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STUDIES OF SYSTEMS DEVELOPMENT AND EVALUATION: COLLABORATION – INFORMATION SEEKING – USABILITY

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ABSTRACT

Systems development is an example of a loosely structured domain with few accredited best practices, fairly self-organising groups, and a disturbing number of unsuccessful projects. To devise tools that more effectively support system developers in successfully accomplishing their work it is necessary to identify and scrutinise the prime constituents of this work. Based on both field studies and experimental work three such constituents are being studied: collaboration, information seeking, and usability.

Collaboration. System developers are responsible for the accomplishment of a task that requires close cooperation within the project group and frequent interactions with external actors to exchange information, negotiate commitments, and so forth. Colleagues often assist each other in providing hitherto unknown sources with an initial face and a trusted opinion about the credibility of the source (Hertzum, in press). It is, for example, a normal conversational practice to accompany the mentioning of information sources that may be unknown to some project participants by information that puts them in context. Systems for managing knowledge and sharing expertise must provide equally rich means of forming a perception about the trustworthiness of documents and other pieces of information. In working with system requirements, developers also need tools for generating and managing an inclusive set of system requirements. The multi-board concept (Robotham & Hertzum, 2000) sketches a low-tech, scenario-based tool for doing this. Aspects of the concept include construction of a common working environment where multiple display boards depict scenarios of the product life cycle and, thereby, support the creation of a shared mindset amongst the system developers.

Information seeking. Information seeking is a crucial aspect of cooperative work. Several studies provide evidence that engineers spend 40%-66% of their time communicating in order to get input to their work and to output results from their work. Developers of systems and products search for documents to find people, search for people to get documents, and interact socially to get information without engaging in explicit searches (Hertzum & Pejtersen, 2000). The intricate interplay between document and people sources arises from the nature of the design task. Many possible solutions are normally available to the developer and in choosing one over the others the developer must consider a complex set of issues involving both the product as such and its context. However, design documentation seems to be biased toward technical aspects of the chosen solution, whereas information about the context of the design process is typically not available. Hence, people become a critical source of information because they can explain and argue about why specific decisions were made and what purpose is served by individual parts of

a design. This suggests that people finding is an important activity and that it should be analysed whether/how systems can support searches for people (Hertzum, 2000).

Usability. Although the importance of usability is gaining widespread recognition, considerable confusion exists over the actual meaning of the term. Sometimes usability is defined quite narrowly and distinguished from, for example, utility. On other occasions usability is defined as a broad concept synonymous to quality in use. While it is tempting to assume simple, general relations between effectiveness, efficiency, and satisfaction – the three aspects in ISO's definition of usability – this does not seem to be the case (Frøkjær et al., 2000). This suggests that, at least for complex systems, it is necessary to measure all three usability aspects independently to be able to make statements about system usability. In addition to the conceptual ambiguity, it has been found that current methods for usability evaluation – such as thinking-aloud studies – suffer from a substantial evaluator effect (Hertzum & Jacobsen, in press). That is, multiple evaluators evaluating the same system with the same evaluation method detect markedly different sets of problems. The evaluator effect exists for both novice and experienced evaluators, for both cosmetic and severe problems, for both problem detection and severity assessment, and for evaluations of both simple and complex systems. System developers need more robust methods to systematically improve the usability of computer artefacts. The simplest way to achieve some of the needed robustness is to involve at least two evaluators in usability evaluations.

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REFERENCES

Frøkjær, E., Hertzum, M., and Hornbæk, K. (2000). Measuring usability: Are effectiveness, efficiency, and satisfaction really correlated? In *Proceedings of the ACM CHI 2000 Conference* (pp. 345-352). ACM Press, New York.

Hertzum, M. (2000). People as carriers of experience and sources of commitment: Information seeking in a software design project. *The New Review of Information Behaviour Research*, 1, 135-149.

Hertzum, M. (in press). The importance of trust in software engineers' assessment and choice of information sources. To appear in *Information & Organization* (Spring 2002).

Hertzum, M., and Jacobsen, N.E. (in press). The evaluator effect: A chilling fact about usability evaluation methods. To appear in *International Journal of Human-Computer Interaction* (Spring 2002).

Hertzum, M., and Pejtersen, A.M. (2000). The information-seeking practices of engineers: Searching for documents as well as for people. *Information Processing & Management*, 36(5), 761-778.

Robotham, T., and Hertzum, M. (2000). Multi-board concept - A scenario based approach for supporting product quality and life cycle oriented design. In I. Horváth, A.J. Medland, and J.S.M. Vergeest (eds.), *TMCE 2000: Third International Symposium on Tools and Methods of Competitive Engineering* (pp. 763-774). Delft University Press, Delft, The Netherlands.