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AN ETHNOGRAPHIC APPROACH TO DESIGN

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INTRODUCTION

In recent years, academic and professional researchers and designers working in the field of Human-Computer Interaction (HCI) have looked to ethnography to provide a perspective on relations between humans and the artifacts they design and use. Within the field of HCI, there are different views among researchers and practitioners on just what constitutes an ethnographic inquiry. For some, ethnography is simply a fashionable term for any form of qualitative research. For others, it is less about method and more about the lens through which human activities are viewed. In this chapter, we will attempt to position the ethnographic approach within historical and contemporary contexts, outline its guiding principles, detail the primary methods and techniques used in ethnographically informed design practice, and provide case examples of ethnography in action.

This chapter provides an introduction to ethnography, primarily as it relates to studies in HCI. We will touch only briefly on some of the more controversial topics current within the field of ethnographic research that have enlivened mainstream academic discourse in recent years. Instead, we will point the reader to books and articles where these topics are discussed in more detail. Our primary aims in this chapter are to provide academics and professionals in the field of HCI with a working understanding of ethnography, an appreciation for its value in designing new technologies and practices, and a discerning eye when it comes to reviewing and evaluating ethnographically informed design studies.

THE RELEVANCE OF ETHNOGRAPHY FOR DESIGN

The turn to ethnography as a resource for design can be traced back to the early 1980s when computer technologies were moving out of the research labs and engineering environments and into mainstream office settings, call centers, manufacturing floors, and educational institutions. There was the realization that the designers and developers of these technologies could no longer rely exclusively on their own experiences as a guide for the user requirements of these new systems. Instead designers and developers needed to find a way to gain an understanding of the everyday realities of people working within these diverse settings (Blomberg, Giacomi, Mosher, & Swenton-Wall, 1991). In many organizations, market research groups were being asked to provide insights into the people and practices that made up these varied settings. However, the techniques most commonly used by market research groups at the time (e.g., attitude surveys, focus groups, telephone interviews, etc.) were not well suited for developing understandings of what people actually do day to day.

Anthropologists and other social scientists had long recognized that what people say and what they do can vary significantly, making reliance on surveys, focus groups, and telephone interviews insufficient for the task at hand. Designers and developers needed a way of getting a firsthand view of the on-the-ground realities—the here and now—of everyday life in these diverse settings. At this time in the early 1980's, social scientists working at the Xerox Palo Alto Research Center were beginning to explore ways of bringing insights from ethnographic research into a productive relationship with the design of new technologies (e.g., Blomberg, 1987, 1988, 1995; Suchman,1983; Suchman et al., 1999a). Not long after, other research labs (e.g., Hewlett-Packard, Apple Computer, and NYNEX) followed suit (e.g., Nardi & Miller, 1990; Sachs, 1995). Today, most industrial research and development labs in the United States have anthropologists and other social scientists on staff (e.g., Intel, AT&T, Kodak, Xerox, and Microsoft to name but a few).

Ethnographically informed design practices also began to take hold in design firms and consulting companies during the early 1990s (e.g., IDEO, Fitch, and the Doblin group). These early explorations culminated in 1993 with the founding of E-Lab, a research and design company that distinguished itself from other design firms at the time by creating an equal partnership between research and design (Wasson, 2000). Ethnographic methods were at the center of E-Lab's research approach, with a commitment to base design recommendations on insights from ethnographic research (Robinson, 1994).

Furthermore, in the mid-1980s the growth in networked applications and devices made possible through the availability of local area networks (LANs) and early Internet implementations created an awareness among designers and developers that they would need to focus beyond the support of single, isolated users interacting with information technologies. What would be needed was a way of exploring the information and communication practices of people interacting with one another, both face-to-face and through mediating technologies. Information technologies were increasingly becoming communication and collaboration technologies that demanded an examination of social interaction across time and space. In response, a group of computer scientists, human factors engineers, and social scientists, somewhat dissatisfied with the dominant perspectives within HCI at the time (e.g., perspectives that emphasized technological possibilities over the uses and users of technology, the interface requirements of standalone applications over networked devices, and human psychology and cognition over social interaction), founded the field of Computer-Supported Cooperative Work (e.g., Greif, 1988; Schmidt & Bannon, 1992). A group of sociologists at Lancaster University and researchers at the Xerox Research Center in Cambridge, England, have played a prominent role in helping to shape the ethnographic research agenda within Computer-Supported Cooperative Work for the last decade (e.g., Bentley et al., 1992; Hughes, Randall, & Shapiro, 1993; Hughes, King, Rodden, & Anderson, 1994; Hughes, Rodden, & Anderson, 1995).

Finally, a more recent trend has redoubled interest in the ethnographic perspective as a valuable tool in the design of new technologies. The explosion of the Internet with its reach into all aspects of people's lives has accelerated the move of information technologies out of the workplace and into homes, recreational environments, and other nonwork-related settings. This has presented a new set of challenges for designers as they design and build applications that leverage powerful, digital technologies for use by people of all ages, engaged in myriad nonwork-related activities. Although the clamor for all that is the Internet may

have temporarily subsided, what has not diminished is the acknowledgment that designing interactive technologies that are useful and engaging will require paying attention to the everyday realities of the people who will use them. Here, the ethnographic perspective is just as relevant.

THE ROOTS OF ETHNOGRAPHY

Ethnography has its historical roots in anthropology, but today is an approach found in most all of the traditional and applied social sciences, and in interdisciplinary fields such as HCI and Human Factors Engineering. In anthropology, ethnography developed as way to explore the everyday realities of people living in small scale, non-western societies and to make understandings of those realities explicit and available to others. The approach relied on the ability of all humans to figure out what is going on through participation in social life. Its techniques bear a close resemblance to the routine ways people make sense of the world in everyday life (e.g., by observing what others do, by participating in social life, and by talking with people). The research techniques and strategies of ethnography developed and evolved over the years to provide ways for the ethnographer to "be present" for the mundane, the exceptional, and the extraordinary events in people's lives.

Over the years within the field of anthropology, both the focus on non-western peoples and the implicit assumptions made about non-western societies (e.g., that they are bounded, closed, and unchanging) have changed. Today, the ethnographic approach is not limited to investigations of small-scale societies, but instead is applied to the study of specific settings within large industrialized societies, such as workplaces, senior centers, and schools; and specific activities such as leisure travel, financial investing, teaching, and energy consumption to name but a few. As a consequence, new techniques and perspectives have been developed and incorporated into anthropology and ethnographic inquiry more generally. However, a few basic principles discussed herein have continued to inform and guide ethnographic practice.

PRINCIPLES OF ETHNOGRAPHY

Natural Settings

Ethnography is anchored in the underlying assumption that to gain an understanding of a world you know little about, you must encounter it firsthand. As such, ethnographic studies always include gathering information in the settings in which the activities of interest normally occur. This does not mean that ethnographic studies never involve techniques that remove people from those everyday settings or that introduce artifacts or activities that would not be present otherwise. The insistence on studying activities in their everyday settings is motivated by the recognition that people have only limited ability to describe what they do and how they do it without immediate access to the social and material aspects of their lives. Furthermore, some aspects of people's experiences can only be understood through observation of activities as they occur (e.g., people's patterned movements through airports or convenience stores, moment-by-moment shifts in scheduling, etc.).

Holistic

Related to the emphasis on natural settings is the view that activities must be understood within the larger context in which they occur. Historically within anthropology, the notion of holism focused attention on the fact that societies were more than the sum of their parts (however, these parts were specified). The particular aspects of a society (e.g., the court system) could only be understood in relation to the other aspects of the society (e.g., kinship system and religious beliefs). Today, because ethnography is less frequently applied to the study of entire societies, the notion of holism has a somewhat different emphasis. Holism holds that studying an activity in isolation, without reference to the other activities with which it is connected in time and space, provides only a limited and potentially misleading understanding of that activity. So, for example, it would be of dubious value to investigate online search strategies without understanding how these strategies fit into the larger set of activities of which search is but one component (e.g., in the context of online trading, shopping, or report writing).

Descriptive

Ethnographic accounts have always provided a descriptive understanding of people's everyday activities. Ethnographers are concerned first and foremost with understanding events and activities as they occur and not with evaluating the efficacy of people's everyday practices. This is not to say that ethnographic accounts cannot or should not be used to suggest how things could be different or to point out inequities in current ways of doing things. However, there is a strong conviction that to suggest changes or to evaluate a situation, one first needs to understand it as it is. The work practice and technology group at the Xerox Palo Alto Research Center developed a slogan to express this conviction that innovation requires an understanding of the present (Fig. 50.1).

As such, ethnographic accounts strive first and foremost to provide a descriptive and not prescriptive understandings of people's everyday lives. In recent years, there have been many challenges to the idea that a purely descriptive understanding

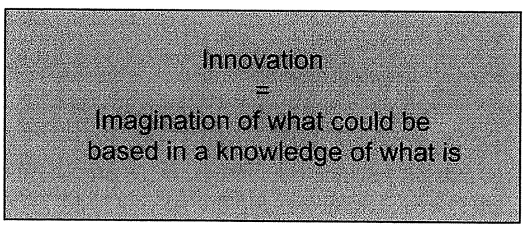


FIGURE 50.1. Innovation.

is possible. Critics point out that every account is shaped by the perspective of the researcher, the goals of the project, and the dynamics of the relationship between the investigator and those studied, to name but a few factors that shape ethnographic accounts. Although it is hard to argue with this position, in our view this recognition does not diminish the value for design of describing the everyday realities of people engaged in activities that we ourselves might never experience.

Members' Point of View

As already alluded to, ethnographers are interested in gaining an insider's view of a situation. They want to see the world from the perspective of the people studied and are concerned with describing behaviors in terms relevant and meaningful to the study participants. As such, ethnographers are interested in the ways people categorize their world and in the specific language they use to talk about things. This perspective sometimes is at odds with the requirements of quantitative survey research where the relevant categories must be known in advance of the study and where the categories and the language used cannot vary across participant groups. As a consequence, in quantitative social science research, the terms and categories used are likely to be those of the research community and not those of the study participants, which can undermine the validity of the results (see Ethnographic Methods section for further discussion of this topic).

