Investigating the Technology-Work Relationship: A Critical Comparison of Three Qualitative Field Methods

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Researchers today are increasingly attempting to understand the relationship between technology and work through field methods. Surveying field methods commonly used by researchers to observe such interactions, I critically discuss the assumptions underpinning three methods (ethnography, participatory design, and contextual inquiry) and the strengths and weaknesses of each method. Comparing ways of looking at human-computer interaction across four categories (i.e., theoretical bases, data collection methods, data analysis methods, and design approaches), I provide guidelines for researchers who are considering ways to examine human interaction and work with computer technologies.

INTRODUCTION

Qualitative field methods are widely regarded as valuable for investigating the relationship between technology and work, examining workplaces and work practices, designing and developing documentation and software, and evaluating whether documentation and software have made the impact they were intended to make (e.g., Beyer and Holtzblatt, 1998; Hackos and Redish, 1998; Schuler and Namioka, 1993; Wixon and Ramey, 1996). Many field methods are currently available and used by technical communicators, including ethnography, participatory design, and contextual inquiry. Although these field methods have important differences in terms of the theories that underlie them, the data collection and analysis methods they use, and the design processes they support, these field methods are not well separated in the technical

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communication literature. For instance, in one collection on field methods (Wixon and Ramey, 1996), ethnography is portrayed as a superset of participatory design and contextual inquiry (Ford and Wood, 1996); participatory design is portrayed as a superset of contextual inquiry (Namioka and Rao, 1996); and contextual design is portrayed as a separate method that incorporates elements of ethnography (Holtzblatt and Beyer, 1996). Because they are so often conflated in the literature, and because they are superficially similar, these field methods are sometimes not used in ways that harness their unique strengths.

In this article, I draw some distinctions among these three methods. At times these distinctions are difficult to draw, particularly because the methods have been so often conflated in software documentation literature. Furthermore, I cannot do justice to the complexity of these three methods in a single article, so the sketches of the methods that I draw here will necessarily be oversimplified. Yet by imposing these distinctions, I hope to identify the different methods' strengths and the different situations in which each would be most appropriate.

Below, I describe each field method's theoretical basis, data collection methods, and data analysis methods. I conclude by discussing when each method might be appropriate. At the end of the article is a table that compares the three field methods in more detail than is possible here.

ETHNOGRAPHY

Ethnography is an approach that developed from work in cultural anthropology. Not surprisingly, ethnography is focused primarily on the cultural aspects of users' work. Its goal is to understand ways of living within a social group, including the tacit rules, practices, and conventions that govern that group. In other words, ethnography is an excellent methodology for developing a thick description (a rich, multi-layered representation) of how users work, act, communicate, and live; it is "the systematic, inductive study of a culture" (Ramey, Rowberg, and Robinson, 1996; see also Zuboff, 1988, pp. 428-429).

Ethnography was not intended to be used as a design method. Rather, its focus is on describing and interpreting culture (Doheny-Farina and Odell, 1985, pp. 504-505; Blomberg, 1995, p. 177; Blomberg, Giacomi, Mosher, and Swenton-Wall, 1993, p. 25). Indeed, linking ethnography and design is a challenge for reasons I discuss later in this section. Nevertheless, many researchers have used ethnography to inform design work (e.g., Blomberg, 1995; Nardi, 1993; Nardi and O'Day, 1999; Suchman, 1987; Zuboff, 1988). It's worth noting here that much of what is described as *ethnography* in the software documentation literature is actually research that uses ethnographic *methods* (such as unobtrusive observations); I focus on true ethnography here, but many of my points can be applied to studies that use ethnographic methods as well.

