a solution; they are participatory top to bottom and must include verifiable, regular avenues for group interaction and definite routines for ensuring that users' concerns are methodically addressed in the resulting design.
- **Mechanisms for consensus/agreement and representation** In most cases, not every user can be involved in a participatory design study. For instance, if a participatory design study involved redesigning an interface used by 2000 workers, it's simply not practical or manageable to involve every worker in workshops and prototyping sessions. Instead, workers must be *represented* in the same way that politicians are elected to represent the interests and views of their constituencies.

In the earlier Scandinavian iterations of participatory design, representatives were assigned to projects by their unions, making them explicitly political representatives. In North America, however, unions hold considerably less power and no other ready-made mechanisms for political representation of workers exist; rather, workers are typically selected by management and are seen as *functionally* representative (that is, "average users"). In any case, users must be given the opportunity to be broadly represented in the study, and the representatives should have a way to settle disagreements or come to consensus.

Common language games such as contextual design's work diagrams and PICTIVE's pictures. To collaboratively develop solutions, users should be able to interact with researchers in a neutral "language" understood by both sides. It's not enough to *offer* such a language game; researchers must also confirm that users are comfortable with the language game, able to understand it, and able to use it both to critique solutions and to express their own solutions.

Common aims codetermined by researchers and users in advance. Near the beginning of the project, researchers and users should be able to settle on a list of common aims that represent the users' interests. That list must be flexible, as users will continue to critically evaluate their own aims.

Criterion #3. Iterative process But to enact collaborative development, researcher-designers and participants must follow an iterative process. Tacit knowledge and invisible practices are by their nature difficult to tease out.

A crude caricature of participatory design might involve gathering workers' comments on current practice and their responses to a prototype, but without sustained, iterative reflection on and use of a designed artifact, workers may not be able to comment critically or respond effectively (see Hackos, Hammar, and Elser 1997). Each change in a prototype tends to unearth other invisible work practices and other tacit knowledge.

In terms of a criterion for a study, this methodological principle translates into a requirement for a series of opportunities to sustain the continuous member check. To meet this criterion, participatory design studies strive for

Continual participation Users should be involved repeatedly or continually and offered mechanisms for co-design at multiple stages.

Revisiting stages Rarely is one sweep through the stages enough because the stages are designed to inspire critical reflection on the work and turn up tacit knowledge. So a successful participatory design project should be flexible enough to revisit stages repeatedly and cyclically.

Sustained reflection Finally, the continuous member check must go beyond simply reacting to the functionality of designs—a danger especially in the later stages of a project, when functioning prototypes take on the appearance of completeness and participants' attention often turns to minor details. At all points, participants should be encouraged and given avenues to critically reflect on the implication of the research results for their own work.

CONCLUSION

Although participatory design is often portrayed as a research orientation or a field, understanding it as a methodology leads us to better understand its promises and constraints, its limitations and its criteria—and, I think, also leads us to greater respect for the careful work that goes into developing a participatory design study. That's especially important for technical communicators. We are, after all, in a design-oriented field (Kaufer and Butler 1993) and we have drawn heavily on design-oriented research methodologies, methods, and techniques such as usability testing.

If we understand participatory design as an *orientation*, we are tempted to articulate a few general principles and retrofit our existing techniques to accommodate them. But if we understand it as a *methodology*, we are able to draw on a coherent body of methods and techniques operating within a general research design under common methodological premises. That is, we are able to conduct studies that have a great deal in common with other studies; we are able to draw from and contribute to a coherent, common body of knowledge. Our work becomes relevant to others working in human-computer interaction, computer-supported cooperative work, and similar fields. TC

REFERENCES

Barnum, C. M. 2002. *Usability testing and research.* New York, NY: Longman.

Bertelsen, O. W. 1996. The festival checklist: Design as the transformation of artifacts. In *PDC '96 Proceedings of the Participatory Design Conference*, pp. 93–101. Palo Alto, CA: Computer Professionals for Social Responsibility.

