Chapter XXIII
Systems Design with the Socio-Technical Walkthrough

Thomas Herrmann
University of Bochum, Germany

ABSTRACT

Socio-technical systems integrate technical and organizational structures and are related to various stakeholders and their perspectives. The design of socio-technical systems has to support this integration and to take the differing perspectives into account. To support this goal, the design concepts have to be represented with appropriate documentation methods, which combine formal and informal aspects. Communication processes have to be facilitated which systematically refer to these kinds of documentation. Therefore a socio-technical, semi-structured modeling method (SeeMe) is introduced. It represents socio-technical concepts with diagrams which can be developed, evaluated and improved by the socio-technical walkthrough (STWT). This facilitation method—together with a corresponding software-tool—has proven to be suitable for socio-technical design in complex, practical projects.

A maximum of explicitness leads to a minimum of understandability

—Ungeheuer, 1982
(translated from the German p. 328)

INTRODUCTION

Socio-technical systems comprise the interaction and dependencies between aspects such as human actors, organizational units, communication processes, documented information, work procedures and processes, technical units, human-computer interactions, and competencies. They are characterized by continuous evolution which is influenced by interests, conflicts and power relations. The socio-technical walkthrough ("STWT," Herrmann, Kunau, Loser and Menold, 2004a; Herrmann, Loser

and Jahnke, 2007) is a methodological approach to take this multitude of aspects into account and to make them the subject of communication, negotiation and decisions in the course of the development of socio-technical systems. The documents which accompany the STWT mirror these aspects and build bridges between the developing competencies, organizational change, programming or configuration of software and identification of appropriate hardware. We suggest that the expectations of the various stakeholders being involved are better met:

- the more technical and organizational structures as well as relevant competencies are integrated and aligned to each other, and
- the more the different perspectives of the stakeholders are taken into consideration, valued and integrated during the discourse which accompanies the participatory design and evolution of socio-technical systems.

Systematical support of socio-technical system design can be based on a wealth of methods, guidelines and principles, for example design principles according to Eason (1988) Cherns (1976) and (1987); "ETHICS," Mumford, (1995); "scenario-based design," Carroll, (1995); or "socio-technical requirements-engineering," Jones & Maiden, (2005). The background of Participatory Design (e.g. "MUST," Kensing, Simonsen and Bødker, 1996) provides guidance on how to integrate the experience of different stakeholders. However, the documentation of the requirements and concepts which accompany the design process do not usually sufficiently support an integrated view on varying aspects such as technical and organizational structures. The experience within a series of practical projects reveals that the available approaches, like prototyping, diagrams of use cases, story boards, mock-ups as well as a set of different visualizations (e.g. for contextual design Holtzblatt, 2002) do not sufficiently support an integrated (over-)view of the interrelationships between the aspects of socio-technical systems. For example, prototypes direct the feedback of evaluators on issues of screen design and lead to a neglect of issues concerning work processes and cooperation between users.

A central problem of socio-technical design is the integration of technical functions with social structures and perspectives. This problem can be overcome by appropriate guidance for conducting workshops and by means of documentation. We propose the socio-technical walkthrough (STWT) as a documentation and facilitation method. It has been gradually developed, evaluated and incrementally improved during the course of several practical cases (Herrmann, Hoffmann, Kunau and Loser, 2004b) in the field of Computer Supported Cooperative Work (CSCW). A set of workplaces where several people's cooperation and communication is supported by CSCW-software is a typical example of a socio-technical system. The STWT combines two parts: the **s**ocio-technical, s**e**mi-structured modeling **me**thod SeeMe with which diagrams can be developed to document the concept of the socio-technical system, and a facilitation method for workshops where walkthroughs are applied to the SeeMe-diagrams to inspect and improve them step-by-step by asking certain questions. For example, the STWT helped to develop a solution for improving the coordination between dispatchers and truck drivers with mobile handhelds (cf. the CASE-STUDY section below). Both roles as well as software-engineers and a project manager were involved to discuss and improve diagrams step-by-step. They clarified the technical functionality needed and the accompanying organizational change. After deliberate analyses and negotiations in four workshops the participants agreed upon more than 10 comprehensive diagrams which described the projected solution. The series of STWT-workshops can serve as a scaffold which sustains projects where software-development, organizational change and development of competencies are parallely pursued.

The theoretical background of socio-technical systems—as referred to by the STWT—is outlined in the following section. A further substantiation of the STWT is given by describing our research approach. The following sections describe the modeling method SeeMe, the particularities of the