Theoretical Precepts

Since ethnography comes out of a tradition of cultural anthropology, it shares the theoretical precepts and focuses of that field. For instance, ethnography assumes a more or less social constructionist understanding of mind – that is, it assumes that individuals are reflections or products of their culture. The central task of a traditional ethnography – the kind most often used in human-computer interaction research – is to explore that culture. Once an ethnographer has observed enough individuals and groups for a long enough time, the assumption goes, he or she can find a "key linkage" that explains the culture and construct an essential model of that culture;

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the model can then be used to understand and predict individuals' actions (Doheny-Farina and Odell, 1985). This model, then, is arrived at inductively, and in fact, one principle of ethnography is the recognition that it requires "a willingness to be in situations out of one's control" (p.129). Ethnography's theoretical precepts color its data collection, analysis, and design work.

Data Collection

For instance, ethnography's theoretical precepts have a tremendous impact on the way ethnographers collect data. Ethnographers tend to approach a given social group with only a very general research question, if any (Doheny-Farina and Odell, 1985, pp. 510-511; for an example, see Zuboff, 1988). Their goal is to observe and become immersed in a culture over time, record observations over long periods, and let specific insights into the culture emerge from patterns they find in their observations. Since the scope of ethnographic work – understanding an entire social group – is broad, ethnographic research tends to take a relatively long time to execute: according to Doheny-Farina and Odell (1985), ethnographic research usually takes a minimum of six months to a year.

As one might imagine, ethnographic research tends to be intrusive, despite ethnographers' efforts not to be. Ethnographers must be able to examine phenomena in the social contexts in which they naturally occur, and they must have the freedom to question and interview people within the social group as well as examine artifacts that the social group uses. For instance, an ethnography of software users might involve 6-12 months in which the researcher is allowed to sit in on meetings, observe workers as they work, distribute questionnaires, and interview managers and workers.

Ethnography places a special emphasis on artifacts used by the observed people, since artifacts typically emerge from group activity and are used to accomplish group goals. For instance, an ethnographer who studies software developers might collect a copy of the developers' reference manuals and study them for characteristics that might reflect on the culture of software development. Yet the artifact is not a unit of analysis in itself; it is meant to provide insight into the real unit of analysis, the group or culture.

Given the sorts of data that ethnographers want to collect, they tend to record naturalistic observations and interviews through field notes, videotapes, audiotapes, and questionnaires (Blomberg, Giacomi, Mosher, and Swenton-Wall, 1993; Doheny-Farina and Odell, 1985; Wood, 1996). They also tend to collect cultural artifacts that they observe workers using.

Data Analysis

Once an ethnographer has collected her or his data, she or he must analyze it. In traditional ethnography, the analysis is driven by the theoretical assumption that a grand narrative or "key linkage" exists: that there is some underlying metaphor, model, general scheme, pattern, or story line that, once discovered, can organize the data and aid in its interpretation (see Cintron, 1993 for a critique). To that end, ethnographers tend to make databases of field notes, artifacts, and interview data, then sift through them and let patterns emerge (see Pycock et al., 1998; Ramey, Rowberg, and Robinson, 1996). The task can be quite daunting: Shoshanna Zuboff reports that for her book *In the Age of the Smart Machine*, she "thematically coded approximately 1,500 pages of field notes and transcripts" (1988, p. 428).

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Design Work

Given the theoretical precepts of ethnography, ethnographers have traditionally found it difficult to move from description to prescription. As a primarily observational methodology, ethnography relies on thick descriptions to deeply analyze particular events and to generalize about the culture being observed. Ethnography, then, informs designers who might otherwise design in a vacuum; it helps designers not to simply impose their world view on users (Blomberg, Giacomi, Mosher, and Swenton-Wall, 1993, pp. 141-142).

Yet such generalizations only go so far. It is often difficult to link ethnographic description to design prescription in productive ways (Blomberg, 1995; Blomberg, Giacomi, Mosher, and Swenton-Wall, 1993; Pycock et al., 1998; cf. Button and Dourish, 1996): knowing about a particular work situation is quite different from knowing how a design affects a wide variety of users or how changes in the design might affect those users. In addition to the practical issues are ethical and practical ones. Blomberg, Giacomi, Mosher, and Swenton-Wall (1993) point out that ethnographers who also design are "change agents": rather than describing the community, they change it, and those changes serve someone's interests – perhaps the workers, but perhaps others who are at cross-purposes to the users (p. 139). Often those changes are resisted by system developers as well as by the community (Bader and Nyce, 1998).