———. 2000. Design artifacts: Toward a design-oriented epistemology. *Scandinavian journal of information systems* 12:15–27.

Beyer, H., and K. Holtzblatt. 1998. *Contextual design: Defining customer-centered systems.* San Francisco: Morgan Kaufmann Publishers, Inc.

Bjerknes, G. 1992. Shared responsibility: A field of tension. In *Software development and reality construction*, ed. C. Floyd, H. Zullighoven, R. Budde, and R. Keil-Slawik. New York, NY: Springer-Verlag, pp. 295–301.

———, and T. Bratteteig. 1995. User participation and democracy: A discussion of Scandinavian research on system development. *Scandinavian journal of information systems* 7:73–98.

Bjerknes, G., P. Ehn, and M. Kyng, eds. 1987. *Computers and democracy—A Scandinavian challenge.* Aldershot, UK: Avebury.

Blomberg, J., J. Giacomi, A. Mosher, and P. Swenton-Wall. 1993. Ethnographic field methods and their relation to design. In *Participatory design: Principles and practices*, ed. D. Schuler and A. Namioka. Hillsdale, NJ: Lawrence Erlbaum Associates, pp. 123–156.

Blomberg, J. and A. Henderson. 1990. Reflections on participatory design: Lessons from the trillium experience. In *CHI '90 Human Factors in Computing Systems.* Seattle, Washington: ACM, pp. 353–359.

Blomberg, J., L. Suchman, and R. Trigg. 1994. Reflections on a work-oriented design project. In *Participatory Design Conference (PDC'94)*, ed. R. Trigg, S. I. Anderson, and E. Dykstra-Erickson. Palo Alto, CA: Computer Professionals for Social Responsibility, pp. 99–109.

Blomberg, J., L. Suchman, and R. Trigg. 1997. Back to work: Renewing old agendas for cooperative design. In *Computers and design in context*, ed. M. Kyng and L. Mathiassen. Cambridge, MA: MIT Press, pp. 267–288.

Bødker, S. 1996. Creating conditions for participation: Conflicts and resources in systems development. *Human-computer interaction* 11:215–236.

Bødker, S., P. Ehn, J. Kammersgaard, M. Kyng, and Y. Sundblad. 1987. A utopian experience: On design of powerful computer-based tools for skilled graphical workers. In *Computers and democracy—A Scandinavian challenge*, ed. G. Bjerknes, P. Ehn, and M. Kyng. Aldershot, England: UK, pp. 251–278.

Bødker, S. and K. Grønbaek. 1991a. Cooperative prototyping: Users and designers in mutual activity. *International journal of man-machine studies* 34:453–478.

———. 1991b. Design in action: From prototyping by demonstration to cooperative prototyping. In *Design at work: Cooperative design of computer systems*, ed. J. Greenbaum and M. Kyng. Hillsdale, NJ: Lawrence Erlbaum Associates, pp. 197–218.

———, and M. Kyng. 1993. Cooperative design: Techniques and experiences from the scandinavian scene. In *Participatory design: Principles and practices*, ed. D. Schuler and A. Namioka. Hillsdale, NJ: Lawrence Erlbaum Associates, pp. 157–176.

Braverman, H. 1974. *Labor and monopoly capital.* New York, NY: Monthly Review Press.

Card, S. K., T. P. Moran, and A. Newell. 1983. *The psychology of human-computer interaction.* Hillsdale, NJ: Lawrence Erlbaum Associates.

Clement, A. 1994. Computing at work: Empowering action by "low-level" users. *Communications of the ACM* 37 (1): 52–63.

———, and P. van den Besselaar. 1993. A retrospective look at PD projects. *Communications of the ACM* 36 (4): 29–37.

Cooper, G., C. Hine, J. Rachel, and S. Woolgar. 1995. Ethnography and human-computer interaction. In *The social and interactional dimensions of human-computer interfaces*, ed. P. J. Thomas. New York, NY: Cambridge University Press, pp. 11–36.