THE POSTMODERN INFLECTION

The scientific paradigm within which ethnography evolved has come under serious questioning over the last decade or so as social studies of science have shown how scientific knowledge production is shaped by the larger social context in which scientific inquiries take place (Latour, 1987; Latour & Woolgar, 1986; Pickering, 1980). As part of this critical discourse, ethnographic accounts have been challenged for their veracity. Likewise, the authority of the ethnographic voice has been questioned (Clifford, 1988; Clifford & Marcus, 1986; Marcus & Fischer, 1986). These challenges have come from a number of fronts, most significantly from study participants who increasingly are able to read ethnographic accounts (Said, 1978) and from feminist theorists who saw in many ethnographic accounts a western, male bias (Harding, 1986; Smith, 1987; Wolf, 1992; Yanagisako & Delaney, 1995). These challenges have made researchers from all fields of inquiry more aware of how their research is shaped by the particular time and place in which it occurs. It is our view that knowledge of the world is always mediated by presuppositions, be they cultural, theoretical, or practical, and as such no ethnographic account is value free. But we also contend that this does not diminish the efficacy of an ethnographic approach as a resource for designing new technologies and practices and that maintaining the illusion of an absolute "truth" is not necessary.

ETHICAL ISSUES

As will be discussed in more detail later, ethnographic research requires developing the trust and participation of the people studied. Without this trust, participants will be reluctant to allow researchers into their homes, boardrooms, and classrooms; and they will not openly share their everyday experiences and concerns. Anthropologists have long realized that such a privileged, trusted position requires reciprocity—if you allow me access to your world, I will protect your interests. This bargain has not always been easy for ethnographers to keep. Over the years, there have been examples of ethnographic research, where wittingly or not, the situation of the people studied has been compromised.[1]

In the context in which ethnographic research is being used to inform the design of new technologies—technologies that will change people's lives—it is critical that the ethnographer reflect on the impact this research could have on study participants (Blomberg, Suchman, & Trigg, 1997). Of course, it is not possible to control all the ways findings from ethnographic research will be used, nor how technologies informed by these studies will be integrated into people's lives. But the ethnographer can work to protect study participants from immediate harm (e.g., that caused by divulging a worker's identity to management) and can inform study participants of possible longer term negative impacts (e.g., job losses brought about by introduction of new technologies). Because ethnographic research has moved into new contexts (e.g., HCI, organizational development), it has been necessary to think creatively about how our ethical guidelines map to these new conditions. However, we cannot lose sight of the importance of protecting the interests of those who have agreed to participate in our studies, be they workers in organizations, traders on wall street, or mothers of special needs children.

ETHNOGRAPHIC METHODS

The ethnographic method is not simply a toolbox of techniques, but a way of looking at a problem, a "theoretically informed practice" (Comaroff & Comaroff, 1992, quoted in Agar, 1996). The methods and techniques outlined have been developed over the years to enable the development of a *descriptive* and *holistic* view of activities as they occur in their *everyday setting* from the *point of view of study participants*. We are not attempting to be exhaustive in our presentation, nor do we want to suggest that there is a fixed set of canonical ethnographic methods and techniques. We encourage researchers

[1]To mitigate such negative impacts, the American Anthropological Association has developed a code of ethics that provides guidance for people engaged in ethnographic research. This code outlines the appropriate disclosures and protections that should be given to study participants (see Fluehr-Lobban, 1991, for a discussion of ethical issues in anthropological research).

to develop new techniques as the circumstances require (e.g., studying virtual communities, globally distributed work groups, technologically mediated interactions). What remains constant in the approach taken is a commitment to describe the everyday experiences of people as they occur.

Planning Research

One of the keys to a successful research project is a carefully thought out plan. Research planning can be divided into three general stages—formulating research objectives, devising a sampling strategy, and selecting appropriate methodologies. These activities are interrelated; so, if one of these has not been carefully considered, the entire research is affected.

Research objectives follow from the specific questions to be addressed by the research. It is often useful to develop a research statement, an affirmative sentence that clearly states what one wants to achieve from a given study. This statement acts as a beacon to help keep the research on track through the many twists and turns of a project. If the research is to be used to inform the development of a software application or a Web site that will help doctors manage patients' records, the research statement could be something as simple as, "... to understand how doctors manage patient records and the implications this activity has for design." If developing a system that can be customized and used by both doctors and patients is desired, then the statement will change, likely including something about how these groups differ in their practices and in their needs for such a system. Although a research statement might change over the course of a project, this change should also be reflected in changes to the research design (e.g., sampling strategy and selection of research methods and techniques).

Sampling

Once the research objectives have been identified, a sampling strategy should be devised that answers two primary questions: What types of participants best suit the research objectives? And, how many participants should be included in the study to achieve the research objectives? Bernard (1995) identifies seven types of sampling strategies that fall under two main categories: probability and nonprobability. Each sampling type has a specific purpose. Our focus in this chapter is on nonprobability sampling because that is the most commonly used in ethnographic research.[2] The nature of ethnographic work, as well as budget, time, and other recruiting constraints, invariably result in selecting participants based on criteria other than a strict probability. In most cases, nonprobability sampling is more than adequate to achieve the desired research objectives of ethnographic studies and HCI projects.[3]

Four types of sampling fall under the rubric of nonprobability: quota, purposive, convenience, and snowball (Bernard, 1995). When sampling by quota, the researcher specifies which groups are of interest (e.g., women, teenagers, truck drivers, people who use software X, etc.) and how many individuals will be needed in each group. The number of groups chosen will depend on the research objectives and the amount of time available, but the basic idea is to cover the range of possible variation one would expect across an entire target population. To ensure the desired variability is covered, it is useful to create a "screener,"[4] a questionnaire-like instrument designed to identify characteristics that are appropriate for a given project. Quota sampling is only possible when the desired participants are easy to identify in advance and recruit. There is no statistical basis for determining the number of participants[5] in each group for a quota sample, but a general rule of thumb is between six and ten. If a researcher is not able to specify how many participants will be in each sampled group, a purposive sampling strategy may be called for. This sampling strategy is based on the same principles as quota sampling, but the number of participants for each group is not specified.

Convenience and snowball sampling rely on a sample as you go strategy. This is required in situations where you do not know in advance who will be available to participate or which individuals or groups should participate. Convenience sampling entails selecting people who are available, meet the requirements of the research, and are willing to participate. One might use this strategy, for example, to observe and interview shoppers as they explore a grocery store.

Snowball sampling relies on participants referring others whom they think would be good candidates for the research or on researchers identifying individuals or groups to be in included in the study from the ongoing research. Because this method utilizes existing social networks, it is especially valuable when desired participants are initially inaccessible or reluctant to participate (e.g., CEOs, drug users, union leaders) or when the relevant population cannot be known in advance (e.g., Johnson, 1990, for a more detailed discussion of sampling in ethnography).

Gaining Access

Sometimes one of the most difficult tasks for the ethnographer is gaining access to field sites and participants. In more traditional ethnographic studies, the ethnographer's challenge was

[2]The intent behind probability sampling, or statistical sampling, is to generalize from the research sample to a larger population with a specified degree of accuracy, measured in terms of probability. All types of probability sampling require a randomly selected and relatively large sample size.
[3]Using nonprobability samples does not mean we cannot make general statements. If participants are chosen carefully, one can obtain reliable data with as few as four or five participants (Nielsen & Landauer, 1993; Romney et al., 1986). Additionally, a recent case study demonstrates that smaller, nonrandomly selected samples can produce the same results as large-scale survey research for as little as 1/100 of the cost (Green, 2001). A nonprobability strategy also does not preclude conducting a statistical analysis or measuring differences between individuals or groups using nonparametric statistics, such as Fisher's Exact Test or nonparametric correlation measures. Their limitation is that they cannot be used to make claims about larger user populations within a specified degree of probability.
[4]Screeners are an essential tool if using an external recruiting agency to locate study participants.
[5]For sampling purposes, participants need not be individuals, but could be families, households, work groups, or other naturally occurring entities.

to gain permission to conduct fieldwork in another country. Once allowed to enter the country, the strategy often was to make friends in the selected village or town and take part in community activities. With the shift in focus away from village or community studies, today it is often necessary to establish more contractual relationships with field sites and study participants. In some cases, recruiting agencies may be used to identify participants, and participants may be offered financial incentives to take part in the study. In addition, gaining access to institutional settings, be they corporations, schools, or government agencies, may require written permission that specifies certain terms and conditions before researchers are given access to the field site. It is important not to underestimate the time (and skill) required to establish these initial relationships and agreements.[6]

Observation

As discussed earlier, ethnographers are interested in understanding human behavior in the context in which it naturally occurs, making observation one of the hallmark methods of the approach. In academic settings, it has been typical for an anthropologist to spend a full year or more in a given field site. Although this continues to be the case for more traditional ethnographic studies, shifts in research focus (e.g., away from studies of entire societies) and in study locations (e.g., less likely in isolated, hard to get to settings) have resulted in more varied research designs that may involve shorter, intermittent fieldwork periods in distributed locations. In corporate and applied settings, the time available for in situ observation may be seriously constrained, sometimes no more than a few days in any one setting. Whereas the amount of time may be relatively brief, observing individuals for even a few days can lead to valuable insights that other methods cannot obtain.

Why Observe? One of the fundamental axioms in the social sciences, and anthropology in particular, is that what people say they do and what they actually do are not always the same. Studies have shown verbal reports to be inconsistent with behavior in a number of areas, including (among many other examples): shopping behavior (Rathje & Murphy, 1991), child rearing (Whiting & Whiting, 1970), recycling (Corral-Verduga, 1997), and health habits (Rich, Lamola, Amory, & Schneider, 2000).

The discrepancies between verbal reports and behavior can be caused by a variety of factors. People may be concerned with their image and so report, consciously or not, behavior that is more socially acceptable. Along these same lines, a participant may respond to a question in a particular way in an attempt to please the researcher. Another source of disparity between behavior and verbal reports is that people are often not aware of their actual behavior because it is so habitual. Such tacit knowledge is often not easily accessible through interview techniques (D'Andrade, 1995).

The limitation of human memory is another reason why interview data can differ from observations. When asking participants about past events, or recurring patterns of behavior, our memory may be selective and skew responses in any number of directions. In many cases, these tendencies occur in predictable patterns (Bernard, 1995).