In sum, ethnography is a useful field method for understanding in broad terms how users work and how they interpret artifacts in their work. Ethnography provides a way to evaluate products in ways that are thorough, longitudinal, and developmental. Furthermore, ethnography allows researchers to gauge cultural reactions to and interpretations of new products.

On the other hand, ethnography has weaknesses when applied to design. For one thing, ethnography represents a significant commitment in terms of time, money, and buy-in: one or more researchers must spend months observing users, who themselves must be willing to be observed and interviewed at the researchers' convenience. Few organizations are willing to make such a commitment on a regular basis (Ford and Wood, 1996). Additionally, although it can excel as an evaluative method, ethnography relies heavily on thick description, and thus ethnographic results are difficult to generalize across users and situations. That lack of generalizing power weakens ethnography as a method for guiding user-centered design.

PARTICIPATORY DESIGN

"Participatory Design (PD) represents a new approach towards computer systems design in which the people destined to *use* the system play a critical role in *designing* it" (Schuler and Namioka, 1993, p.xi). In opposition to "the cult of the specialist" in which a learned person or group makes decisions about the best way to design a system, PD emphasizes active, democratic participation by users: "People who are affected by a decision or event should have an opportunity to influence it" (1993, p.xii). Indeed, PD developed from Scandinavian design approaches that were meant to balance the concerns of management and labor in the construction of computer systems. The impulse of PD is not only political but technical: as Pelle Ehn (1993) points out, the participation of skilled workers in the design process improves the product.

Participatory design focuses on giving participants power in designing artifacts for their own use. Unlike ethnography, PD is intended primarily to be a design method rather than a research

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method (Blomberg, Giacomi, Mosher, and Swenton-Wall, 1993), so the focus is on the artifact as tool-in-use rather than the culture that artifacts help to explicate.

Theoretical Precepts

PD's theoretical basis is broadly constructivist: it focuses on how users construe and use tools in their own activities. (See Mirel, 1998 for a discussion of constructivism; see Bødker, 1991 and Greenbaum and Kyng, 1991 for examples of the tool focus in PD.) Although participatory designers have an interest in the broader cultural issues that ethnography explores, those cultural issues are always explored in terms of the users' *goal-directed actions*, the day-to-day tasks that the users repeatedly accomplish. Consequently, participatory designers tend to focus on *breakdowns* in daily work, or moments at which users find that their tools do not work as expected (Bødker, 1991). They are interested in how tools are designed for specific cultural-social-political contexts and how those tools can be changed to better facilitate work and empowerment within those contexts.

Data Collection

In PD, data collection is based on a research question co-defined by researchers and participants. Once that research question is developed, researchers collect data through observations of participants' work, interviews with participants, collaborative design, walkthroughs, and cooperative prototyping. Yet these data are not simply collected so much as co-constructed: researchers and participants work together to explore the tool and how it relates to participants' work practices, and often the data consist of researcher-participant dialogues as they collaboratively encounter prototypes, simulations, and games (e.g., Bødker and Grønbæk, 1996; Bødker, Grønbæk, and Kyng, 1993; Ehn and Kyng, 1991; Ehn and Sjogren, 1991). In all of these cases, the unit of analysis is the tool-user, that is, the individual-in-context or individual-in-simulation.

Data Analysis

Participatory designers make sense of data through methods including analysis of artifacts (Bødker and Pedersen, 1991), video coding and analysis (Suchman and Trigg, 1991; Bødker, 1996a), and work language analysis (Katzenberg and Piela, 1993). Yet the most popular analysis tools are prototypes (Bødker, 1991; Ehn and Kyng, 1991; Madsen and Aiken, 1993; Namioka and Rao, 1996). These tools are used in *cooperative design* sessions in which participants and researchers jointly produce, examine, and modify prototypes. Such sessions are typically structured in ways that allow participatory designers to meet their primary goals of democratizing the workplace and drawing from the considerable skills and experiences of users (Ehn, 1993; cf. Bødker, 1996b).

