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**The
Role
of**

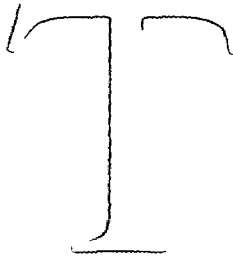
ETHNOGRAPHY

Over the last few years, ethnography has been proposed as new approach to “requirements elicitation” in interactive systems development. The turn to ethnography is a response to the need for an adequate understanding of the nature of work to underpin the construction of interactive systems. In the context of system design, ethnographic studies have included photocopier use, [13] office work, [14] air traffic control, [7] police work [1] and transportation control rooms. [8] However, ethnography though holding much promise is still relatively untried in system design. It has been, and still is, strong on its critique

**in
Interactive
Systems
Design**

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of other methods, such as Task Analysis, [4] but it has yet to prove itself within the wider community of software engineering, particularly to those working in commercial and industrial contexts.



his article is a retrospective look at our own experience of using the method and suggests some roles which ethnography can play as a contributor to interactive system design. Though we are strong supporters of the method we do not regard it as a panacea for the com-

plex and "wicked" problems of interactive systems design. In fact, if ethnography is to take a more regarded place in systems engineering, then it is important to assess its utility within the development process.

The case for ethnography

The increased prominence of interactive systems has seen a movement of computer systems out into the world of work and organisation. [6] Developers of these systems have turned to ethnography to complement existing human centred methods of systems development. The incorporation in system design of a social perspective and the prominence of ethnography emerges from a growing plausibility of the diagnosis that many system problems emerge because their design pays insufficient attention to the social context of work. This failure is often attributed to the inadequacy of existing methods of requirements elicitation and work analysis.

It is also increasingly accepted within the software engineering community that understanding the "social" real world is an important factor in software design. [9] A growing expectation is that requirements elicitation should be informed by an analysis of the "real world" circumstances of work and its organisation. [5] As a result, it is no surprise that ethnography emerges as a candidate method for understanding the human nature of requirements. The principle virtue of ethnography is its ability to make visible the "real world" aspects of a social setting. It is a naturalistic method relying upon material drawn from the first-hand experience of a fieldworker in some setting. The aim of ethnography is to see activities as social actions

embedded within a socially organised domain and accomplished in and through the day-to-day activities of participants.

The tradition of ethnographic enquiry is well established within sociology. Ethnography is an observational technique that uses a naturalistic perspective. That is, it seeks to understand settings as they naturally occur, rather than in artificial or experimental conditions, from the point of view of the people who inhabit those settings, and usually involves quite lengthy periods of time at the study site. It is the ability of ethnography to describe a social setting as it is perceived by those involved in that setting (the archetypal users) that underpins its appeal to developers. However, it is not without its problems. A principal one is the presentation of the results of ethnography in a form that is readily usable by designers. For many software engineers ethnography seems far too unsystematic a method, its results presented in an overly discursive form; design options are not clearly stated and do not attend sufficiently to engineering needs. In other words, its virtues become vices.

Against this is the argument that what is wrong with many of the traditional methods of system design is that they owe far too much to the needs of engineering with the result that crucial aspects of the "real world" are not never properly treated. [2] It is in this respect that "analytic approaches" which "decompose" elements of the work activities and tasks, such as Task Analysis and Office Automation, which focuses on the flow of data within a domain, are found wanting. [12, 13] The result, so it is argued, is that essential aspects of the socially organised character of the domain concerned are obscured or, worse, misrepresented.

There are, of course, many aspects to these kinds of arguments, some of which involve a critique of the nature of work in modern society and how current methods of design instantiate the dehumanising rationality of modernism. Our own arguments for ethnography are more pragmatic in nature. If we accept that the design of interactive systems needs to attend to the sociality of work, then any method must respect the nature of this phenomenon. However, many of the existing methods fail to sufficiently recognise the social

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nature of work. This is not a call for the wholesale abandonment of more formal methods; they, like ethnography, will need to find an appropriate place in design.