The complexity of social life is another reason individual accounts of an event may miss certain relevant details. The environments in which humans interact are extremely dynamic and complex—composed of social relationships, artifacts, and physical spaces—which can make it difficult for individuals to fully envision, let alone articulate, after the fact, what is going on.

The Researcher's Observational Role. When it comes to observation, there are varying degrees to which the researcher can become integrated into the scene. At one end of the spectrum, the researcher may become an *observer-participant*. In this role, one attempts to be as unobtrusive as possible, quietly observing events from a discreet, yet strategic, position. At the other end of the spectrum is the *participant-observer*. In this situation, the researcher is actively involved in the events observed.

There are pros and cons associated with each type of role. Although being fully integrated into the action provides the researcher with a first-hand experience of an event and otherwise inaccessible insights, taking good notes in this context is difficult at best. A great deal of energy is spent trying to assimilate rather than on attempting to make sense of the events in the context of the research objectives. One often has to rely on memory, therefore, writing up field notes after the fact. Taking a more observational role affords a wider perspective on events and the time to record and analyze events as they unfold. On the downside, it precludes the opportunity to experience the activity first hand. In many research situations, the ethnography's position moves between these two extremes, sometimes occupying a hybrid position of both partial participant and outside observer.

Structuring Field Observations. Before setting out to observe, decisions need to be made about what, where, and when to observe (Whiting & Whiting, 1970). One might decide to observe individuals as they go about their work and daily routines (person focused), a technique sometimes referred to as "shadowing" (Wasson, 2000). A variation of person-focused observation is the "beeper study," in which participants carry a pager with them during the research period. When the researcher sends a page, the participants record where they are, what they are doing, and the context in which they are doing it. The researcher might also decide to focus on a specific event, such as a meeting or software education class (event focused), or observe the activities that occur over time in a given area, like an office (place focused). One can even shift the subject of observation to an artifact, such as a document, and record its movement from person to person (object focused).

[6]Anthropologists have been accused in the past of only studying the disempowered and disenfranchised because these individuals were less likely to feel powerful enough to refuse participation in ethnographic studies. When studying people with more power and ability to say no (Nadar, 1974), it is often necessary to demonstrate how their participation will be of benefit to them, their community or workplace, or the wider society.

Videotaping. Given the complexity of human behavior, it is impossible to notice and record in real time everything of interest to the researcher. This is one of the reasons video cameras are becoming increasingly popular in fieldwork. Video records can be used as a reference to supplement field notes. The ethnographer also has the advantage of being able to watch an event multiple times, so can change levels of analysis or observational focus with subsequent viewings (e.g., interaction between people vs. the movement of one individual in and out of a scene).

Videotaping also allows people not primarily involved in the fieldwork to participate in the analysis and opens up the range of perspectives that can be bought to bear on the analysis (e.g., Blomberg & Trigg, 2000) used video collection tapes in interactions with product developers; also see Brun-Cotton & Wall, 1995; Karasti, 2001; Suchman & Trigg, 1991).

An additional bonus of using video cameras is that they can record events in the absence of the researcher. Not only does this free the researcher to be involved in other activities, but the camera also can be a silent presence[7] in situations where an outsider (even a well-trained participant observer) would be seen as intrusive (e.g., child birth, counselor–student interactions, board room deliberations, etc.). This, however, does not preclude the need to later review the videotapes and incorporate relevant information into the analysis, a time-consuming activity.[8]

In summary, how and what one observes and analyzes depends on the research objectives. In many cases, a combination of techniques is preferable, allowing the ethnographer to view things from a variety of perspectives.[9]

Interviewing

Interviewing is one of the ethnographer's most valuable tools (Gubrium & Holstein, 2002). Interviews can inform research design and observations. They are essential in understanding member's perspective. Interviews are often grouped into three categories: unstructured, semistructured, and structured. In reality, it is more like a continuum, with at one extreme the casual conversation and at the other a formal questionnaire.

In the early stages of fieldwork, interviews are most often open-ended and unstructured. In these early stages, the ethnographer is just beginning to get a perspective on the activities and people studied. An unstructured format gives the researcher the freedom to alter the line of questioning as the interview unfolds. The researcher essentially is learning what questions are important to ask. Unstructured, however, does not mean haphazard or lacking purpose. The researcher will know the topics to be explored when entering the field, and will usually have a loose interview protocol to serve as a guide for the interview. Although the protocol provides a basic framework for an unstructured interview, the participant plays a major role in the direction the interview takes. As Bernard (1995) puts it, the idea is to "get an informant on to a topic of interest and get out of the way." When the interview moves to a topic of particular interest, the researcher can then probe deeper to elicit more details.[10] Indeed, interviewing is an art, and one of the key skills an ethnographer learns is the art of "interrupting gracefully" (Whyte, 1960).

In an open-ended interview, it is important to avoid what Rhoades (1982) calls the "Joe Friday Syndrome," using an interrogation style of questioning to uncover the "facts." The purpose of keeping the interview open is to allow for a wide range of responses. Using too structured a format at an early stage constrains the range of possible answers and increases the chances of missing critical pieces of information.

As a project progresses and patterns begin to emerge, interviews can become more structured and the line of questioning less broad. The researcher begins to narrow in on topics that are particularly informative and relevant to the research objectives. Questions on the protocol become more focused and specific as answers to previous questions guide the follow-up questioning. A general guideline for determining when enough interviewing has been conducted is the point when responses to questions cease to be novel or surprise the researcher (Blomberg et al., 1991).

Once the range of responses is known and the data begin to show clear patterns and themes, the researcher may want to structure interviews further. A host of structured techniques exist. Some are designed to identify the ways people organize information within a specified domain, such as free listing, card sorts, triad's tests, and paired comparisons (Romney, Batchelder, & Weller, 1986). Other techniques, such as questionnaires and surveys,[11] are used to assess variation between two or more groups or to establish how representative the findings are in a larger population. The main idea behind these techniques is to keep the form and content of the questions consistent for each respondent, thus allowing for differences among the sample population to be ascertained. One advantage of conducting structured interviews after an ethnographic study is completed is that the question structure and language can reflect the way participants talk about and organize experiences, thus increasing the validity of the survey findings.

The Interview As a Communicative Event. The interview has become somewhat ubiquitous in western societies and is viewed as a reliable means of acquiring information of all kinds (e.g., attitudes toward tax increases, the value placed on education, preferences for certain products, basic demographic

[7]Videotaping is only ethical with the expressed permission of the participants in the interaction.

[8]A variety of software applications now exists that can help the researcher manage and analyze recorded on video. Caveat, for example, allows the researcher to select and annotate images/events of particular interest. A more sophisticated (although less user-friendly) program is the Observational Coding System that provides for a more quantitative analysis.

[9]For a review of time allocation techniques in ethnographic work, the reader is referred to Gross (1984).

[10]For a brief overview of probing techniques, see Bernard (1995).

[11]A good introductory book on surveys is *How to Conduct Your Own Survey* (Salant & Dillman, 1994). For readers interested in a more advanced treatment of the subject, they are referred to Babbie (1990).

data, etc.). However, as Briggs (1983) points out, what is said in an interview should not be thought of as "... a reflection of what is 'out there,'" but instead must be viewed "... as an interpretation which is jointly produced by the interviewer and respondent." This view compels us to regard the interview as a communicative event in which the structure and context of the interaction condition what the researcher learns. This is no less the case in highly structured interviews (see Jordan & Suchman, 1990, for a critical analysis of the ecological validity of survey research). Briggs recommends that we adopt a wider range of communicative styles in our interactions with study participants, particularly styles that are indigenous to the study population.

Rules of Thumb When Interviewing. Although there are no hard and fast rules for interviewing, a few general guidelines will help facilitate the interview process and increase the chances of obtaining useful information. Some points to remember:

- Interview people in everyday, familiar settings. Not only does this make the participants more comfortable, it also allows them to reference artifacts in the environment that play an integral part in their activities. Moreover, a familiar environment is full of perceptual cues that can help jog the not-so-perfect human memory.
- Establish and maintain good rapport with participants, even if it slows the interview process.
- Do not underestimate the value of casual conversation. Some of the most insightful information comes from informal conversations when social barriers are lowered.
- Assume the respondent is the expert and the researcher the apprentice. This not only shows the participant respect, but also gives them confidence and facilitates conversation. Even if the interviewer happens to be more knowledgeable on the subject, the goal of an ethnographic interview is to get the *participant's* perspective.
- Do not interrupt unnecessarily, complete a participant's sentences, or answer your own questions. Again, the idea is to get the respondent's point of view, not the researcher's.
- When conducting an open-ended interview, avoid asking yes/no questions. Responses to these questions provide less information than questions beginning with what or how.
- Be flexible enough to adapt the line of questioning when necessary. Human behavior is complex and full of surprises.

Connections Between Observation and Interviews. As noted previously, one of the defining qualities of ethnography is its emphasis on holism. To obtain this holistic view, triangulating different data types is useful (Agar, 1996). Observation alone is seldom enough to adequately address research objectives. As such, observation is invariably coupled with interviews. Interviews can extend and deepen one's understand of what has already been observed. Conversely, interviews can be conducted before observing, giving the researcher a better idea about what is most appropriate to observe. As any experienced ethnographer will attest, much of a researcher's time is consumed with aligning and connecting data from multiple sources.

Interviews can also be conducted in the context of ongoing activities. Instead of setting aside a specific time and place for an interview, the researcher creates an opportunity to ask questions as participants go about their daily activities. It is usually best to get the agreement of the participants ahead of time for this type of interviewing. The strategy can be extremely useful in getting answers to questions that are prompted by observation of ongoing activities.

Self-reporting Techniques

In cases where the event or activity of interest occurs over a long period of time, or requires a significant amount of introspection on the part of the participant, self-reporting techniques can be valuable. This methodology is especially good at revealing patterns in behavior or obtaining data that is otherwise inaccessible (Whyte, 1960, 1984). Although a number of techniques exist, self-reports generally fall under two categories: diaries and visual stories.