For instance, in one study (Bokder and Grønbæk, 1991), participatory designers worked closely with architects, engineers, and draftspeople to develop a computer program that would support their work. After interviewing participants about their work and holding "future workshops" in which participants envisioned ways to solve common work problems, the designers constructed prototypes and videotaped participants using them in "a step-wise hands-on evaluation of the prototype" (p. 458). The designers studied the sorts of breakdowns and focus shifts the participants encountered; these breakdowns and focus shifts were taken as indications of deeper contradictions in the work activity. But they also encouraged participants to envision ways to improve the prototype. They found that participants were able to creatively transcend tradition: they "were able to go beyond their traditional skills when confronted with new technological

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possibilities such as prototypes and example applications" (p. 467). In this case, Bødker and Grønbæk followed a *democratic process* by encouraging participants to become co-designers who had a strong say in how the product developed. In doing so, they *drew from workers' skills and experiences*: workers were able to relate their design suggestions directly to the problems and routines they faced in their normal work.

Design Work

This brings us to design work – a somewhat artificial distinction, since in PD, the design work is often done simultaneously with the analysis (Mørch, 1997; Sumner and Stolze, 1997). As the example above shows, designers and participants cooperatively develop products, primarily from existing artifacts. That last part is important: existing artifacts typically provide the base for prototypes, which in turn iteratively evolve into new artifacts. Participatory design work involves progressively changing the status quo rather than enacting radical change
(cf. Beyer and Holtzblatt, 1998, p. 20, where they make this point about prototyping.)

Participatory design, then, excels at involving and empowering users. Since that is true, it is often easy to persuade users to buy in to participatory design projects, and to contribute enthusiastically to them. In addition to democratizing the workplace, participatory design avoids "reinventing the wheel" by harnessing users' skills. And since participatory design focuses on iteratively improving existing artifacts, it can often be done at a rapid pace using paper prototypes or off-the-shelf software customized for users' needs. Participatory design is a rapid, inexpensive process that, although somewhat intrusive, provides visible results on an ongoing basis.

Yet participatory design has drawbacks as well. Chief among these is that PD encourages *incremental* rather than *radical* change; it is not geared to introduce new solutions that radically depart from current work practices. (Sumner and Stolze (1997) illustrate this orientation in their paper entitled "Evolution, Not Revolution: Participatory Design in the Toolbelt Era.") Related to that drawback is PD's primary focus on the artifact to be designed – the tool-in-use – rather than on the larger social-cultural-historical context in which the artifact is used. That is, although PD involves exploring the political and technological milieu in which users work, that exploration is not done systematically. Indeed, PD does not strongly separate data collection, data analysis, and redesign work; these three stages are typically melded in the iteratively designed prototype.

CONTEXTUAL INQUIRY

Unlike ethnography, from which it is derived – but like participatory design, to which it is frequently compared – contextual inquiry (hereafter CI) is explicitly structured as a field method oriented toward design. It is dedicated to divining the underlying work structure of a given workplace and standardizing the work structure in ways that increase the system's efficiency and the individuals' control and happiness. CI is an adaptation of "ethnographic research methods to fit the time and resource constraints of engineering" (Holtzblatt and Beyer, 1993, p. 93). Thus it involves short, targeted observations and interviews coupled with elaborate analyses guided by work structure models. CI functions as a field method in service of a larger methodology called *contextual design* (Beyer and Holtzblatt, 1998).

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Theoretical Precepts

Like ethnography, CI takes as its task the discovery of a grand narrative or key linkage. But unlike ethnography, the grand narrative is a formal work structure model that, once understood and diagrammed, can be redesigned. According to this view, once investigators use their data to divine the work structure, they can manipulate the work structure through affinity diagrams – abstract representations of context (culture), the physical environment, workflow, sequence (Holtzblatt and Beyer, 1993; Beyer and Holtzblatt, 1998), and artifacts (Beyer and Holtzblatt, 1998) – without having to deal again with the customers. Only when cultural understanding is achieved through these tools and workflow solutions are developed can designers turn to the problem of instantiating their solutions via design artifacts (Holtzblatt and Beyer, 1993, p.99).

