



# Participatory design with train drivers — a process analysis

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## Abstract

A participatory design process involving train drivers is analyzed and described in this paper. A group of six drivers were involved in the design process, and within a short period, four design iterations were completed. The present case study was the final part of a larger research project (TRAIN) investigating the train driving task including the drivers' information environment, number and nature of hours worked, work situation and work environment, and their effect on the drivers' behaviour and the train driver system safety.

Although usability activities are widely used in IT development today, the users are not involved to the desired extent. This paper argues that to produce usable systems, quality time has to be spent initially to acquire knowledge of a work domain and establishing a common ground in terms of shared knowledge and a better understanding of the work context between the parties involved in system development. Our suggestions on participatory analysis and design that conclude the paper are based on the present case study including train drivers, as well as our experiences from previous case studies.

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*Keywords:* Participatory design; Collaborative design; System design; User involvement

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## 1. Scope and introduction

The scope of this paper is twofold, to explore process aspects of participatory design and to apply this knowledge in the design of a system supporting train drivers' work. We argue that, to address usability problems in highly qualified work settings, we must involve

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users in the usability activities to a much higher extent than at present, and much earlier in the system development process. To make a distinction, the kind of usability problems discussed here are not just a question of how people interact with computers on the surface. The problems we talk about hinder the users from achieving their goals efficiently in relation to their work activities. Such work activities may involve segments of repetitive patterns, but in general, they are complex, demanding the user to plan and make important decisions and often exchange information and collaborate with colleagues. This description pictures a highly qualified work setting, which is what many people face today. Below we review a few issues in the system development process related to user involvement. If these issues are ignored, they are likely to lead to systems with poor usability. User involvement is not an experiment where we want to study users in order to understand them, as if they are a particular kind of people. Instead, we need to understand what they do at work and what they want to achieve.

### *1.1. An incomplete analysis results in an unfinished design*

There are numerous examples of design solutions that fail to meet the users' needs and hence turn out to be unusable. It has for instance been reported that 63% of all large software projects overrun their budgetary estimates; the top four reasons are all related to unforeseen usability problems, e.g. frequent requests for changes by users and overlooked tasks (Lederer and Prasad, 1992). Furthermore, the Chaos 1995 report (Standish Group, 1995) indicates that more than a quarter of the projects surveyed were completed with only 25–49% of the originally specified features and functions. The main precursors to failure were lack of user input, incomplete requirements and specifications, and changing requirements and specifications.

Our aim is to design good systems. However, good design requires a deeper understanding of the target domain, and lack of design insight is one of the main reasons for poor design (Thimbleby, 2000). Present design solutions are in general poor from a use perspective, the technology in itself does not hinder efficiency, effectiveness, and satisfaction, but the design solutions are often not carefully crafted. Problems may remain although a design is considered complete, and by then they are left to the user to solve, a completely unexpected situation from the user's point of view, who wants to accomplish quite a different task.

New technology has a significant impact on work organisation and job design, but in practise, these aspects are largely ignored. They are typically addressed late in the process because then the consequences are discovered (Clegg et al., 1997). New support systems usually require tasks to be performed in sequential flows; moreover, dependencies between different tasks are often disregarded. Consequently, work procedures become restrained and information becomes fragmented. Natural work, in contradiction, is flexible and often interrupted by phone calls, visiting customers or colleagues that need attention. Whether support systems allow flexible troubleshooting in complicated situations, which inevitably arise in all workplaces, determines the efficiency of work more than logic and sequencing of task flow (Sachs, 1995).

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