Accordingly, although there is a case for ethnography in interactive system design, at the present time it is a promissory note rather than a claim based on substantial achievement. Its main use has been in research, and in field sites which are small scale, involving highly focused interactions, such as control rooms. If it is to substantiate its case as a method of system design, ethnography will need to go beyond these and, in addition, face up to the problems of large scale system development.

Moving Beyond research

Building interactive systems is a complex and difficult business. Developers need to acquire adequate knowledge of the relevant domain, communicate this across a design team and organise the process of system building. In commercial contexts these problems are deeply infused with the familiar commercial constraints of budgets, time and resources. Ethnography must service a number of demands if it is to be widely accepted in this industrial context. Without this acceptance the use of ethnography in systems design runs the risk of becoming devalued as merely a research curiosity. The effective application of ethnography in the

which there is a relatively clearly visible differentiation of tasks at one work site. For the lone fieldworker such sites are ideal. They minimise travel and communication problems, and all that the fieldworker needs to see is there in one place and can be gathered with a minimum of disruption. Scaling such inquiries up to the organisational level or to processes distributed in time and space is a much more daunting prospect in raising issues of depth and representativeness.

The pressure of time

Viewed from a computing perspective, ethnography is a "prolonged activity" and in the context of social research can last a number of years. Added to this are the problems, noted earlier, of communicating ethnographic findings to designers. The outputs of ethnographic analyses are typically discursive and lengthy, which appear to have little in common with the description techniques that are standard in systems engineering.

The role of the ethnographer

Moving out of the research setting into a more commercial one also raises different sets of ethical responsibilities as well as making access to sites more vulnerable to the contingencies of the commercial and industrial world. Ethnography insists that its inquiries be conducted in a non-disruptive and non-interventionist manner, principles which can more easily become com-

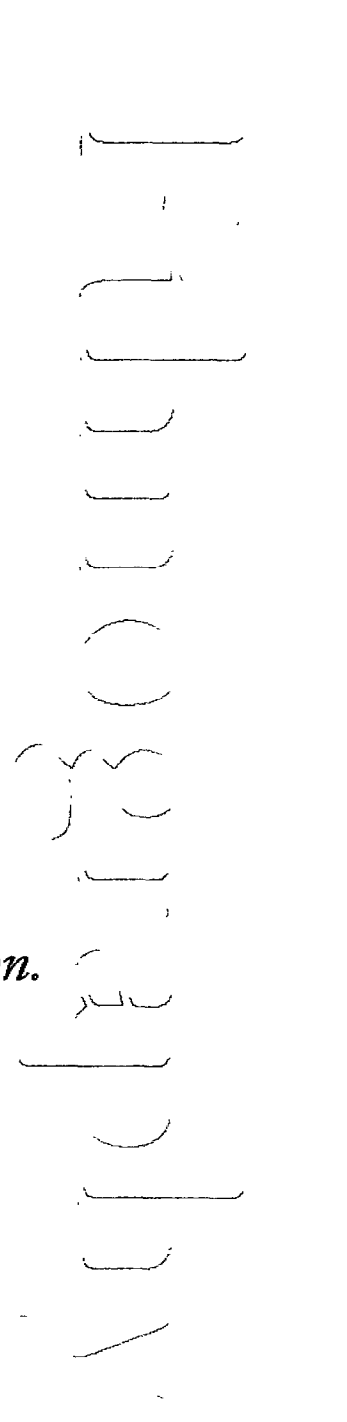
*If we accept that the design of interactive systems needs to attend to the **sociality** of work, then any method must respect the nature of this phenomenon.*

development of interactive systems needs a number of key problems to be addressed.

The problem of scale

To date the main use of ethnography has been limited to relatively small scale and confined environments, such as control rooms and other micro interactional contexts. In such settings there tends to be a clear focus of attention for the participants, who are typically few in number, and in

promised given that much of the motivation for IT is to reorganise work and, as part of this, displace labour. Less dramatically, but important nonetheless, fieldworkers not only require access to relevant sites but also need acceptance on the part of those who work in them. Protecting the identity of people, respecting the fact that the fieldworker is like a guest within their lives, and so on, become much harder to sustain in applied work of this kind.