Data Collection

Again, like ethnography, CI starts with a clearly defined set of concerns rather than a research question (Raven and Flanders, 1996, p.2); those concerns focus on cultural aspects of the overall work. Yet they are investigated with short-term invasive methods rather than the longitudinal methods employed by ethnography: targeted observations, walkthroughs, and particularly interviews conducted during those observations and walkthroughs, as well as artifacts collected at the participants' worksites. Indeed, in designing CI "to fit the time and resource constraints of engineering" (Holtzblatt and Beyer, 1993, p. 93), Karen Holtzblatt jettisoned the time-consuming longitudinal research focus that is a cornerstone of ethnography. Instead, she relied on targeted, interview-centered data collection in which individual participants-in-context might be observed and interviewed only once, for only an hour.

Data Analysis

The data analysis is driven by the assumption that the observational snapshots collected by CI researchers can lead to an understanding of the underlying work structure. (This assumption is critiqued in Hackos, Hammar, and Elser, 1997.) CI uses affinity diagrams to analyze data from targeted observations, walkthroughs, and interviews in terms of context (culture), the physical environment, workflow, sequence (Holtzblatt and Beyer, 1993), and artifacts (Beyer and Holtzblatt, 1998). Thus CI allows researchers to create abstract models that describe the underlying work structure based on focused but short-term data.

Design Work

Such abstract models do not merely allow researchers to quickly create a cultural understanding of the work observed; they also furnish a design approach. Designers can manipulate these abstract models to generate design solutions that will transform the entire work structure. In fact, in contrast to PD, the act of designing actual interfaces is delayed as long as possible: "We could use prototypes, mockups, or sketches to represent [a] system structure. But we find they focus the team on the user interface (UI). They hide the structure of the system behind UI details, making it easier to talk about menus, icons, word choice, and screen layout than about whether the structure and organization are right." (Holtzblatt and Beyer, 1993, p.99). Instead, products evolve as physical solutions to abstract problems (i.e., work structure goals). The focus is on "designing a coherent response that hangs together as a new work practice" (Holtzblatt and Beyer, 1993, p. 305).

Contextual inquiry, then, has been designed to do certain things – and it does them well. It excels at promoting radical change because it involves manipulating the underlying work structure rather than the artifact. It minimizes the intrusiveness and time spent in field research

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because it involves short, targeted observations and interviews that can then be related and generalized through work models. It encourages thorough change that goes beyond UI changes.

Yet at the same time, contextual inquiry has drawbacks as well. Its minimal intrusiveness means that CI generalizes from short observations and interviews that may not be representative, or may be representative at only one point in users' development; that is, CI does not account for developmental work activity, as ethnography and participatory design do. Furthermore, the minimal contact with users may not allow researchers to understand the political context at their sites, and thus may impede them in attempts to make work processes more democratic. Indeed, without sustained contact with users, designers might not be able to be effective advocates for the users during the crucial stage of devising work models; designers do come into contact with users after prototypes have been designed, but that point is delayed as much as possible. Perhaps even more importantly, CI presumes that there is an underlying work structure that can be modeled and manipulated – an assumption that, apart from its theoretical difficulties, poses practical problems, since workers doing the same job at different sites often have fundamentally different work practices and environments.

CONCLUSION

In this article, I have critically examined three field methods in some detail. Here, I summarize by discussing when it might be appropriate to use each method. At the end of the article, Table 1 provides a detailed comparison of the three field methods.

