

# Methodological constraints in researching systems development work

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## **Abstract**

The author describes the problems and constraints experienced when researching an in-house team of system developers working on a groupware project. These constraints partly shaped the approach to field work and led to the need to use multiple methods of data collection. The developers themselves used many ways of coordinating the project which cut across established team structures and cultures. Multiplicity of datasets is therefore intrinsic to the subject of the study. Template analysis is being employed as a technique to analyse the diverse datasets.

## **Keywords**

Participant observation, ethnography, template analysis, groupware, software customisation.

## **1. Introduction**

Over the last decade a debate has been conducted in the field of Information Systems (IS) research over the validity of qualitative research methods. It is beyond the scope of this short paper to review the relevant literature, but two examples are Orlikowski and Baroudi [9] and Landry and Banville [6]. These authors, while recognising the dominance of the positivist paradigm, argue that interpretivist and critical methodologies have much to offer in a field which studies the interaction between technology, organisations and people. Whether or not this argument has been won in IS, it has not been accompanied by a marked increase in the number of qualitative studies of the system development process. This is in contrast to fields such as Human Computer Interaction (HCI) and Computer Supported Cooperative Work (CSCW) which both have a large corpus of field studies of technology in use. In a recent study of current IS research Silverman [13] argues that in IS, as in other research fields, the positivist versus interpretivist “paradigm war” is a distraction from the more useful discussion about what kind of qualitative research is required to study the field.

By re-posing the question and critiquing the predominance of surveys and interviews in qualitative IS research Silverman provides a rare resource – a discussion of appropriate field work methods - for would-be qualitative researchers in this field. In particular researchers who undertake ethnographies will find themselves with a shortage of exemplary published research. Nader [7, p98] tells a story about a student who asked an eminent practitioner for advice on how to conduct his first ethnography. “In response Kroeber was said to have taken the largest, fattest ethnography book off his shelf, and said, ‘Go forth and do likewise.’” Problematically in our field there is a lack of studies to emulate - the software engineering shelves are not lined with fat ethnographies. We may turn to the classic studies in sociology and anthropology, but these lack direct relevance. Traditional ethnography tends to follow a pure rather than applied research model [3], whereas most researchers into software engineering or systems development tend to have a strong practical orientation to their work, such as wishing to use research to inform the design of technology, methods and tools to support software design.

Harper [4] notes that even in the field of CSCW, where ethnography has become one of the key methods for studying work practice in order to inform system design, there is little or no discussion of what a field work program should consist of. “By and large, most discussions and reports of ethnography in CSCW say very little about what the organisation of fieldwork might have been, treating those things as taken for granted matters that can be left aside.” [4, p240.] Because of this lack of resources a discussion into how qualitative research methods can be applied to software engineering research is much needed and very welcome. In this paper I shall discuss some problems of conducting qualitative research and illustrate this from my own experience of researching software customisation in a groupware project.

## **2. Overview: the changing context of systems development**

The context of systems development is changing rapidly. Generally organisations are using technology to facilitate transformations in the way that they work rather than to automate existing procedures. Software applications such as groupware - software to support collaborative working and information sharing - require a different approach to development from large, be-spoke systems such as corporate databases. Much systems development work is now to do with the customisation and integration of packaged software, using fourth-generation application development tools which afford a rapid, user-centred approach to development. In this changing context one would expect corresponding changes in the practice of system development. Although research has been carried out into the impact of technologies such as groupware on both organisations and users (see for example [8], [10]), very little systematic study has been made into the work practices of system developers working in these new contexts.

This gap was the motivation behind my research project, an eighteen month field study of a groupware development project, carried out by an in-house IT department (the ITD). The site is the London-based administrative centre of “GreenFam”<sup>1</sup> an international, non-governmental organisation. The business of GreenFam is research and campaigning around radical causes.

GreenFam had adopted a three-year operational plan which included the adoption of groupware and upgrading its global communications network. Lotus Notes had been selected as the software of choice after an intelligent and well-informed consultation process. The main objectives of the plan were:

- to facilitate the policy of moving team members out of the centre to field offices (‘deconcentration’) and to move entire functions from the London centre to other parts of the globe (‘decentralization’);
- to treat information as an accessible corporate resource, rather than privately stored in individual mailboxes and files.