Ehn, P. 1989. *Work-oriented design of computer artifacts.* Hillsdale, NJ: Lawrence Erlbaum Associates.

Ehn, P., and M. Kyng. 1987. The collective resource approach to systems design. In *Computers and democracy –A Scandinavian challenge*, ed. G. Bjerknes, P. Ehn, and M. Kyng. Brookfield, VT: Gower, pp. 17–58.

Ehn, P., and M. Kyng. 1991. Cardboard computers: Mocking-it-up or hands-on the future. In *Design at work: Cooperative design of computer systems*, ed. J. Greenbaum and M. Kyng. Hillsdale, NJ: Lawrence Erlbaum Associates, pp. 169–196.

Ehn, P. and D. Sjögren (1991). From system descriptions to scripts for action. In *Design at work: Cooperative design of computer systems*, ed. J. Greenbaum and M. Kyng. Hillsdale, NJ: Lawrence Erlbaum Associates, pp. 241–268.

Forsythe, D. E. 1999. "It's just a matter of common sense": Ethnography as invisible work. *Computer supported cooperative work* 8:127–145.

Glesne, C. 1998. *Becoming qualitative researchers: An introduction*, vol. 2. New York, NY: Allyn and Bacon.

Grønbaek, K., and P. Mogensen. 1994. Specific cooperative analysis and design of general hypermedia development. In *Participatory Design Conference (PDC'94)*, ed. R. Trigg, S. I. Anderson, and E. Dykstra-Erickson. Palo Alto, CA: Computer Professionals for Social Responsibility, pp. 159–171.

Grossman, W. M. 2002. Interview: Designed for life. *New scientist* 176:46–49.

Hackos, J. T., M. Hammar, and A. Elser. 1997. Customer partnering: Data gathering for complex on-line documentation. *IEEE transactions on professional communication* 40:102–110.

Iacucci, G., K. Kuutti, and M. Ranta. 2000. On the move with a magic thing: Role playing in concept design of mobile services and devices. In *DIS '00.* Brooklyn, NY: ACM, Inc., pp. 193–202.

Iivari, N. 2004. Enculturation of user involvement in software development organizations: An interpretive case study in the product development context. In *Proceedings of the third Nordic conference on Human-computer interaction*, pp. 287–296. New York, NY: ACM Press.

Johnson, R. R. 1998. *User-centered technology: A rhetorical theory for computers and other mundane artifacts.* New York, NY: SUNY Press.

Kaufer, D. S., and B. S. Butler. 1996. *Rhetoric and the arts of design.* Mahwah, NJ: Lawrence Erlbaum Associates.

Madsen, K. H. and P. H. Aiken. 1993. Experiences using cooperative interactive storyboard prototyping. *Communications of the ACM* 36 (4): 57–66.

Mirel, B. 1998. "Applied constructivism" for user documentation. *Journal of business and technical communication* 12:7–49.

———. 2004. *Interaction design for complex problem solving: Developing usable and useful software.* San Francisco, CA: Morgan Kauffman.

Muller, M. J. 1991a. No mechanization without representation: Who participates in participatory design of large software products? In *CHI'91.* New Orleans, LA: ACM, pp. 391.

Muller, M. J. 1991b. PICTIVE: An exploration in participatory design. In *CHI'91.* New Orleans, LA: ACM, pp. 225–231.

Muller, M. J. 1993. PICTIVE: Democratizing the dynamics of the design session. In *Participatory design: Principles and practices,* ed. A. Namioka and D. Schuler. Hillsdale, NJ: Lawrence Erlbaum Associates, pp. 211–237.

Muller, M. J. 1997. Ethnocritical heuristics for reflecting on work with users and other interested parties. In *Computers and design in context*, ed. M. Kyng and L. Mathiassen. Cambridge, MA: MIT Press, pp. 349–380.