Ethnography

Given ethnography's strengths, researchers should draw on it to research users' workplace cultures and work practices. Ethnography is uniquely suited for the sort of longitudinal observation that is needed for building a thick description of users, their habits, workplaces, and artifacts; neither of the other methods affords this sort of detailed description. Yet, since ethnography involves a considerable time and money investment and offers little in terms of generalizable design guidance, it probably should not be used routinely for the direct design of artifacts.

Participatory Design

PD's strengths are quite different from ethnography's. Researchers should draw on it if they want to rapidly and incrementally improve an existing artifact; if they are concerned with the democratization of the workplace; or if they strongly want to draw on the existing strengths of users. On the other hand, participatory design is not well suited for promoting radical design changes: because it tends to take an existing artifact as a starting point, the participatory design process tends to be bound by that artifact. Furthermore, participatory designers are "in the trenches." They spend most of their time working directly with users, and tend to have fewer chances to step back and reflect on the overall work than researchers using either of the other methods.

Contextual Inquiry

CI minimizes the length of intrusive field work by minimizing the time spent with users. By relying on work models to analyze and manipulate work, it promotes thorough change that goes below the artifact's surface features. Consequently, unlike PD, CI is well suited for radical (as

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opposed to incremental) design solutions. Researchers should draw on CI if they need to develop innovative design solutions on a relatively short schedule (3-6 months) and if they have little contact with users. At the same time, by giving up the intrusive research techniques of the other two methods, CI relies heavily on the notion of an underlying work structure – a notion that may not reflect the messiness of everyday work across sites and across time. By involving users in closely bounded and targeted ways rather than throughout the process, CI increases the likelihood of improperly "reading" users. For those reasons, by itself, CI is not well suited for researchers who need a thorough, detailed understanding of users, who want to build on existing solutions, or who are primarily concerned with empowering users to co-design their own work artifacts and practices.

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Table 1. A Comparison of Ethnography, Participatory Design, and Contextual Inquiry.

	Ethnography	Participatory Design	Contextual Design
Theoretical precepts			
Understanding of mind	Social constructionist	Constructivist	Social constructionist
Understanding of culture	Gained through observation and immersion	Gained through observation, study, interviews, cooperative design	Gained through targeted snapshot observations and extended group analysis
Understanding of history	Addressed through culture; longitudinal study might uncover development	Addressed through observations; iterative work might interact with development	"Snapshots"; assumes that users' work is essentially static
Understanding of task	Nuanced but unstructured	Cooperatively developed; nuanced but changes as users become co-developers	Structured but underdefined
Understanding of artifacts	Cultural artifacts used to accomplish meaningful goals.	Tools designed for specific contexts; perceptions of tools are as important as facts; users' feelings about tools as important as tools' functionality.	Figure into physical model, but not systematically explored in terms of how they structure and stabilize work. Focus is on "underlying work structure" rather than interface.
Understanding of structure of activity	No formal model.	Draws on constructivist theory for activity structure	"Work structure" represented through models: context, physical, flow, sequence, artifact, consolidated flow
Data collection			
Research focus	Emergent; usually guided by a very general research question	Research question	Clearly defined set of concerns rather than a research question
Methods	Observation, interviews	Observation, interviews, collaborative design, walkthroughs, cooperative prototyping	Observation, interviews (during observations), walkthroughs
Nature of observation	Unstructured; inductive; longitudinal	Semistructured; iterative	Semistructured; snapshot
Unit of analysis	Group	Individual-in-context or individual-in-simulation	Individual-in-context
Partnership model	Participant-observer or anthropologist	Collaborator	Apprentice or partner
Data analysis			
Analysis tools	Databases of field notes, artifacts, interview data	Prototypes, videocoding, work language analysis, artifact analysis	Affinity diagrams and related tools (not databases)
Microanalysis (level of operations)	None	Analysis of breakdowns	None
Mesoanalysis (level of actions)	Stories from field notes and interviews; classification system	Observations, interviews, design interactions	Observations, abstracted into various models
Macroanalysis (level of activity)	The grand narrative or key linkage that emerges from the longitudinal study	The shape of the entire collaboration	The underlying work structure, derived from the various models
Design work			
Description to prescription	Primarily descriptive. Quest for "key linkage" that can focus the process of classifying observations (a metaphor, model, general scheme, pattern, story line).	Descriptive, participatory (designers consult with users to generate solutions).	Descriptive, oriented toward extracting essential work structure. Work structure then becomes guide for design solutions.
Products	Unclear link between description and prescription. Unsystematized.	Evolve iteratively from existing artifacts.	Evolve as physical solutions to abstract problems (i.e., work structure goals).