Diaries. As implied in the name, diaries consist of a participant's written record, which could include personal thoughts or specific behaviors or accounts of events in which an individual participates. Guest (2000a), for example, asked fishermen to keep daily diaries on their fishing activities and corresponding motivations over a year to establish patterns in behavior that would normally not be observable by a lone researcher. In another recent study, researchers analyzed 180 diaries, written over 80 years ago by young nuns, for the expression of positive and negative content. Interestingly, they found a positive relationship between the proportion of positive statements and life expectancy (Snowdon, 1996).

How diaries are analyzed depends on the research objectives and resource constraints. If researchers and participants have time, it may be useful to have follow-up discussions with participants to clarify points or gain a deeper understanding of the meaning behind the words. The texts can also be coded for themes, key words or phrases, and patterns examined across individuals or between groups.[12]

Visual Stories. Visual stories are essentially pictorial diaries that use a camera in addition to text. They can be particularly valuable when working with nonliterate participants, such as children, or in situations where words alone are inadequate to capture the essence of the subject (Johnson, Ironsmith, Whitcher, Poteat, & Snow, 1997). Much like their textual counterpart, visual diaries can be used in any of a number of ways. In some cases, the researcher may want to structure the visual story to some degree. Wasson (2000), for example, describes giving participants a written guide directing them to take

[12]With varying degrees of success, text analysis software has been used to help with large data sets. Some noteworthy programs include: Ethnograph, NUD*IST, E-Z-Text, and NVivo.

photographs of their interaction with a product under study. They were then asked to organize the developed photos into a story that made sense to them, and researchers conducted follow-up interviews over the telephone.

A more open-ended framework can also be informative. Interested in cultural differences between Italian and American fishermen, Johnson and Griffith (1998) instructed participants from both groups to take photographs of whatever they wanted. After developing the film, Johnson coded the pictures based on their content and found significant thematic differences between the groups, which he interpreted as indicating different cultural values.

A more recent derivation of the visual story uses a video camera. The basic technique is the same, but with the added benefit of having the participant's running narrative alongside the visual content. Being able to experience the two sources of information simultaneously provides the researcher with a rich record of an activity. Blomberg, Suchman, and Trigg (1996) set up a stationary video camera in the law office of a study participant and asked him to turn on the camera whenever he had occasion to retrieve documents from his file cabinet. The running narration recorded on videotape provided insights into the everyday use of the file cabinet that helped inform the design of an electronic file cabinet.

Remote Date Collection Techniques and Strategies

Continuing technological developments—in video, audio, wireless, network applications, tracking capabilities, and pervasive computing—have created new (and largely untapped) opportunities to observe and collect rich and dynamic data across geographies in real time, as well as "asynchronously." These technologies increasingly enable ethnographers to remotely collect data in a wide variety of contexts. They also provide a dynamic window into peoples' behaviors and experiences in the digital domain—observing people interact with computer applications, as well as in the context of Internet/network-based social worlds and communities.

Remote Video and Audio Via the Internet. The increasing pervasiveness of the "web cam" is perhaps the simplest illustration of how technology has expanded the observational capabilities of ethnographers. In contrast to standard offline videotape recording, an Internet-enabled digital video camera can stream video in real time. Moreover, simple remote control software is already in use, enabling a viewer (e.g., an ethnographer) to pan, zoom, and focus the camera (within limits of course) from a remote location. This digital video data can be viewed by multiple people in multiple geographies either in real time or by accessing video archives. This capability may prove particularly useful for geographically distributed research and design teams. Although storage of the digital data provides a challenge, as does bandwidth limitations, continuing developments in broadband, video/audio compression, and streaming and digital storage promise to decrease these challenges.

Observations and Interactions in the Digital Domain. Ethnographers working to support the development or redesign of interactive computer applications obviously need to attend to the ways in which people interact with and through computer technologies. This includes understanding how people traverse the digital domain—their paths, patterns of interaction, and individual experiences in relation to the Internet and other interactive computer applications.

Data derived from increasingly sophisticated tracking technologies—that monitor, gather, collect, and integrate information on peoples' computer-based activities—may prove to be a useful source of information for ethnographers. In this context, some usability professionals recently have begun to assess web site usability by analyzing server log files (Kantner, 2001). This essentially involves looking for patterns in log files—which can be viewed as indicators of online behavior—as clues to problematic interactions with and aspects of web-based interfaces. Although, the quantitative data supplied by log files and similar indicators of online behavior obviously does not enable one to understand the situated nature of the activities, it may highlight interesting patterns that can be subject to further qualitative exploration.

Monitoring and networking technologies that enable one to remotely view what another person sees on their computer screen have existed for several years (Perkins, 2001). New tools are providing an opportunity to interact in real time (e.g., via a "chat" interface or voice), at the same time as online behaviors are captured. These capabilities are being used by businesses providing live online customer service, as well as by usability professionals conducting remote online testing of web applications.[13] Although the current focus of these emerging tools is primarily on assessing the usability of applications, as they increase their flexibility they may become a useful tool for ethnographers working on the design of interactive computer systems.

Artifact Analysis

Ethnographers have long had an interest in the material world of the people they study. The artifacts people make and use can tell us a great deal about how people live their lives.[14] Artifact analysis can be an important part of contemporary ethnographic studies (e.g., Rathje & Murphy, 1991). For example, conducting an artifact analysis of the stuff on people's desks can say a great deal about their work. Or studying the contents of an automobile's glove box can tell a great deal about how the car is used

[13]One cannot underestimate the potential for these new tools to create social and political dilemmas concerning personal privacy and the further penetration of corporations into all aspects of people's lives. This will in turn raise important ethical issues for the ethnographer as participant and consumer of this new information.

[14]Archaeologists rely almost exclusively on the artifacts that remain in archaeological sites for their interpretations of the behavior and social organization of past human societies.

(e.g., about the role the car plays in connecting people's work and home lives). Depending on the kinds of research questions asked, it may be useful to include the collection and analysis of specific artifacts.

Record Keeping

In all ethnographic research, it is essential to keep good records. Although the strength of the ethnographic voice derives in part from the fact that the ethnographer is present and witness to events of interest; the ethnographer should not rely exclusively on experiential memory of these events. It is important that field notes be taken either during or soon after observing or interviewing. The specific nature of the notes will depend on the research questions addressed, the research methods used, and the whether audio or video records supplement note taking. Field notes should at least include the date and time when the event or interview took place, the location, and who was present. Beyond that, notes can vary widely, but it is often useful to indicate the difference between descriptions of what is observed, verbatim records of what is said, and personal interpretations or reflections. When working with a team of researchers, field notes need to be understandable to other team members. This is often a good standard for the specificity required of field notes even when working alone. If such a standard is maintained, it will be more likely that the notes will be useful to the researcher months and even years later, in the event re-analysis or a comparative study is undertaken.

Relation Between Qualitative and Quantitative Data

In a previous section, we touched on the complementary nature of observational and interview techniques and the benefit of combining these two approaches. Triangulation of data can serve to connect quantitative and qualitative data as well. It is sometimes the case that prior to the start of a project the only data available is quantitative in nature, usually from one or more surveys. Surveys can tell us something about how representative certain characteristics—typically demographic variables—are of a group of people relative to a larger population. Qualitative data derived from ethnographic research can complement quantitative research in a number of ways. By providing a meaningful context, ethnographic research can inform the content and language of more structured questions, thus making them more meaningful and relevant to the participants. Without any qualitative research to provide context, the validity of a survey can be seriously flawed. We may find out after the fact that we have sent out hundreds of surveys asking the wrong questions or using terminology respondents do not understand.

Qualitative techniques also allow researchers to dig deeper after a survey has been tabulated, and aid in interpreting and explaining trends that the quantitative data might reveal (Guest, 2000b). Numbers show patterns from an aggregate, but invariably they can not explain why such patterns exist. Ethnographic methods can thus illuminate processes and identify the meaning behind the numbers.

COMMUNICATING AND APPLYING THE RESULTS OF ETHNOGRAPHIC RESEARCH AND ANALYSIS

The challenge for ethnographic researchers aiming to inform and inspire the creation of compelling and useful technology solutions is to make the learning derived from ethnographic research and analysis relevant and actionable for development teams. To "connect the dots" between ethnography and technology design, ethnographers must find ways to effectively represent and communicate the insights gained from their research to a broader design team.

This section briefly outlines some of the general ways in which ethnographic research can facilitate the design of useful and compelling technology solutions. In addition, a number of specific ways to represent, communicate, and apply the learning derived from ethnographic research are outlined and illustrated. These modes of representation, communication, and application should not be viewed as prescriptive and/or exhaustive. Instead, they are intended to provide examples that will stimulate thinking about how to apply the results of ethnographic research in the context of a particular design/development processes.

Broadly speaking, ethnographic research and analysis in the context of human computer interface design can:

- Enhance the working models of developers about the people who will interact with technology solutions and the domains and contexts in which they will do so.
- Provide generative tools that support innovation and creativity.
- Provide a critical lens for evaluating and prioritizing design ideas.
- Serve as a guidepost or point of reference for development teams.

These broad purposes are reviewed briefly.

Enriching and Enhancing the Working Models of Developers

To design a technology solution, developers must have at least an implicit working understanding of the people who will interact with the solution. Such working models may include assumptions about a range of essential characteristics of the people who will engage with the solution and the contexts in which they will do so (Newman, 1998). Indeed, some would argue that successful design requires a high degree of empathy with the target population (e.g., Leonard & Rayport, 1997). Implicit and/or explicit models or assumptions about users may be formed through some combination of direct experience (e.g., interacting with and/or observing people in the target population in controlled or noncontrolled settings) and secondary learning (talking with others about the target group, viewing videotapes of target activities, reading, analogy to other directly experienced groups, etc.). However formed, the working models of

developers may be of varying levels of complexity, robustness, coherence, consistency, and viability. The broad, deep, and contextualized understanding that can be derived from ethnographic research can serve to build, enrich and enhance the development team's explicit and implicit working models of end users.