Of course, few of these issues are easily solved. However, it is important not to be too ambitious for any method, least of all in software engineering where new methods follow one another with monotonous regularity. Design is, at best, a "satisficing" activity, often dealing with "wicked" problems [11] and a matter of doing the best one can with the resources available. Nevertheless, if it is accepted that designers should be informed about the social character of work, and that ethnography is an important means of gaining such knowledge, then serious attention needs to be given to the variety of ways in which ethnographic studies can be used by designers.

Ethnography in the development process

Experiences of ethnography within systems development are limited. The majority of reported studies have exhibited a tendency to focused on similar work settings, the most notable of these have been undertaken as part of a research project. The general approach has been informal with the prototyping of a research system having been developed in line with the emerging results of an on-going ethnographic study. This is the approach we followed in constructing a tool for the prototyping of Air Traffic Control (ATC) interfaces [3]. In this case a period of some four weeks of ethnography in the London Air Traffic Control

was involved in the three year project.

What the ethnography provided was a thorough insight into the subtleties involved in controlling work and in the routine interactions among the members of the controlling team around the suite. These subtleties were rooted in the sociality of the work and its organisation and had been missed by earlier cognitive and task analytic approaches to describing controlling work. What became clear is that any new interface system would have to keep the controller "geared into" the work by not automating, for example, the ordering of the screen-based flight strips. In other words, we felt it important to retain at least some of the functionalities of the current paper flight strips while, at the same time, being in a position to evaluate what information the controller needs, what is less important but needs to be "ready to hand," and what was inessential.

It is important to note that the aim of the project was research rather than the development of a system to be used in the "front line" of controlling. Thus, we did not have the problems that would have arisen in implementing a product. The research team was small so that much of the communication between the sociologists and the computer scientists could be done informally. There was limited need for the construction of a requirements document or for a process model since the development work focused on the production of prototype rather than a product.

The research nature of the project also ensured that the pressures of the time evident in industrial systems development were limited. However, despite the lack of time pressure it was evident in the project that there was a declining rate of utility for the fieldwork contribution to the prototype development. This is not to say that there was not more to learn or that we could not have learned more sociologically from further study of the ATC control room, only that for the project the "fine tuning" of the design needed to be informed by experts actually using it. In other words, although there is always more to learn, the payoffs for development came relatively quickly in comparison with social research uses of ethnography.

Figure 1
The concurrent use
of ethnography

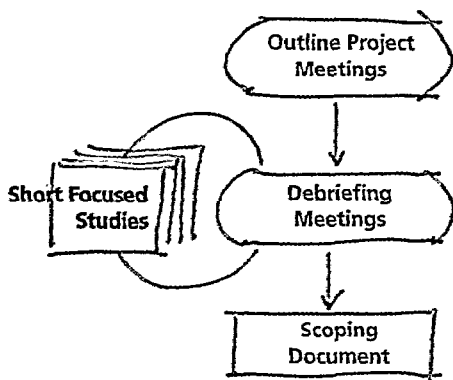
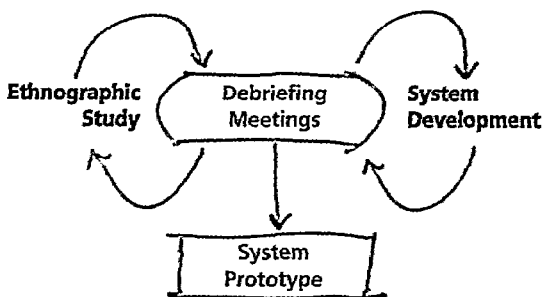


Figure 2:
Quick and Dirty
Ethnography

Centre (LATTC) was followed by a lengthy debriefing session involving the fieldworker and the designers. Meanwhile, a first prototype was constructed. The process was repeated a number of times and each further stage of the fieldwork was intended to target issues raised by the designers during the debriefings. Approximately eighteen months of ethnographic study

Focused approaches to ethnography

The extensive use of control rooms in the ATC domain offered a natural focus for the ethnographic study. However, many other domains are less bounded than air traffic control rooms. Systems need to be developed to support work in these more general domains and ethnography must service the demands of scale inherent in them. Our initial experiences in moving toward less focused studies of work centred on software development and the construction of a software development tool. The aim was to develop a tool that more adequately reflected the collaborative and interdependent character of "real world" design work. We realised from the beginning, and this was one of the purposes of the study, that the fieldwork would present new challenges in involving a much less "confined" field site than the control suite at LATCC. For one, the development engineers, in both of the sites we eventually looked at, were working in industrial environments and, accordingly, subjected to a wider range of contingencies, events and policies that impacted more directly on their work.

