In Proceedings of Amia 2002.

Defending Clinician Values: Quality-in-Use of Decision Support Systems for Thoracic Surgery

Linda Lidman[1,2] M.Sc., Ankica Babic[1, 5] Ph.D., Mattias Arvola[2] M.Sc.
Urban Lönn[3], MD, Ph.D., Henrik Casimir-Ahn[4] M.D., Ph.D.
1. Medical Informatics, Dept of Biomedical Engineering, Linköping University, Sweden.
2. Department of Computer and Information Science, Linköping University, Sweden.
3. Department of Cardio-Thoracic Surgery, Uppsala University Hospital, Sweden.
4. Linköping Heart Center, Linköping University Hospital, Sweden.
5. Faculty of Electrical Engineering, University of Ljubljana, Slovenia.

The aims of the practical work carried out within this research were to redesign a clinical decision support system for thoracic surgeons, called AssistMe [1] and to evaluate the concept behind this system.

The main objective was to give an account of the design considerations that were found to be of key importance when designing a clinical decision support system for thoracic surgery like AssistMe. Another aim was also to let future users test the system after it had been redesigned and evaluate the concept behind it. Investigated were also the users' experience of the system and their views on whether it would be applicable in their daily work practice. An account is also given of experience of using a notation called Question Options Criteria (QOC) [2] during the design space analysis in a real design project like this one.

In order to design a system that the thoracic surgeons were willing to use in their daily work, it was believed to be important to start with and focus on the thoracic surgeons, their needs and work practice. An ethnographically inspired contextual inquiry [3] was hence undertaken in the Department of Thoracic Surgery of Linköping University Hospital. These field studies along with other inquiring and analytical activities such as task analysis and the making of scenarios led to the establishment of a number of qualities-in-use for decision support systems for the practice of thoracic surgery. Social qualities such as "serving the team mind" of a thoracic surgery team and aesthetic qualities such as the "feeling of trust and accountability" were found to be important. Further, practical qualities such as "interruptability", "ease of learning" and "effective interaction" and psychological qualities like "providing cognitive relief" and "providing psychological support" also came out of the understanding for the demanding, clinical work situation. Finally the quality of "freedom of choice for the clinician" was found to be essential as a quality fundamental to human well being, personal development, independence and flexibility; essential ingredients of job satisfaction for a clinician [4].

The aforementioned qualities-in-use and identified indicators of these qualities were used to guide further design efforts. During these efforts, that could be described as a design space analysis, the QOC-notation was used, but later abandoned because of the sever difficulties of incorporating the notation into the process of design. Despite efforts, the notation turned out to hamper rather than help. The main reason for this was believed to be the cycle of reflection-in-action [5] that design entails.

The design endeavours led to the production of Low-fidelity prototypes that were tested and revised and later also a Hi-fidelity prototype. This Hi-fidelity prototype was evaluated by a number of thoracic surgeons in think-aloud sessions. These sessions were all concluded with the surgeon giving his views on the underlying concept and the applicability of the system in his daily work practice.

The result shows that AssistMe is believed to be applicable in the practice of thoracic care and it also points to a positive attitude towards the system concept. As one of the surgeons put it; "*medicine is supposed to be practiced on the basis of both experience and science. AssistMe can help experience be acknowledged in a scientific way and help experience gain recognition as the important instrument that it really is in medical practice"* (excerpt from field notes).

References

[1] http://lincoln.imt.liu.se , March 2002
[2] MacLean, A., Bellotti, V. & Young, R.M. (1989), Design Rationale: The argument behind the artifact. In *Proceedings of CHI'8*9, May 1989.
[3] Beyer, H. and Holtzblatt, K. (1999). Contextual Desig*n. Interactions,* vol. 6, no. 1.
[4] Friedman, B. (1996). Value-Sensitive Design. *Interactions,* vol. 3, no. 6.
[5] Schön, D.A. (1992). Designing as reflective conversation with the materials of a design situation. *Knowledge-based system*s, vol. 5, no. 1.