

Identifying Ergonomic Requirements of ICT for Healthcare Working Systems

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Introduction: In an ageing society solutions are needed, which can help to overcome the trade-off between the increasing demands and the limited resources. An eligible approach to gain higher quality, safety, and efficiency in healthcare working systems seems to be the use of modern technology such as information and communication technology (ICT) (Carayon & Friesdorf, 2006).

Available ICT solutions for healthcare working systems often lack in usability or evident process support. Errors can occur leading to inefficiency or even jeopardize the patient's safety (Backhaus, 2010, Backhaus & Friesdorf, 2007). Different studies show that the anticipated benefit (improving quality of care and reducing costs) could be realized only partially (Himmelstein et al., 2010). In most cases ICT is either partly or not at all compatible to other digital systems. Overall the prevalence rate of available (medical) information systems as well as their range of functions is still in less satisfaction (Haas, 2005).

Due to medical and technical progress the way how ICT can be used to support treatment processes are varying strongly and changing quickly. For example, the importance of applications used at home is continuously increasing. Therefore the group of potential users (e.g. patient or care giving relatives) is expanding and the customer's requirements are getting more heterogeneous. These aspects cause that the complexity in a user-oriented development process is more and more increasing. Therefore the ergonomic design of systems, products and services matching the user demands is a highly challenging process especially for healthcare working systems. (Glende & Podtschaske & Friesdorf, 2009).

Methods: General guidelines have to be specified by using usability context analyses. Guidelines on how to perform a usability context analysis are available in the standards but they are insufficient for analyzing complex working systems. In this case domain specific models and methods are necessary. The Objective of this contribution is to illustrate the issues related to the ergonomic development of ICT applications for healthcare working systems. In order to solve these problems domain specific models and developed methods are shown to specify usability context analyses for healthcare working systems. The presentation is divided into the following parts:

1. Introduction of the general ergonomics approach and corresponding International Standards;
2. Demonstration of characteristics of the field "healthcare working systems";
3. Development of domain specific ergonomic models and methods for an usability context analysis in healthcare working systems;

4. Evaluation of the developed models with the help of a case study.

Results: The case study illustrates various tasks that have to be supported by ICT during an abdominal surgical treatment process. With the aid of a requirement catalogue it is possible to derive detailed functions that are suitable for the task. Such a catalogue of requirements is essential in order to define and develop an utilizable ICT for healthcare working systems. Some requirements cannot be implemented easily. For example, the consideration of different demands of stakeholders is not a trivial task. Design requirements, e.g. concerning aggregation of data and information, depend on the corresponding care provider and the (sub-) task.

The case study shows the suitability of models to illustrate complex interrelations of patient treatment. Based on the results the requirements are defined and task-supporting functions are derived. The models afford the development of a “common ground of understanding” between the potential user and the developers of the product. Necessary expertise and different perspectives can be submitted in the process of product development and product evaluation. This is a crucial pre-condition for developing integrated and utilizable (software) products and therewith for developing ergonomic working systems.

Discussion: In order to improve the quality of the results further usability context analyses (e.g. chronic heart diseases, dementia patients, diabetes mellitus) are recommended. Additionally investigations such as usability tests and simulations are necessary to evaluate the efficiency of use and the satisfaction with the product.

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