In addition to these were the problems arising from asking a fieldworker to cover what proved to be a very large task. Software development is a complex business and tracking through its unfamiliar complexities, understanding the management of its components, seeing how the teams worked together, trying to figure out how the integration of the various components was achieved, and more, all proved to be an immense task.

To address these issues we adopted a "quick and dirty" approach to the ethnography where fieldworkers undertook short focused studies to quickly gain a general picture of the setting. The phrase "quick and dirty" does not refer simply to a short period of fieldwork but signals its duration relative to the size of the task. The use of ethno-

graphic study in this manner not only seeks relevant information as quickly as possible but accepts at the outset the impossibility of gathering a complete and detailed understanding of the setting at hand. Rather, the focus is on informing strategic decision making to select those portions of the work setting of particular importance in informing design.

"Quick and Dirty" ethnography

This "quick and dirty" approach is capable of providing much valuable knowledge of the social organisation of work of a large scale work setting in a relatively short space of time. Indeed, it can be argued that the "pay off" of the "quick and dirty" ethnography is greater in that a great deal is learned from a relatively short time expended on fieldwork. The use of ethnographic study in this way accepts at the outset the impossibility of gathering a complete and detailed understanding of the setting at hand. What the "quick and dirty" fieldwork provides is the important broad understanding that is capable of sensitising developers to issues which have a bearing on the acceptability and usability of an envisaged system rather than on the specifics of development.

What has proved more difficult in our experience is sustaining the collaborative pattern of sociologists and designers achieved in the more informal concurrent approach used in the air traffic control work. Development work on the tool continued almost independently of the fieldwork. It has also proved difficult presenting the lessons of the fieldwork to designers because of the much

less focused character of what the fieldworker learned. This communication problem was exacerbated by the unstructured nature of the ethnographic record produced by the fieldworker.

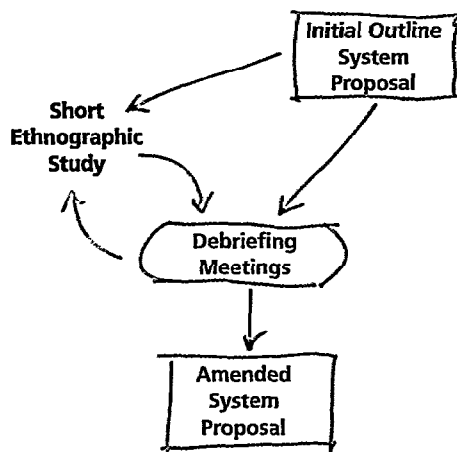
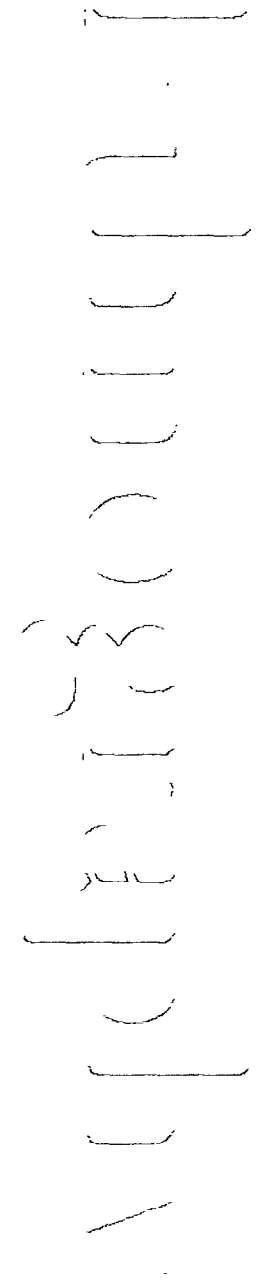


Figure 3: Using ethnography to assess an existing specification



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Evaluative Ethnography

Another more focused version of ethnography that does not necessarily involve a prolonged period of fieldwork is directed at a "sanity check" of an already formulated system proposal, that is, it is used in assessing an initial specification. As a result of short ethnographic studies a new requirements specification is constructed through a series of debriefing meetings



Workstation for the United Kingdom New En Route Centre, a total turn-key solution being developed by Loral to handle increased air traffic

Courtesy: Loral

which builds upon the results of the study.