Generative Tools or Frameworks to Support Innovation and Creativity

The design of technology solutions for human beings obviously poses a range of potential creative challenges at varying levels of complexity. What should we build? What kinds of experiences should the technology solution support or enable? What features and functions would be useful, compelling, and satisfying for a particular group of people in a particular domain/context? How can we use existing or emerging technological capabilities to enhance a particular group's experiences in a selected domain or solve a particular human problem? Even if there are clear parameters defining the functionality that will be built (e.g., a set of requirements), a development team must still generate a compelling, easy-to-use, and satisfying way of delivering that functionality that makes sense and is maximally valuable to the target users. The learning derived from ethnographic research and analysis can serve as a generative foundation or tool that can inspire innovative ideas for enhancing the experiences of end users through the use of technology. By providing a deep understanding of a human domain (patterns of relationship, systems of meaning, organizational structure, guiding principles or rules, etc.), ethnography can promote an essential condition for creativity that matters (Robinson & Hackett, 1997)—relevant and actionable innovations that solve problems and create new and realizable opportunities.

Critical Lens for Evaluating and Prioritizing Ideas

Design teams not only face the challenge of generating innovative ideas and concepts, but also the equally important task of evaluating and prioritizing ideas and options that arise from various sources (e.g., business stakeholders, end users, development teams). The learning derived from ethnographic research and analysis can provide a critical experiential lens through which development teams can begin to evaluate and prioritize ideas based on how they may fit into (or not) or enhance the lives of selected groups of people. The need for evaluation and prioritization may occur at various points throughout the development process, ranging from decisions about features and functions, broad directions for design concepts, varying content organizational models, and so forth.

Guideposts for Development Teams

The learning derived from ethnographic analysis, particularly when represented and communicated in compelling visual or narrative forms, can serve as an experiential guidepost or frame of reference for individual designers and design teams throughout the development process. Even though such guidelines may not prescribe or specify what should be done, they can aid developers by focusing attention on essential aspects of an experience, highlighting variations in the experiences of different types of end users, and limiting exploration of experiential "dead-ends." In other words, they can provide a general structure and direction within which a team can focus its creative energies.

MAKING ETHNOGRAPHY MATTER: COMMUNICATING AND APPLYING ETHNOGRAPHIC INSIGHTS TO DESIGN

This section outlines some of the ways in which the insights derived from ethnographic work can be represented and communicated to effectively inspire and guide the design of valuable and compelling human–computer interactive systems. These ways of representing and communicating what is learned are intended as examples of ways in which ethnographers and development teams can make ethnographic work relevant for design.

Experience Models

To help generate potentially valuable ideas, critically evaluate and prioritize design concepts, and guide the actions of development teams, it is important to identify and articulate patterns, principles, and relational frameworks for understanding experience. Simple re-presentations of observational data or lists of disconnected findings are not particularly useful as an aid to design. In other words, it is important to ascertain and visualize patterns and principles that underlie how people create meaning, interact, and organize their experiences in a selected domain. Experience models or frameworks identify, highlight, and visualize relevant patterns of human behavior and experience to guide design.[15] They can address and map dimensions of individual experience (how individuals make decisions, organize information, modify behavior over time, etc.), as well as the dynamics of group behavior (patterns of communication and collaboration, social contexts, and structures). They can be of varying levels of complexity, generality, scope, and specificity.

The collaborative construction of experience models can enable teams to move beyond simplistic and untested assumptions

[15]Experience models or frameworks were first used at E-Lab as a tool to connect insights from ethnographic research with design innovations. The frameworks or models, which consist of visual representations depicting key analytic relationships, were used by design teams as they explored and validated design ideas and directions. Frameworks and models have more recently been used to help inform business and brand strategy as well as technology and artifact design.

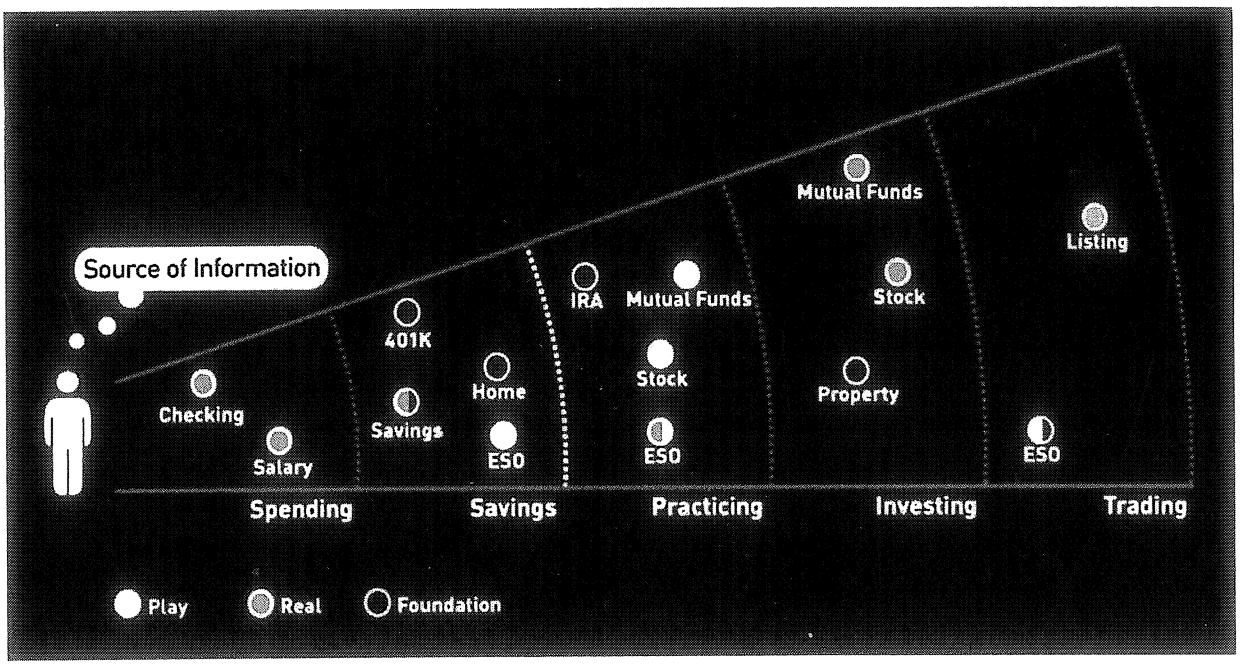


FIGURE 50.2. Experience model of financial development zones. ESO = employee stock options.

regarding domains of experience and end-user characteristics toward the development of a shared, principled understanding of how relevant experiences are structured and work. Once constructed, experience models become dynamic tools or frameworks for focusing a development team's attention on important aspects of experience, generating innovative design concepts, and prioritizing and evaluating concepts/designs, as well as a shared frame of reference throughout the development process.

The model presented in Fig. 50.2, is one of several developed in the context of ethnographic research and analysis for a financial services company serving individual investors. This company aimed to develop web applications that would facilitate customers' active engagement in the investment process with particular financial instruments. The model was intended to articulate and visualize a financial development process, as well as the varied meanings of money. This particular model highlighted the role of practice in developing the confidence and knowledge to become engaged in the investment process, and the iterative/recurrent nature of the process, as people learned to deal with new financial instruments and domains (e.g., securities, bonds, options, etc.). Moreover, it illustrated the distinctions that people make between real, play, and foundational money, and the relationship between these categories, investment behavior, and financial development. To oversimplify a bit, people are more fully engaged and active in the investment process when they view the assets/investments as real (e.g., money that is used to address their current and emerging needs, pay bills, etc.) rather than as play (e.g., stock options that are perceived as intangible and somewhat imaginary) or foundational (e.g., savings for the future that are left untouched). As people have an opportunity to practice and develop their knowledge, they may move from construing a particular financial instrument or activity as play to real. These notions suggested that web applications in this domain should not be focused on simply providing a wealth of financial information or a plethora of tools. Instead, these patterns helped to foster the generation of numerous ideas of ways to engage people in playful learning in the financial domain, with the aim of facilitating the financial development process.

In addition to being generative tools, experience models can provide frameworks that help teams prioritize and evaluate concepts and goals. For example, a health services company aimed to develop an electronic medical record system (combining client server applications with web based portals). This system would, among other things, increase the efficiency and effectiveness of their medical practice, enable patients to view their health records online, and ultimately empower patients and foster a proactive approach to wellness and health care (both by clinicians and patients). At the outset of the engagement, the health services company had generated a rather long requirements list (several hundred features and functions), and a particular view of the structure and function of the web components of the system. It was clear that the budget for this initiative was not sufficient to build a system that met all of the initial requirements. Perhaps more importantly, it was unclear which components would ultimately add the most value for the various stakeholders (clinicians, patients, the business owners, etc.), and there was no principled way of prioritizing and evaluating potential features, functions, and design concepts. Field research examined the experiences of and relationships between clinicians and patients in context (in clinic settings

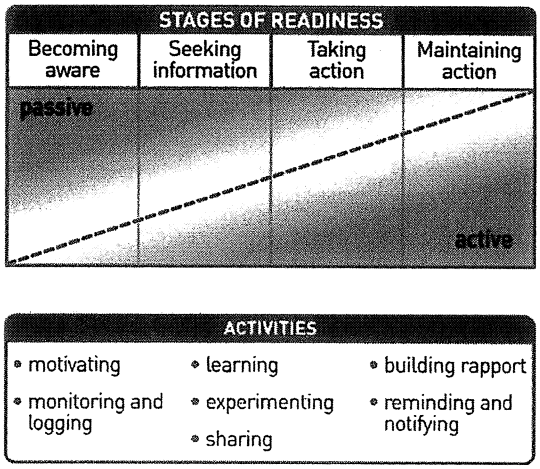


FIGURE 50.3. Experience model of stages of readiness.

and in homes) through a variety of methods (see Case Study 1). Collaborative analysis led to the development of a number of experience models of varying levels of complexity regarding the health management process. For example, one of the simpler models (Fig. 50.3) described how individuals, in the process of adopting an active/proactive stance in relation to health issues, move through varying stages of readiness.

A more comprehensive, integrative model highlighted the ways in which various factors interact in influencing a person to take action in addressing a health issue and mapped the role of various health care-related activities (e.g., monitoring, motivating, learning, sharing, building rapport) in various stages of readiness. The combination of these models enabled the team to identify or map the most important opportunities (Fig. 50.4) for facilitating progression toward a proactive orientation to health, and provided guidance in identifying ways to provide messages and experiences tailored to a person's stage and readiness.