Working as a participant observer I followed the Lotus Notes project over an eighteen month period into the third phase of the project.

## **3. Three problems of methodology**

In recent years a crisis of confidence in ethnography in sociology and anthropology has led to a turn to “confessional tales” [14] that explicitly discuss the problems of methodology, and the relationship between the researcher and the subjects of research. Qualitative researchers of systems development are less forthcoming about methodological problems, perhaps because of their practical purpose. This can be disconcerting, particularly to a novice in qualitative methods. Although it is tempting to present research as a rational process, intentionally designed to be appropriate to the phenomenon being studied, in my experience the researcher’s scope may be very limited by the constraints of researching

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<sup>1</sup> As a condition of their participation in the research I have agreed to conceal the identity of GreenFam, and not to write about the work of the organisation in such a way as would enable it to be identified. The names of individuals have been changed to protect confidentiality.

in organisations. I now go on to outline three problems of methodology which I encountered when studying GreenFam.

### **3.1. Choosing a method of inquiry**

To outsiders to qualitative research my method of inquiry - research of a single case study over a long timescale as a participant observer - requires justification. A typical criticism might be that because of its specific focus on systems development practice *in situ* the conclusions of the research are not generalisable and therefore do not help us to understand the changing nature of software development at large. This is a criticism which has been taken seriously by ethnography and there are strong counter-arguments both of which apply to my research. One is that a single-case study may make a significant contribution to general theory-building [12, pp83-84]; another that a study of a single workplace can be a resource to inform the design of technology [11]. Although the case study approach has been fully justified by the results of the research I cannot claim that this is a consequence of the initial research design. In fact my original intention was to undertake a more conventional IS research project consisting of observation and interviews in a number of contrasting groupware development contexts, combined with a survey.

GreenFam was the first and only one of several organisations I contacted that eventually agreed to allow me to study their work. It was not until the research was under way that my concern at not finding other suitable sites gave way to a realisation that what I could learn from focussing on a single case outweighed the limitations of the approach. A research project is a learning experience for the researcher, during which their own practice matures. In the course of studying GreenFam I began to realise that my original research proposal had methodological flaws - that I would have learned very little about the actual practice of developing groupware if I had limited my study to a series of interviews with the GreenFam developers. This is in line with Silverman's [13] critique of the limitations of the prevalent interview method in qualitative IS research. Interviews are used because they supposedly provide an insight into how actors think about their work, but in fact may tell us very little about how work is enacted in day to day situations unless combined with observation.

Research in organisations is a negotiated and contested process between the researcher and research subject, and these constraints may shape the eventual study rather than an *a priori* research design. I was fortunate in that the GreenFam case study produced sufficient data to be justified *post hoc*, but it would be untrue to pretend that I had a great deal of control over the choice of a method of inquiry.

### **3.2. The invisible work of systems development**

Finding suitable sites to study is not the only difficulty faced by the qualitative researcher. Once established in a site there is another set of constraints to be negotiated and contested - those placed on the researcher by the organisation. Traditional ethnography carries with it the baggage of a colonial past and much of today's reflective ethnography [2, p146] has a concern with the power of the researcher over the researched. The GreenFam developers were not the colonial subjects of classical anthropology, or the social underclass favoured by the Chicago School, but rather dedicated professionals with a great deal of political awareness due to the nature of the organisation.

I sometimes felt that the power relationship was reversed as the ITD placed a number of constraints on my involvement, all of which had an impact on the methods I could use. Firstly, the developers agreed to my presence only on the understanding that I would work on the groupware project while carrying out research. This produced a continual tension between my role as a participant - in which I was of most use to GreenFam - and my preferred role as semi-detached observer. It was never possible to observe all the work of the research project as I was excluded from much of it. Secondly I was not

allowed to use a tape recorder and so my record of the research consists mainly of field notes (often written up from memory at the end of the day); 'live' notes taken in situations such as meetings where note-taking was acceptable in the context of my work; electronic documents of discussions and email about the project.