The example we draw on to illustrate this use of ethnography is research that involved approximately three weeks of fieldwork in two branch offices of a building society. [10] It was commissioned by a computer company to check out, using ethnography, some aspects of a model the company was interested in using

for IT developments in the financial sector. In particular, we were asked to investigate customer relations at the front desk and mortgage processing

In the relatively short period of fieldwork, it became clear that the model on offer had almost wholly ignored the character of "front desk work" in branch offices, representing it as a series of information flows and tasks that could be unproblematically instantiated in the "real world" conditions of branch work. Much of this work was customer driven in the sense that the routine but essential work of processing the immense amount of paper that was generated was persistently interrupted by the need to serve customers or respond to their enquiries. Although much of the work was routine there was an unpredictability to it in that cashiers did not know in advance what any particular customer wanted. Transactions with customers could be straightforward or involve complications of various kinds, neither of which was predictable.

The above is, of course, again only a very brief sketch of the results of the ethnography. Nonetheless, they were

sufficient to suggest that the model was, in significant respects, deficient. Such a conclusion is not necessarily of much comfort to designers who have, no doubt, spent many hundreds of "person hours" developing the model. However, although in this case it reinforced the computer company's initial doubts, so much so that they withdrew from the negotiations to purchase the



article

model, it is not difficult to see this use of ethnography in a more positive light. Independently of the pressures that surrounded this project, the approach identified could well be used to develop and improve the development of requirements specifications.

Re-examining previous studies

One of the major problems that arises when new approaches and methods are proposed is that not only do they challenge existing approaches but there is also a lack of experience and a corpus of examples to draw upon. Although ethnography is relatively new in systems design, it is a method which has been used for many decades in sociology and anthropology. Many of these studies have been related to work and while not all them have been studies of interest to system design, nonetheless, they can be informative.

In our own case, we have returned to previous ethnographic studies to inform the preliminary design of a shared object platform which, among other things, is intended to handle shared information in a wide variety of domains. The distinguishing feature from existing multiuser storage facilities is the focus on cooperative sharing across a group of users and the provision of mechanisms which support the management of this sharing.

Though ideally "concurrent ethnography" would have been an appropriate method to use because of the objectives of the research and the timescales involved, it was felt that much could be learned, and at relatively low cost, by using available studies even though they had not been carried out with system design in mind. What we were looking for were domains which would exhibit some of the varieties of document production, management and use as socially organised features of the work. To this end we chose previous studies of social work, police work, and invoice processing in a multi-site fast food company. These represented a range of domains which, though not in any sense exhaustive of document use, enabled us to identify sufficient similarities and differences to inform the preliminary design of the platform.

The use of a range of studies also holds the promise of uncovering some properties that generally hold true and a common service

should support. For this reason, we suggest that this use of ethnographic materials is especially useful where obtaining sight of general infrastructural principles is the prime goal. In this respect, we learned the importance of history and record of use within the information store. The need for effective and dynamic management of access to shared information was also central. Somewhat in contrast to current research trends non real-time interaction through access to shared documents also featured prominently as did the need to provide facilities that maintained links between electronic and paper records.

Of course, not all ethnographies lend themselves to system design objectives. Ethnographic researchers, like any other researchers, have their own objectives in mind which may not always accommodate the specific interests of a particular system design problem. Indeed, we had to discard a number of excellent ethnographies for this reason. However, there is another important consideration here. Unlike many of the natural sciences and engineering disciplines, the social sciences, on the whole, have failed to produce a cumulative corpus of findings to underpin any application of their knowledge. Although this feature can be overdrawn even in the natural and the applied sciences, the situation is that the multi-paradigmatic character of social research makes it very difficult, not to say hazardous, to presume that there is an available bedrock of findings which designers can consult. There is little doubt, however, that designers would find such a corpus extremely useful, though it would need to be used with due caution. In other words, re-analysing ethnographic studies could well be a useful way of sensitising designers to the social organisation character of a considerable variety of settings. This is not a substitute for the more directed uses of ethnography when there are specific design issues to address but, depending on the design objectives, can perform a useful role in making designers aware of what to avoid and what the more specific issues might be.