Opportunity Maps

An opportunity map that derives from the creative application of experience models, can serve both generative and evaluative purposes. In the previous example, it provided a principled lens for critically evaluating and prioritizing the initial list of requirements: Which features and functions would have the best chance to really facilitate health-related action and would be most relevant and helpful to patients? In addition, the opportunity map encouraged the team to view the web application from a very different vantage point from the one initially conceptualized as a portal enabling access to an electronic medical record and a library of medical information. Instead, the design

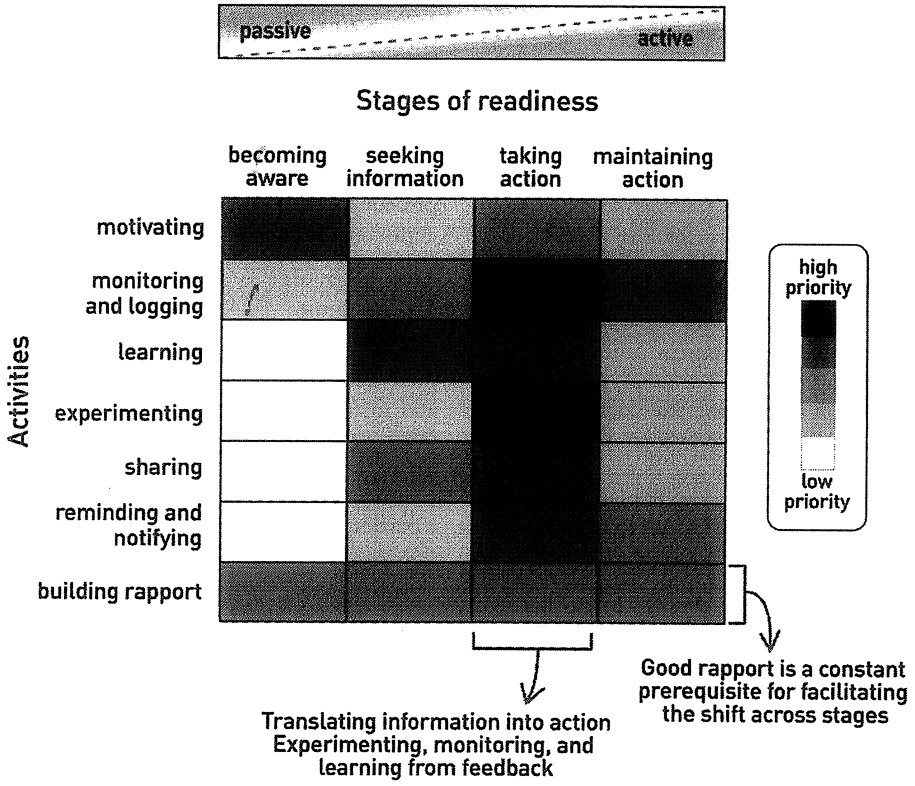


FIGURE 50.4. Opportunity map for stages of readiness.

moved toward a framework for effective and flexible collaboration between clinicians and patients through varying stages of the health management processes.

Profiles

One of the primary challenges in developing interactive systems is to design them so that they meet the needs of varying users, who may play different roles, engage in varied tasks, have different motivations and strategies, and so forth. Profiles identified through ethnographic studies are a simple but valuable tool for representing and communicating some of the experiential variations and similarities within a target population. Profiles may be descriptive of the experiences and characteristics of individuals or composite representations of prototypic users. They highlight a selected range of experiential dimensions and variations of people in the target audience (characteristic strategies, modes of interaction, tools, key relationships, expectations, etc.) to help development teams understand and anticipate how certain types of people may experience and interact with technology solutions. For example, Fig. 50.5a and Fig. 50.5b show composite profiles based on fieldwork conducted for a project concerned with how young people relate to wireless communication devices and applications.

The value of profiles also is enhanced by making them visible and dynamically present for development teams (e.g., profile posters displayed in project rooms, multimedia representations that are reviewed with development teams, role-playing scenarios, and walk-throughs based on profiles, etc.). Rich and dynamic representations of essential characteristics and experiences of individuals can serve as a common frame of reference and reminder to development teams regarding the people for whom they are designing the system. Such profiles may take many forms, including narrative descriptions, matrices/tables, integrated still images, and video snippets.

Although not a substitute for actual feedback from and testing with end users, profiles can function as partial stand-ins or virtual advocates for certain user groups (Beyer & Holtzblatt, 1997). By doing so, they may provide a partial lens and communication vehicle for evaluating design concepts, stimulating and framing questions about how various users might construe or engage with a particular design and enabling teams to frame design decisions.

Scenarios

Scenarios are another way ethnographic research findings can be portrayed. The notion of scenario-based design has become increasingly popular (Carroll, 2000; Rosson & Carroll, chapter 53 in this volume; Nardi, 1992; Sonderegger, Manning, Charron, & Roshan, 2000). Scenarios illustrate how a person's experiences and actions unfold in specific contexts or situations (Fig. 50.6). They may highlight interactions (with computer systems, people, business entities, etc.), decisions processes, activity sequences, influencing factors, and so forth. They may also illustrate the different ways in which varied groups or types of people experience and navigate through similar situations. Analysis of scenarios can foster the identification of areas of difficulty (pain points) and experiential gaps (or opportunities) that may be addressed or enhanced through technology solutions. When integrated with profiles, they can illustrate how different target audiences navigate through the same situation, which in turn can suggest ways in which solutions can and should be adapted for varying target audiences. Scenarios can serve as a dynamic reminder of the broad range of contexts and situations in which people may engage and interact with technology solutions, fostering thoughtful discussions about how to design solutions that fit into and complement or enhance peoples lives (Fig. 50.6).

Scenarios based in ethnographic research have an advantage (over those created from the designers imaginations alone), in that levels of detail can be added based on the initial research or follow-up visits to the field site can provide missing elements of the scenario. This is important in that it is not always possible to know in advance just what aspects of the activity should be included in the scenario to provide generative or evaluative value for design.

Design Representations: Mock-ups and Prototypes

Representational artifacts, be they paper prototypes, mock-ups, or working prototypes, can play an important mediating role in connecting use requirements and design possibilities. When informed by studies of practice, these design representations respecify practices and activities in ways that are recognizable to practitioners. The prototypes go beyond simple demonstrations of functionality to incorporate materials from the participants' site, embody envisioned new technological possibilities, convey design ideas in relation to existing practices, and reveal requirements for new practices. Prototyping practices as such recover and invent use requirements and technological possibilities that make sense each in relation to the other (Suchman et al., 1999b). In addition, these representational artifacts facilitate the communication of what has been learned about technologies in use to the larger research and technology development communities.

In an ethnographic study of engineering practice at a state Department of Highways, design prototypes critically deepened the researchers' understanding of the requirements of the work of document filing and retrieval (the focus of the study). At each step, from early design discussions with practitioners, to the creation of paper mock-ups of possible interfaces to the online project files, and finally to installing a running system at the work site, the researchers became more aware of the work's exigencies. For example, in recognition of some of the difficulties that engineers experienced with their filing system, various alternative document coding strategies that augmented the existing filing system were designed. Through successive rounds, in which engineers were asked to code documents using mocked-up coding forms (both paper-based and online), the researchers' understanding of the requirements of the work deepened. Eventually, the search and browsing interfaces evolved to be more finely tuned to the requirements of the engineers' work (e.g., Trigg, Blomberg, & Suchman, 1999).

Blake

Background

Blake is a junior at Princeton University. He is majoring in economics, and is heavily involved in his capella singing group. This summer he will travel with the group to perform in Europe. Although American, Blake grew up in Japan, and moved back to the US for college. Blake's father is in international banking, and his older brother works in a management consulting company. Blake is currently interning at an investment bank, and has his sights set on entering the corporate life after he graduates.

Quick mobile stats

Cellular phone user since high school
Nokia 5190
Device and plan paid for by family
Family AT&T plan

Handspring Visor Edge
Present from family
Paid for by family

Walkman
Old Sony model
Paid for by himself

Technology

Blake uses his cell phone to:

- receive calls from his family (mosty his mother)
- make arrangements to meet friends
- locate friends when they are in the city
- occasionally play "snake" when he needs to pass time

Bake uses his Handspring Visor to:

- record all the information (mainly telephone and address) of his friends and work contacts
- keep track of his list of "to-do's"

Blake uses his computer to:

- write papers and do research
- email

Key Insights

- **Blake "sells" the idea of a cell phone to his mom**

When they lived in Japan, Blake's mother was always concerned about safety. Blake was very much aware of this, and convinced his mother to buy him a cellular phone by "selling" her on the idea that it was a safety device and that would enable her to reach him at any time. In his opinion, framing the phone in this way was a "good move on (his) part."

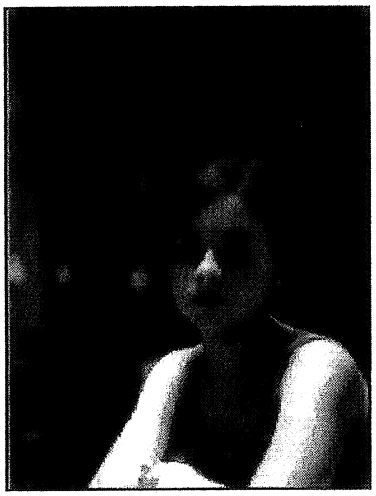
- **Blake was the last in his family to acquire a PDA**

Blake's older brother was the first in the family to purchase a Handspring PDA, and soon after, both parents also acquired similar PDAs. Blake was already familiar with the functionality of the PDA before his parents gave him one last year. Because he was the last in the family to get a PDA, he currently has the most advanced model, which is very thin, and has a slick brushed chrome exterior. He likes using his PDA, and feels that carrying it gives him a sense of security.

- **Blake needs a new computer**

Although Blake has the latest model Handspring Visor, not all of his devices are as up to date. At college, he uses a 90 mHz computer that does not have a USB port. Blake's computer frustrates him because it is slow, and also because he cannot download the programs that enable all the functions on his PDA. Blake would like to get a new computer, because he sees it as a "center" for his collection of devices.

FIGURE 50.5a. Composite profile of Blake in relation to wireless communications.