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REFERENCES

Bader, G., and J.M. Nyce. "When Only the Self is Real: Theory and Practice in the Development Community." *Journal of Computer Documentation.* 22: 5-10, 1998.

Beyer, H., and K. Holtzblatt. Contextual Design: Defining Customer-Centered Systems. United States of America: Morgan Kaufmann Publishers, Inc. 1998.

Blomberg, J. "Ethnography: Aligning Field Studies of Work and System Design." In: A. F. Monk and G. N. Gilbert (Eds.), Perspectives on HCI: Diverse Approaches. New York: Harcourt Brace & Company. 175-198. 1995.

Blomberg, J., J. Giacomi, A. Mosher, and P. Swenton-Wall. "Ethnographic Field Methods and Their Relation to Design." In: D. Schuler and A. Namioka (Eds.), Participatory design: Principles and practices. Hillsdale, NJ: Lawrence Erlbaum Associates. 1993.

Bødker, S. Through the Interface: A Human Activity Approach to User Interface Design. Hillsdale, NJ: L. Erlbaum. 1991.

Bødker, S. "Applying Activity Theory to Video Analysis: How to Make Sense of Video Data in Human-Computer Interaction." In: B. Nardi (Ed.), Context and Consciousness. Cambridge, MA: MIT Press. 147-174. 1996a.

Bødker, S. "Creating Conditions for Participation: Conflicts and Resources in Systems Development." *Human-Computer Interaction.* 11: 215-236, 1996b.

Bødker, S., and K. Gronbæk: "Users and Designers in Mutual Activity: An Analysis of Cooperative Activities in Systems Design." In: Y. Engeström and D. Middleton (Eds.), Cognition and Communication at Work. New York: Cambridge University Press. 130-158. 1996.

Button, G., and P. Dourish. "Technomethodology: Paradoxes and Possibilities". *Human Factors in Computing Systems: CHI '96 Conference Proceedings.* New York: ACM. 19-26. 1996.

Cintron, R. "Wearing a Pith Helmet at a Sly Angle: or, Can Writing Researchers Do Ethnography in a Postmodern Era?" *Written Communication.* 10: 371-412, 1993.

Doheny-Farina, S., and L. Odell. "Ethnographic Research on Writing: Assumptions and Methodology." In: L. Odell and D. Goswami (Eds.), Writing in Non-academic Settings. New York: Guilford Press. 503-535. 1985.

0-7803-6431-7/00/$10.00 © 2000 IEEE

Dorazio, P., and J. Stovall. "Research in Context: Ethnographic Usability." *Journal of Technical Writing and Communication.* 27: 57-67, 1997.

Ehn, P. "Scandinavian Design: On Participation and Skill." In: D. Schuler and A. Namioka (Eds.), Participatory Design: Principles and Practices. Hillsdale, New Jersey: Lawrence Erlbaum Associates. 41-78. 1993.

Ford, J. M., and L.E. Wood. "An Overview of Ethnography and System Design." In: D. Wixon and J. Ramey (Eds.), Field Methods Casebook for Software Design. New York: John Wiley & Sons. 269-282. 1996.

Greenbaum, K., and M. Kyng, (Eds.). Design at Work: Cooperative Design of Computer Systems. Hillsdale, NJ: Lawrence Erlbaum Associates. 1991.

Hackos, J. T., M. Hammar, and A. Elser. "Customer Partnering: Data Gathering for Complex On-Line Documentation." *IEEE Transactions on Professional Communication.* 40: 102-110, 1997.

