SELECTIVE ETHNOGRAPHIC ANALYSIS

Qualitative Modeling For Work Place Ethnography

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Introduction

In order to harness the value of workplace ethnography, it is becoming more and more apparent that we need a way to incorporate ethnographic data into work system analysis and design efforts. One of the biggest problems we face in this regard is making the best use of the insights that ethnography brings to a design process. Traditionally ethnography takes a lot of time, is done mostly in isolation, and the insights are mostly presented in a written and/or verbal way. In design projects we often don't have time to wait for the results of a long-term field study. Even if we do, using those results effectively is problematic. Knowledge acquisition has some of the same problems (time and use) that we see with ethnography. For many years people in the Expert Systems community spoke of the "knowledge acquisition bottleneck." We could say the same for ethnography: How can we best address the "ethnography bottleneck?"

One way to address both the translation of insights to design principles, as well as the time issue, is to use qualitative modeling as a way to manage ethnography and to

communicate the results of ethnography to designers. Qualitative modeling is used in analysis and design as a way to express ideas and formal descriptions of the system, without solely relying on natural language. Often this is done using a graphical language to express the meaning of things. The use of a modeling framework gives all the participants in a design effort, from ethnographers to designers and workers, a common means to communicate and collaborate more effectively.

Ethnography in organizational settings

In recent years the idea that anthropologists can add value to the analysis and design efforts in competitive organizational settings has become increasingly accepted [1] [2]. Anthropologists take a very rigorous approach to the understanding of cultures as a whole [3]. Understanding the culture of an organization can help us to design better technology for use within organizations.

The use of ethnography in work systems design

Work Systems Design (WSD) is a participatory methodology that tries to incorporate the understanding of the formal as well as the social systems of work. This is accomplished by combining the knowledge and experiences of different workers from the organization, as well as ethnographers, and system designers. Together a team of people try to understand all aspects of the organization in order to design a more effective work place.

The WSD approach uses the power of a formal structural design approach together with the more informal and long-term ethnographic methods. Ethnographers study the cultures of existing organizations in order to give the design team input on the existing formal and informal social systems.

It should be no surprise that this is a very difficult process and it is not at all obvious how a design approach and ethnography can be integrated..

The “ethnography bottleneck”

The time factor

The first issue we have to deal with is the time it takes to do ethnography. It is unexceptable for an ethnographer “to go native” for a year or longer. WSD projects should be able to be completed in a couple of months. This means that we need to get reliable and valid data within a short period of time.

Although this requirement might be in conflict with the requirement for theoretical and scientific rigor in the field of anthropology, it is nonetheless a step that needs to be taken if we want to make ethnography be an accepted method in design. One way of dealing with this issue is to focus an ethnographic study on specific topics of interest. This means that we need a way to decide what parts of a culture need to be investigated. We don’t want to claim that changing this way of doing qualitative research still can be called ethnography and can be used as an anthropological study as such, but we would claim that it uses an ethnographic approach in the study of an organization. We call this form of ethnography *Selective Ethnographic Analysis* (SEA).

The relevance factor

Selective Ethnographic Analysis might solve the time issue, but it does not in and of itself solve the problem of communicating an ethnographic analysis to others. Our experience at NYNEX has been that one of the biggest bottlenecks with bringing in the social systems view, is the way we can communicate the findings of an ethnographic study to system designers, management and workers of an organization. It is often not that they are unable to understand the results of a study; the problem lies in ‘the relevance factor’.

For instance, system designers and engineers don't know how to deal with this information about the social systems; they don't know how to fit this kind of analysis into their world of defining and designing the functionality of a system.

Selective Ethnographic Analysis

Ethnographic modeling and analysis

Selective Ethnographic Analysis is a method for ethnographic data collection in the context of a specific problem or issue that needs to be addressed in a design effort. It consists of a four-step cyclic process that can be performed as many times as necessary: 1) identify the data that needs to be collected, 2) perform the observation, 3) analyze the data, 4) generate recommendations for dealing with the problem or issue in the design effort.

This is significantly different than long-term ethnography. One of the foundations of ethnography is the study of a culture without intervention or design. A traditional ethnography is descriptive. In design we need to be able to analyze the context and identify the problems and/or issues that will prevent us from designing a good system. In other words, designers need a *design stance* [4]. As such, SEA is normative. In Selective Ethnographic Analysis we try to understand the causes and relations of social and work place problems to the design of systems. SEA gives us the ability to design in a social context. A context that in systems design was never able to be expressed before.

When social and work place problems and/or issues have been identified in a design project, we need to get a deeper understanding of the social systems through selective observation of these problems in the work place. The goal of a SEA study is to collect ethnographic data, analyze this data in context of the design, and make recommendations to solve the problem or remove the issue. Such recommendations can

help create an understanding of the social systems in context and can then be used within the design phase.