Bridget

Background

Bridget is a 16-year-old junior at a Catholic school on Long Island. She has a very busy schedule. In addition to the demands of high school, she is intensively involved in Irish dancing, including dance classes, competitions, and considerable commuting time. Bridget has an outgoing disposition, and dedicates hours each day to keeping in touch with three groups of people: friends from her old school, friends from her new school, and friends from dancing. Bridget's father is in finance, her mother works part time, and her 10-year-old brother is in 4th grade.

Quick mobile stats

- Borrows her mother's cellular phone
- Will receive a phone once she starts driving

Technology

Bridget uses her computer for several hours each day to:

- Instant Message with her friends
- Email
- Surf the Internet
- Look for music

Bridget uses the home phone to:

- Chat with friends

Bridget uses her mother's cellular phone to:

- Check in with her mom

Key Insights

- **Bridget learns to Instant Message**

When Bridget began using AOL Instant Messenger several years ago, she quickly learned that the medium invites and even requires its own form of writing. This is not her English teacher's prose. It is an amalgam of slang, abbreviations and symbols, all delivered rapid-fire to support the conversational feel of Instant Messaging (IM). Bridget is very much aware that not everyone uses IM like she does with her friends. She says, "grown-ups like to type all proper with capitals," and complains about an uncle who types long paragraphs before hitting "send," thus losing the conversational feel of IM.

- **Bridget "hangs out" online**

Bridget loves to Instant Message. She has a buddy list of over one hundred friends, and often conducts up to six conversations at once. She flips from dialogue box to dialogue box, and thinks of communicating on IM as very similar to having a conversation. While she is online, Bridget also checks and writes email, and surfs the Internet. On most days, Bridget IMs in the evenings, because "that's when all the other kids are online."

- **Bridget experiences the pitfalls of Instant Messaging**

Bridget has come to understand the merits and drawbacks of communicating on IM. One of her frustrations is the difficulty of conveying the nuances of tone that a telephone conversation supports. There have been several instances when what Bridget "said" had been misunderstood by her friends, which then caused some upsets. Another feature of IM that Bridget has been hurt by is the ability to copy and paste sections of conversations. Unlike a telephone conversation, which is fleeting, IM conversations can be saved and forwarded on to other people. In the complex social landscape of teenhood, this can become the source of many misunderstandings.

FIGURE 50.5b. Composite profile of Bridget in relation to wireless communications.

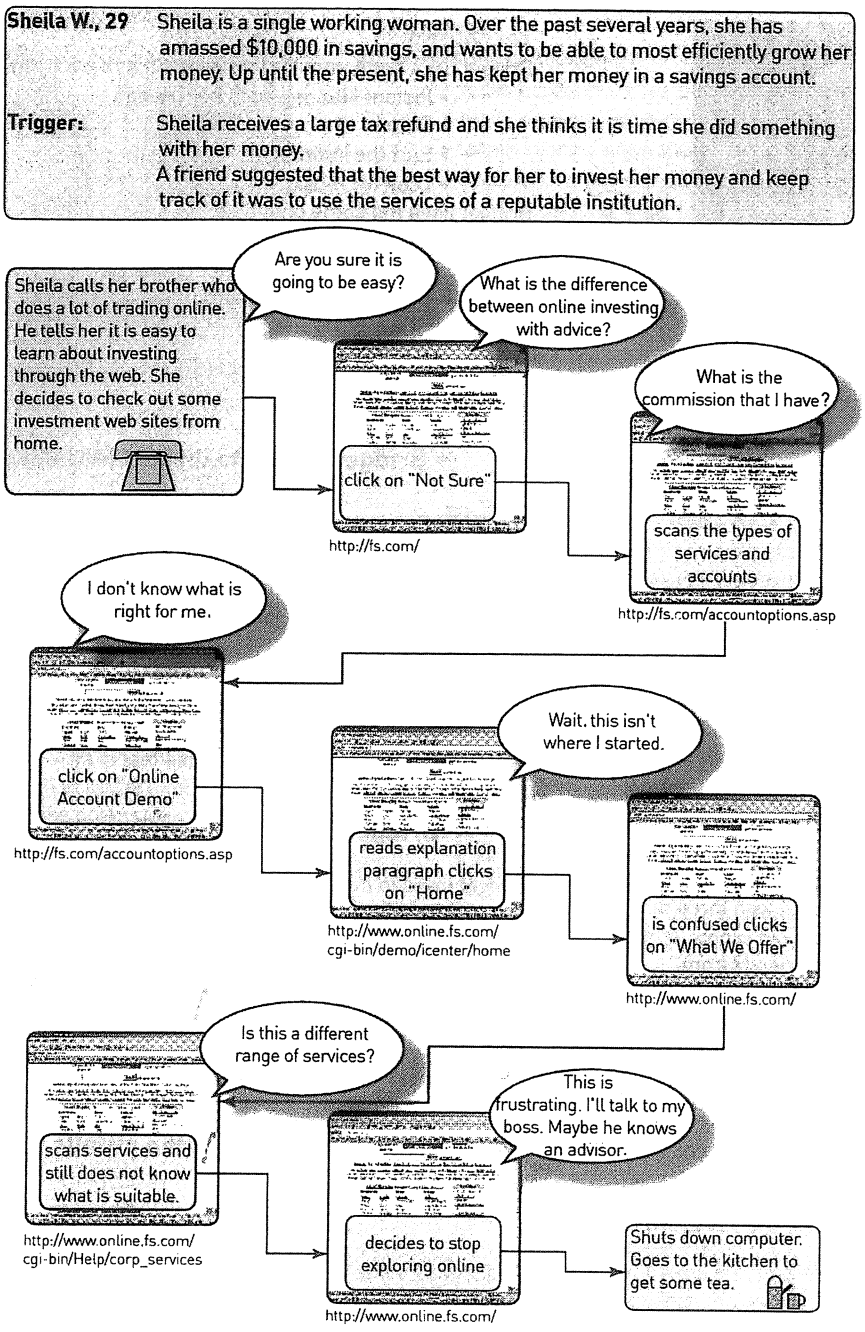


FIGURE 50.6. Simple scenario of a woman exploring online investing resources.

RELATION TO OTHER QUALITATIVE APPROACHES AND PERSPECTIVES

The ethnographic approach has strong connections to and affinities with other approaches that have contributed to the development of the field of HCI, namely distributed cognition, activity theory, ethnomethodology, and participatory design. There is not space here to go into depth on any of these approaches. Our aim is simply to highlight relations between these approaches and ethnography, and provide a way to distinguish between them.

Distributed cognition (sometimes referred to as social or situated cognition) was first introduced to the HCI community by Lave (1988) and Hutchins (1995). Distributed cognition located cognition in social and material processes. When it was

introduced, it challenged the dominant paradigm within HCI, that cognition primarily involved the psychological and mental processes of individuals. The connection between distributed cognition and ethnography is not only in the insistence that our understanding of human activity be located outside individual mental processes, in human interaction, but also in the conviction that to gain an understanding of human activity, ethnographic, field-based methodologies are required.

Activity theory also shares with ethnography a commitment to field-based research methodologies. In addition, there is the shared view that behavior (activity) should be a primary focus of investigation and theorizing, and a recognition that objects (artifacts) are key components in descriptive and explanatory accounts of human experience (e.g., Engeström, 2000; Nardi, 1996).

Ethnomethodology is often used interchangeably with ethnography in the HCI literature. This is not only because the terms are etymologically similar, but also because many of the social scientists contributing to the field of HCI have adopted an ethnomethodological approach (e.g., Bentley et al., 1992; Button & Harper, 1996; Crabtree, 2000; Hughes et al., 1993, 1994, 1995) with its focus is on locally and interactionally produced accountable phenomena. Ethnomethodology's particular set of commitments (e.g., Heritage, 1984) are not shared, however, by everyone working within the ethnographic paradigm.

Participatory design does not have its roots in qualitative social science research, but instead developed as a political and social movement, and as a design approach committed to directly involving end users in the design of new technologies (see Muller, chapter 54 this volume; also Kensing & Blomberg, 1999; Schuler & Namioka, 1993). Within the HCI context, participatory design has shed much of its political and social action underpinnings, and is viewed primarily as a set of methods and techniques for involving users in design. Its connection to ethnography is in the commitment to involve study participants in the research, and in the value placed on participants' knowledge of their own practices. Also, in recent years, those working within the field of participatory design have incorporated ethnographic techniques (e.g., Crabtree, 1998; Kensing, Simonsen, & Bødker, 1998) as a way of jointly constructing with participants knowledge of local practices.

ETHNOGRAPHY IN ACTION

Case Study 1: Health Care Provider

An onsite health care provider wanted to build a web-based portal that would facilitate communication between employees, employers, and clinicians, and ultimately improve employee health. The research was conducted in employee homes, employer offices, and health clinics, and involved interviews and shadowing of patients as they interacted with health care practitioners in clinics.

One of the main findings, illustrated in the experience model (see Fig. 50.3, p. 34), was that the health experience is composed of several stages and associated activities. Awareness and/or acceptance of a condition or need is the first stage, followed by the desire to search for relevant information. As the search progresses, an individual eventually becomes informed enough to begin to take more direct action toward addressing the situation. Once action is taken, the key is to maintain this behavior for an appropriate length of time, often indefinitely.

The research team found that certain activities were more likely to be associated with each stage, suggesting that understanding where a person stood in relation to the stages was fundamental to developing effective strategies for communicating and motivating healthy behavior. For example, when an individual is in the information-seeking stage, it would be important to provide a means to locate, store, and interpret general information. Once an individual begins taking action, reinforcement of their behavior is crucial and a design solution needs to support such activities as monitoring and logging progress.

During the home interviews, the field team discovered that people use, and respond well to, quantifiable measures of progress such as cholesterol or T-cell counts. Moreover, such indicators serve as positive reinforcement, further motivating healthy behavior. We recommended, therefore, that the proposed system provide functionality that would allow users to monitor and log health-related information that is relevant to them.

Another key finding to come out of the research was that communication between patients and clinicians was extremely important for a patient's health, but it is frequently impeded by a variety of barriers. For a system to be successful, it would have to remove at least some of these barriers to pass through a patient's trust filter (Fig. 50.7).