Holtzblatt, K., and H. Beyer. "Making Customer-Centered Design Work for Teams." *Communications of the ACM,* 36: 93-103, 1993.

Holtzblatt, K., and H. Beyer. "Contextual Design: Principles and Practices." In: D. Wixon and J. Ramey (Eds.), Field Methods Casebook for Software Design. New York: John Wiley & Sons. 301-334. 1996.

Holtzblatt, K., and S. Jones. "Contextual Inquiry: A Participatory Technique for System Design." In: D. Schuler and A. Namioka (Eds.), Participatory Design: Principles and Practices. Hillsdale, NJ: Lawrence Erlbaum Associates. 1993.

Kyng, M., and L. Mathiassen. Computers and Design in Context. Cambridge, MA: MIT Press. 1997.

Mirel, B. ""Applied Constructivism" for User Documentation." *Journal of Business and Technical Communication.* 12: 7-49, 1998.

Mørch, A. "Three Levels of End-user Tailoring: Customization, Integration, and Extension." In: M. Kyng and L. Mathiassen (Eds.). Computers and Design in Context. Cambridge, Massachusetts: MIT Press. 51-76. 1997.

Muller, M. "PICTIVE: Democratizing the Dynamics of the Design Session." In: D. Schuler and A. Namioka (Eds.), Participatory Design: Principles and Practices. Hillsdale, New Jersey: Lawrence Erlbaum Associates. 211. 1993.

Muller, M. J., and S. Kuhn. "Introduction to Special Issue on Participatory Design." *Communications of the ACM.* 36: 24-28. 1993.

0-7803-6431-7/00/$10.00 © 2000 IEEE

Namioka, A. H., and C. Rao. "Introduction to Participatory Design."
In: D. Wixon and J. Ramey (Eds.). Field Methods Casebook for Software Design.
New York: John Wiley & Sons. 283-299. 1996.

Nardi, B.A. A Small Matter of Programming: Perspectives on End-User Computing.
Cambridge, MA: MIT Press. 1993.

Nardi, B.A., and V.L. O'Day. Information Ecologies: Using Technology With Heart.
Cambridge, MA: MIT Press. 1999.

Pycock, J., K. Palfreyman, J. Allanson, and G. Button. "Representing Fieldwork and Articulating Requirements Through VR. Proceedings of CSCW '98: Conference on Computer-Supported Cooperative Work. New York: ACM, Inc. 383-392. 1998.

Ramey, J., A.H. Rowberg. and C. Robinson. "Adaption of an Ethnographic Method for Investigation of the Task Domain in Diagnostic Radiology." In: D. Wixon and J. Ramey (Eds.), Field Methods Casebook for Software Design. New York: John Wiley & Sons. 1-16. 1996.

Raven, M. E., and A. Flanders. "Using Contextual Inquiry to Learn About Your Audiences." *Journal of Computer Documentation.* 20: 1-13. 1996.

Schuler, D., and A. Namioka. (Eds.). Participatory Design: Principles and Practices.
Hillsdale, NJ: Lawrence Erlbaum Associates. 1993.

Suchman, L. A. Plans and Situated Actions: The Problem of Human-Machine Communication.
New York: Cambridge University Press. 1987.

Sumner, T., and M. Stolze. "Evolution, Not Revolution: Participatory Design in the Toolbelt Era." In: M. Kyng and L. Mathiassen (Eds.), Computers and Design in Context.
Cambridge, Massachusetts: MIT Press. 1-26. 1997.

Wixon, D., and J. Ramey, (Eds.). Field Methods Casebook for Software Design.
New York: John Wiley & Sons. 1996.

Wood, L. E. "The Ethnographic Interview in User-Centered Work/task Analysis."
In: D. Wixon and J. Ramey (Eds.), Field Methods Casebook for Software Design.
New York: John Wiley & Sons. 35-56. 1996.

Zuboff, S. In the Age of The Smart Machine: The Future of Work and Power.
New York: Basic Books. 1988.

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