Although we might use some of the same principles as the traditional ethnographer, there are differences in the way we go about performing a SEA study as opposed to long-term ethnography. One of the major differences is the time we have available to collect significant and valid ethnographic data. As a first step in SEA we need to *identify the kind of data that needs to be collected*.

For instance, if there are issues around co-locating workers in an geographical setting, we need to collect data about a) the way people communicate in the current work place(s), and b) the use of space in the current work setting. The second step in SEA is *collecting the data through work place observations*. Having collected this kind of data, we can make a recommendation as to how a change in location, communication methods, and space will have an impact on the future workplace. This is the third step in SEA: *the analysis of the data in context of the problem or issue that needs to be addressed*.

The outcome of a SEA study is a recommendation to the design team on how to handle an issue in the design. This is the fourth and final step in SEA: *the generation of a recommendation based on the analysis*.

Representing the social systems of work

One of the problems that we want to address is the problem of relevance. Our experience at NYNEX shows a lack of use of ethnography in design, because of the frustration that designers experience in not knowing how to make ethnography relevant to their design efforts. In turn, ethnographers often get frustrated because of the lack of impact their studies have on design. We believe that this has to do with problems with *the representation* of the social systems. Representations should be linked to design.

Concepts that are relevant for design have to be represented within the context of their social environment.

A written description, although a form of representation, is not a representation that is used very often by system designers. Our claim is that creating a shared understanding of the ethnographic findings can be accomplished by using a well-defined modeling framework to represent ethnographic data in a shared medium. The framework should relate all aspects of a system in one coherent and fairly simple model or set of models? Shared understanding is created by modeling both the formal system aspects as well as the social system aspects in one model. This helps in crossing the boundary of incorporating the social systems of work within a design effort.

The modeling framework

A modeling framework defines a categorization of the world, which helps to get a better understanding of the world. In the case of SEA, such a modeling framework is important for creating an understanding of social systems. We have developed such a framework, named the World Modeling framework [5]. World Modeling distinguishes eight modeling aspects, and one distribution aspect (dependencies between the eight other aspects) that are important for any type of system. Together these nine aspects allow us to categorize the formal, informal, and social systems of an organization. The analysis of these nine aspects are defined as separate modeling activities. The nine activities are:

I. *The "what" aspects of the system.* This describes the functional aspects of the system. You can think about this aspect as a description of "what the system is doing" or "what the agents in the system are doing". This aspect is modeled in the **process or task/activity model**.

II. *The "on what" aspects of the system.* This describes the universe of discourse of the system. You can think about this aspect as a description of "on what domain" does the system has to operate, and what is the data structure of this domain. This aspect is modeled in the **object model**.

III. *The "with what" aspect of the system.* This describes the knowledge within the system (i.e. the knowledge contained within the "what" aspect). You can think about this aspect as a description of the expert and social knowledge within the system. This aspect is modeled in the **knowledge model**.

IV. *The "organizational" aspects of the system.* This describes "who does what" within the system. This aspect describes the formal and informal roles of agents, the organizational structure, and the power relations within the system. This aspect is modeled in the **organization model**.

V. *The "when" aspect of the system.* This describes the control over and timing of the "what" aspects of the system. You can think of this aspect as a description of the temporal relations (description in time) between the system functions in the "what" aspect of the system. This aspect is modeled in the **timing model**.

VI. *The "resource" aspects of the system.* This describes the resources used to implement the "what" aspects of the system. Resources can be specific hardware, people, infrastructure, etc. This aspect lends itself to describing specific technical requirements that constrain the implementation of the system. This aspect also describes the actual people that play different organizational roles in the organizational aspect. This aspect is modeled in the **resource model**.

VII. *The "communication" aspects of the system.* This describes the communication between resources within the system. This can be human-human

communication as well as human-computer communication. This aspect is modeled in the **communication model**

VIII. *The "geography" aspects of the system.* This describes the location-specific aspects of the system, such as where the people are located.

IX. *The "distribution" aspects of the system.* This describes the relationships between the other eight modeling aspects. For example, here you describe the distribution of the independent roles that exist within the organization model over the related aspects. This aspect is modeled in the **distribution model**.

Using these aspects as part of the framework within which one categorizes and describes the observations done within a specific study, we can create a model of the data that is captured during observation. Using such a common framework can help an ethnographer in the understanding and analysis of the data, as well as to communicate their findings to designers better and more easily.

From our research we have seen that modeling reduces complexity by creating categorization and order through which people can create meaning, in order to get a shared understanding [6].

Conclusions

Social systems analysis is an important part in designing effective work places. In this paper we have identified some of the problems that exist with using ethnography in work systems design. In particular, we mentioned the time and relevance factors. We described selective ethnographic analysis as a modeling method for work place ethnography. World Modeling is a qualitative modeling framework that can be used to

categorize the ethnographic data, model and analyze the relevant data, and communicate recommendations to the designers.

The Work Systems Design group at NYNEX Science & Technology, in collaboration with the Institute for Research on Learning, continues to research ways to model and represent the social systems of work, in order to design more effective work places.

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