Combing these two major findings, the research team recommended building a health history tool that allows patients among other things, to monitor and log pertinent information in a web-based platform. The log also would be accessible from the clinician's office, allowing a patient and health care practitioner to review the patient's progress together and make annotations throughout the visit. Such a solution would improve the communication between patient and clinician while simultaneously empowering patients to take charge of their health.

Case Study 2: Department of Highways

The headquarters of a state Department of Highways was the site for a collaborative research and design effort with engineers charged with the design of a bridge, scheduled for completion by the year 2002.[16] The project aimed to design an electronic document management system that was informed by an understanding of the everyday requirements of engineering work at the Department of Highways. The project began with onsite

[16]For more on the project with the Department of Highways, see Suchman (1998, 1999).

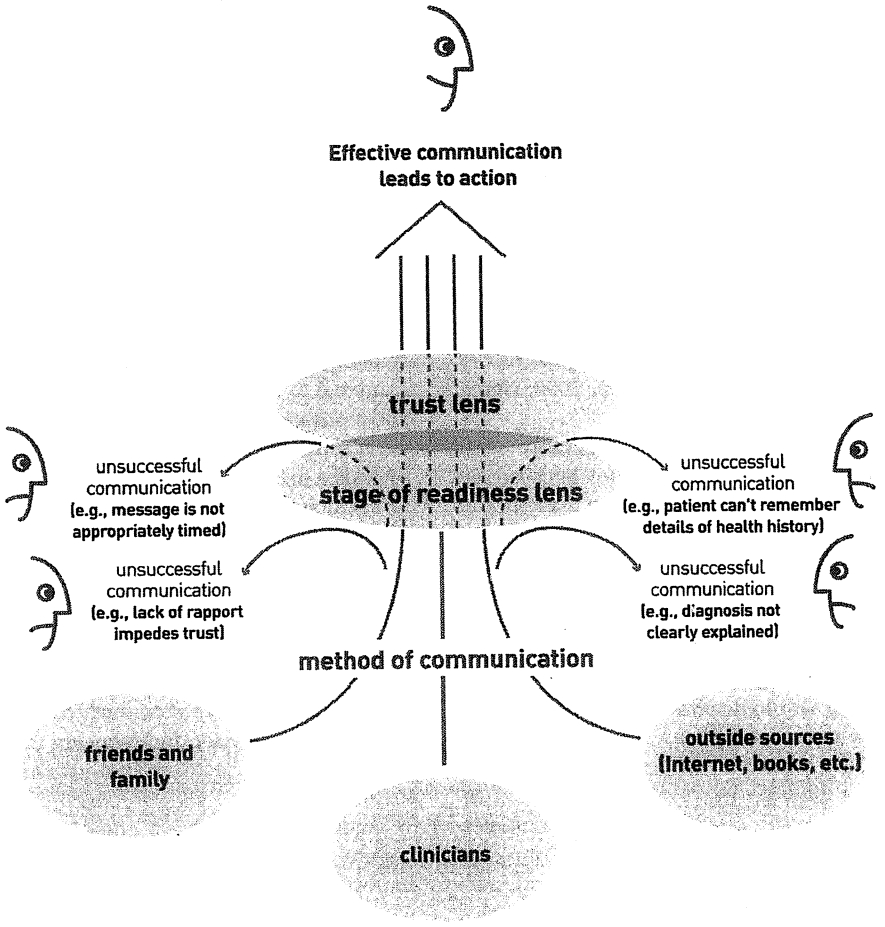


FIGURE 50.7. Communication model.

interviews and observations of engineering practice, with a focus on the document-related work practices.

Based on an initial understanding of the document management requirements of the work, as part of the design process, several alternative paper-based document coding forms were designed. After several iterations, a coding form was settled on that was then incorporated into the electronic document management system, both as a form to be scanned into a document database and as a model for an online coding form. The evolution of the coding form was informed by the prompted use of the form by engineers at the Department of Highways (Fig. 50.8).

One of the key insights that came from the ethnographic study was the need to design continuing connections between the digital and physical document worlds. This included locating familiar ways of organizing documents in the new electronic system, and taking advantage of visual memory in document search and browsing by displaying page images of the documents and not just the text (Fig. 50.9).

The insights gained from the ethnographic study also pointed to challenges that would face engineering teams adopting the new system. First, because members of project teams would no longer be the sole interface to the documents in the project files, team members would need to consider who might view the documents and for what purposes before deciding to add a document to the database. This was not necessary when the project files were paper-based, because the physical location of the documents, in the engineering team's work area, restricted access. Electronic access now meant that users of the system could be located anywhere within the Department of Highways, making explicit access controls necessary. In addition, it would be crucial that an ongoing relation between the paper and digital document renderings be maintained as engineers found it most useful to work with the printouts of large engineering documents. The online renderings were not particularly useful by themselves. The research and design team was able to anticipate these work practice issues, make the highways engineers aware of them, and suggest possible ways they could be addressed.

CONCLUSIONS

Over the last two decades, ethnographic studies have become an important tool for designers and development teams designing new information and communication technologies. Today, in academic, institutional, and corporate settings, there is the realization that understanding the everyday realities of people

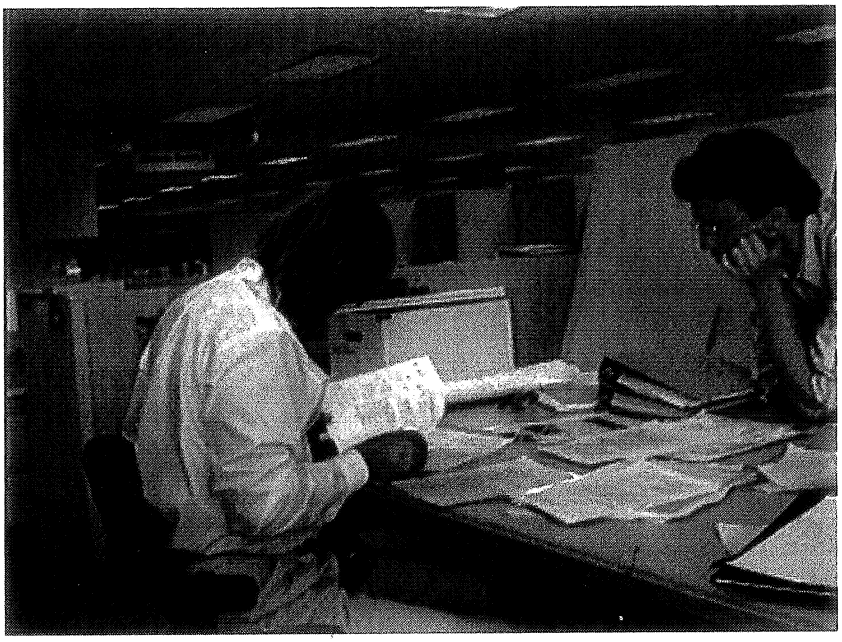
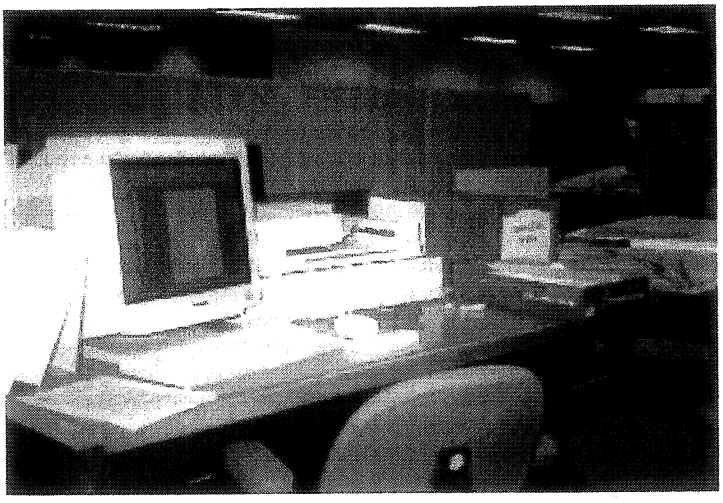


FIGURE 50.8. Engineer using mock-up of coding form to code documents.

living and working in a wide range of environments and engaged in myriad activities is essential for creating technologies that provide engaging and productive experiences for their users.[17] Emerging from these last two decades of research and practical experience is the recognition that representational tools (experience models, scenarios, mock-ups, and prototypes, etc.) and design and development practices (collaborative data analysis, joint opportunity mapping, video review sessions, etc.) are



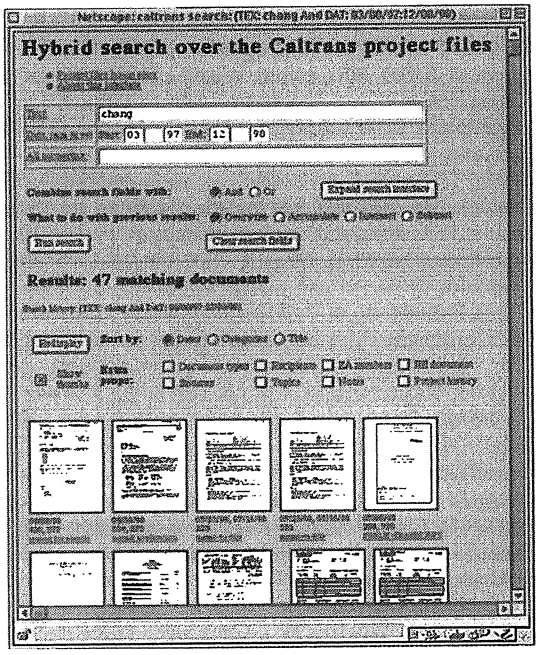


FIGURE 50.9. Components (document scanner, PC, coding forms, etc.) of the designed document management system and document search results page with thumbnails.

[17]For a discussion of the relation between ethnography and design, see also Anderson (1994), Grudin and Grintner (1995), Rogers and Belloti (1997), and Shapiro (1994).

necessary for connecting ethnographic studies and technology design. Insights from ethnographic studies do not facilely map directly onto design specifications or straightforwardly generate user requirements, but instead must be actively engaged with design agendas and activities. Those wishing to leverage the potential of ethnographic studies should not only understand what motivates the approach and is at its foundation (e.g., natural settings, holistic, descriptive, members' point of view), but should also recognize the importance of creating the conditions in which design can take advantage of ethnographic insights.

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