Muller, M. J. 1999. Invisible work of telephone operators: An ethnocritical analysis. *Computer supported cooperative work* 8:31–61.

Muller, M. J. 2003. Participatory design: the third space in HCI. In *The human-computer interaction handbook: Fundamentals, evolving technologies and emerging applications.* Hillsdale, NJ: Lawrence Erlbaum Associates, Inc., pp. 1051–1068.

Muller, M. J., and R. Carr. 1996. Using the card and pictive participatory design methods for collaborative analysis. In *Field methods casebook for software design*, ed. D. Wixon and J. Ramey. New York, NY: John Wiley and Sons, pp. 17–34.

Muller, M. J., D. M. Wildman, and E. A. White. 1993. Taxonomy of PD practices: A brief practicioner's guide. *Communications of the ACM* 36 (4): 26–27.

Nardi, B. A., ed. 1996. *Context and consciousness: Activity theory and human-computer interaction.* Cambridge, MA: MIT Press.

Nardi, B. A. and Y. Engeström. 1999. A web on the wind: The structure of invisible work. *Computer supported cooperative work* 8:1–8.

Novick, D. G. 2000. Testing documentation with "low-tech" simulation. In *SIGDOC 2000.* Cambridge, MA: ACM, pp. 55–68.

Nyce, J. M. and J. Lowgren. 1995. Toward foundational analysis in human-computer interaction. In *The social and interactional dimensions of human-computer interfaces*, ed. P. J Thomas. New York, NY: Cambridge University Press, pp. 37–47.

Rubin, J. 1994. *Handbook of usability testing.* New York, NY: John Wiley and Sons.

Smart, K. L. and M. E. Whiting 2002. Using customer data to drive documentation design decisions. *Journal of business and technical communication* 16:115–169.

Spinuzzi, C. 2002a. Documentation, participatory citizenship, and the Web: The potential of open systems. *Proceedings of the 20th Annual International Conference on Computer Documentation.* Chapel Hill, NC: ACM Press, pp. 194–199.

———. 2002b. A Scandinavian challenge, a US response: Methodological assumptions in Scandinavian and US prototyping approaches. *Proceedings of the 20th Annual International Conference on Computer Documentation.* Chapel Hill, NC: ACM Press, pp. 208–215.

———. 2002c. Toward integrating our research scope: A sociocultural field methodology. *Journal of business and technical communication* 16:3–32.

———. 2003. *Tracing genres through organizations: A sociocultural approach to information design.* Cambridge, MA: MIT Press.

———. In press. Lost in the translation: Shifting claims in the migration of a research technique. *Technical communication quarterly* 14.

———, J. Bowie, I. Rogers, and X. Li. 2003. Open systems and citizenship: Developing a departmental website as a civic forum. *Computers and composition* 20:168–193.

Sullivan, P., and J. E. Porter. 1997. *Opening spaces: Writing technologies and critical research practices.* New directions in computers and composition studies. Greenwich, CT: Ablex Pub. Corp.

Sumner, T., and M. Stolze. 1997. Evolution, not revolution: Participatory design in the toolbelt era. In *Computers and design in context*, eds. M. Kyng and L. Mathiassen. Cambridge, MA: MIT Press, pp. 1–26.

Tudor, L., M. Muller, and J. Dayton. 1993. A C.A.R.D. game for participatory task analysis and redesign: Macroscopic complement to PICTIVE. In *INTERCHI'93.* Amsterdam, Netherlands: ACM, Inc.

Wall, P. and A. Mosher. 1994. Representations of work: Bringing designers and users together. In *PDC'94: Proceedings of the Participatory Design Conference*, eds. R. Trigg, S. I. Anderson, and E. Dykstra-Erickson. Palo Alto, CA, pp. 87–98.

Zuboff, S. 1988. *In the age of the smart machine: The future of work and power.* New York. NY: Basic Books.

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