Observation of software development work in these conditions was often problematic. It is inherently problematic anyway because much of the work is private or invisible, and done under pressure. An excerpt from my field notes reads -

“... Anna is very busy - head down into the computer screen and no time to talk.”

The invisible nature of software development was clearly demonstrated to me on the few occasions when project members worked together demonstrating and solving a design problem - occasions which were notable by their rarity. The observable aspect of the work, consultations and meetings with users, were carried out by the project member responsible and I was not included in these meetings unless directly involved by my own responsibilities.

Fortunately for the success of the research the invisible and private nature of the work was also a problem for the groupware project members. The Notes project work was divided between the members of the different teams of the ITD<sup>2</sup> and thus crossed structural and cultural boundaries in the department. This produced a need for explicit communication of the work that was underway in order that it could be coordinated effectively. Communication breakdowns occurred early on in the project and resulted in conflict between team members. The ITD thereon made a conscious effort to inform everybody of all aspects of the Notes project through email, a new discussion database, weekly meetings, and numerous informal opportunities for discussing the work. This visible coordination work became my main source of data leading to a further methodological problem - multiple data sets in a variety of different forms.

### **3.3. The problem of analysing multiple data sets**

Silverman [12, pp98-99] warns novice researchers of the dangers of using multiple methods to collect data in the deluded belief that this will lead to a more comprehensive overall picture. The analysis of different datasets may be very problematic and lead to scrappy and under-analysed data, rather than producing a definitive, panoptic version of reality. I would argue that methodological pluralism was unavoidable at GreenFam given the specific problems outlined in 3.2. The many sources and types of data in this research project are the very stuff of participant observation in this context.

Analytic rigour will hopefully substitute for the lack of a single method of data collection. In order to make sense of the multiple datasets an I am using template analysis as described by Crabtree and Miller [1] and King [5]. The method analyses textual data for codes which represent the themes which are to be developed; the list of codes are known as a template. Having developed a preliminary codebook from my field notes, my richest dataset, I can use the template to analyse other datasets such as meeting notes and documents. Template analysis for me is essentially a 'data-mining' approach, flexible enough to be applied to my diverse datasets and facilitating the identification of patterns and relationships.

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<sup>2</sup> The ITD was organised into four teams - the Office Automation, Database, Telecommunications and Systems teams. In addition there was a Notes developer working on the project who occupied an uneasy space between the Office Automation and Database teams.

Codes are labels applied to meaningful chunks of data. They are organised hierarchically with super-codes and sub-codes and are therefore useful for analysing different levels of detail and for building up the main themes and categories to be developed in the ethnography. As many codes as are appropriate can be applied to a chunk of data, and the same sub-codes may be reproduced within super-codes. This facilitates the identification of relationships between themes. If this hierarchical re-composition of data has a familiar ring to researchers of software engineering then it is perhaps an appropriate method to be employed in research targeted at this audience.

#### **4. Conclusions: designing a fieldwork program for software engineering research**

If the usefulness of qualitative research methods from sociology and anthropology in software engineering and IS research is taken as given, it is now time to shift to looking at the specific problems and requirements of field studies in this domain. Harper [4] has made a significant contribution to this in outlining what an ethnographic fieldwork program should involve. Although focussed on research in CSCW the three main components of the program are equally relevant in information systems and software engineering research. Harper recommends following the life-cycle of information through the organisation being studied; going through ritual inductions, whatever these may be, to establish credibility with the subjects of the research; designing interviews and observations to uncover the practical organisation of work – rather than what the subjects think the ethnographer might be interested in. The validity of these recommendations are born out by my own experience of trial and error where the information generated throughout the project life-cycle provided the framework for the study. My “ritual induction” was achieved only when it became recognised by the GreenFam developers that some of my findings were in fact useful in informing their work. It is now time for researchers to share their experiences of using qualitative research methods in order to develop a research practice for studying how technology is developed in organisational settings.

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