Summary and Lessons Learned

The motivation for this article is part of a longer term attempt to place ethnography within the broader context of system design in light of the



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focus on “real world” contexts of use. For interactive systems it is vital that designers understand the work setting as a socially organised setting as a preliminary to design. It is in this respect that ethnography has a role to play. In other words, the prime objective is not so much ethnography as such, but ethnography as a means of uncovering the “real world” character of work for systems design. It is by this test that ethnography needs to be judged in system design. Thus, it is a matter of looking at the method in light of the varied circumstances of system design, including those that arise in industrial and commercial systems development.

Ethnography is currently fashionable in many areas of interactive systems development but if it is to survive this kind of attention then it is important that the method find an effective voice rather than remaining content with ephemeral celebrity. There are a number of specific lessons we think worth emphasising from our experiences of ethnography.

A variety of roles for ethnography

Designers require different information at different phases of the process: a point which has more than just a passing bearing on the role of any design method. Ethnography has a role to play in various phases of system design and makes different contributions to them. Further fieldworkers can be extremely flexible in their response to the various contingencies that can arise, and deal with them as they occur. The very engagement of a fieldwork within a “real world” work setting presents opportunities to learn much about that setting which is relevance to design.

Responding to the pressure of time and budget A charge often levelled at ethnography is that it is a “prolonged activity.” As we have suggested,

this is not quite the problem that it is imagined to be. Depending on the purposes of the design, much can be learned from relatively short periods of fieldwork. Within the context of design diminishing returns from fieldwork set in relatively quickly. It is often more effective to direct effort in accordance with design objectives once an effective understanding of the setting of the work and its characteristics has been obtained.

The importance of focus

A major determinant in the successful undertaking of projects involving ethnography was the question of focus. In our study of air traffic control a natural focus was provided by the setting for the study and the prototype being developed. Work was oriented toward a control suite which was placed within a control room with the explicit intent of making work publicly available and accessible through manipulation of flight strips. An existing focus was also provided by the initial design intentions within the shared object service and the existence of a previous specification within the building society. In contrast, no single location or set of work activities existed which provided a complete insight into the work of software development. Much of the effort of ethnography was in determining this focus through a series of “quick and dirty” ethnographic studies.

The importance of previous studies

One of the major problems of interactive systems design, and one of the reasons for the turn to ethnography and studies of the social organisation of work, is that it represents a set of new challenges. This means that, to a degree, it lacks experience and a corpus of findings to draw upon. Many interactive systems are likely to be if not quite the first of their kind, at least suffi-

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ciently innovative to pose challenges in which previous systems are likely to prove of little help. This also represents a challenge to ethnography and the contribution it can make, through an accumulation of its studies, toward informing "good practise" in design. This means paying attention to the ways in which a corpus of studies can be made available to software engineering, and others involved in the design process, ways which while enunciating general features of the social organisation of work, also display the variety of ways in which these become instantiated in "real world" contexts.

Finally, and this is to reiterate one of the main virtues of ethnography, system design is work design. This is, we would suggest, an unalterable fact about system design, let alone interactive system design, and one which, too rarely, is given the emphasis it deserves. Ethnography, by its nature, has to attend to this aspect even though its studies will be concerned with "work as it is currently done." Thus, even though design may be concerned with developing a completely new system, understanding the context, the people, the skills they possess, what kind of work redesign may be involved, and more, are all important matters for designers to reflect upon. It is also more capable than most methods of requirements elicitation, as it ought to be, in highlighting those "human factors" which most closely pertain to system usage, factors which are not always just about good interface design but include training, ease of use in work contexts full of contingencies which are not the remit of system design, and more. It is in respect of these considerations that ethnography is especially useful in design.

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