A Participatory Design Project on Mobile ICT

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INTRODUCTION

Statistical data on employees in Europe indicate the increased prevalence of new types of work and organisations (Lilischkis, 2003; Lilischkis & Meyer, 2003). There is a lot of quantitative evidence of the spread of mobile e-work. SIBIS (2002/2003) defines mobile workers as those who spend some working time away from their home or workplace such as on business trips, in the field, or on customer's premises. High intensity mobile workers are those who work in a remote location at least 10 hours in a week. Mobile e-work is defined as high intensity mobile work in the course of which an online connection to the Internet and to company computer systems is used. User-oriented information and communication technology (ICT) facilitates, enables, and supports mobile work and workers.

Useful communication and collaboration tools are a prerequisite for effective e-work. However, the usability and reliability of the tools also affect the functioning and well-being of the dispersed mobile group, as well as the individual worker's well-being (Hyrkkänen, 2006; Richter, Meyer, & Sommer, 2006; Vartiainen, Hakonen, & Kokko, 2003). In developing user-oriented communication and collaboration equipment, much attention has been paid to the tools themselves. On the other hand, the fact that the development of new electronic tools challenges the development of the entire work activity system has received little attention.

When a newly developed tool is launched, the old and new practices collide and a number of conflicts emerge. In the worst case, this leads employees to spend their time resisting the change. Tool development should be expanded to include working concepts in which attention is paid to developing the entire work activity system (Carayon, 2006; Engeström, 2006). In this case, it is important to get the users to take part in the new tool development. Then errors and misunderstandings in user-designer collaboration could also be seen as positive potential, forcing the participants to reflect on their roles and perspectives and to further develop their shared understanding of the development project (Engeström, 1999; Hartswood & Procter, 2000).

The purpose of this article is to describe and assess the participatory development process of a palm computer with special software from the work activity system point of view and analyse the benefits and drawbacks experienced by an employee while testing, implementing, and using a new communication and collaboration tool. This study focuses on the maintenance personnel of Company Alpha (the name has been changed for this study). The workers are responsible for the maintenance and serving of real estate.

BACKGROUND

Ergonomics is concerned with human-machine interface technology or user-interface technology, which is often also referred to as microergonomics (Hendrick & Kleiner, 2001). Larger work systems have to be considered when there is a need to better understand human–technology interaction, capabilities, and limitations. Work systems are complex sociotechnical systems (Carayon, 2006), and therefore, it is not relevant to focus on interface design alone when new tools are developed. Macroergonomics is an approach which attempts to achieve a fully harmonised work system at both the macro- and microergonomic levels by integrating principles and perspectives from industrial, work, and organisational psychology (Kleiner, 2006).

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Figure 1. The generic work system

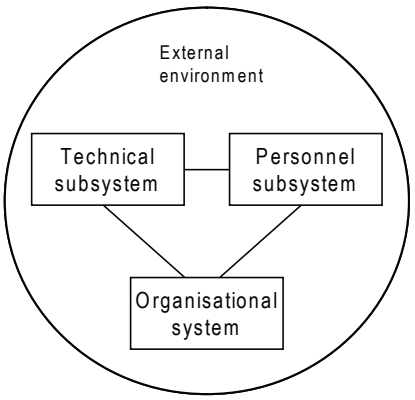

Figure 1 illustrates the generic work system adopted from Kleiner (2006). The work system consists of a personnel subsystem, where two or more people collaborate; a technical subsystem, where people are interacting with technology; and an organisational system, which includes physical and cultural internal environment of an organisation and an external environment.

Mobile work is a potentially interesting area of new applications for mobile ICT. Designing new ICT tools for mobile work systems is a challenge because our understanding of these systems is still fairly limited. Most of the literature addresses the product design from the stationary point of view, either describing the features of a product in a known use context or discussing the product development associated with manufacturing or marketing (Clark & Wheelwright, 1994; Kamrani & Salhieh, 2003; Lewis, 2001; Magrab & Magrah, 1997). Few studies have focused on mobile systems used in highly dynamic contexts (Kjeldskov & Stage, 2004).

Participatory design is a field of research and a progressive practice among professional designers (Kensing & Blomberg, 1998). In participatory design, the end users are invited to cooperate with the developers in a product development process. Potentially, they are expected to participate in several stages of the development process. Among others, Olsson and Jansson (2005) and Kensing and Blomberg (1998) claim that participatory design is essential in developing and testing new products. Ulrich and Eppinger (2004) have also emphasised that an information channel between product users and the designers of the new product has a crucial role in order to discover relevant product features to meet users' needs. However, earlier studies of participatory design have focused on issues like the design process, concept communication, product specification, and prototype trials. Studies rarely focus on the importance of the work contexts where the new products will be used. This article examines the participatory design process from the natural work context view by reporting a case study of a working tool development for the mobile maintenance team.

The people examined represent a group of 12 male employees working under the supervision of one foreman in a maintenance district located in Finland. The data were gathered through semistructured interviews and by observing the working habits of the employees. The model of the generic work system described in Figure 1 was used for analysing the data: the data were coded and classified according to the factors of the system with the help of AtlasTi programme. A parallel coder was used for confirming the reliability of coding. After parallel coding, the parameters of classification were redefined.

MAIN FOCUS OF THE ARTICLE: PARTICIPATION AND COLLABORATION IN WORK AND TOOL DESIGN

Company Alpha maintains and modernises buildings. The real properties to be serviced were divided into districts. The service districts were further divided into maintenance areas, each with one employee responsible for the maintenance. The maintenance work consisted of the service tasks defined in the maintenance contract, emergency situations demanding immediate responses, and possible on-call and specific tasks.

Each employee used a maintenance van to move from one service location to another and transfer all the necessary spare parts and maintenance equipment. The employees drove directly from home to the service area, where they started work at seven o'clock in the morning. They visited the office only for specific reasons. The maintenance men ended their working day at four o'clock after which they drove straight home.

Twelve maintenance men worked as a community and cooperated with each other when necessary, despite working in a mobile and dispersed manner. For communication and collaboration, they used handheld computers and mobile phones.

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