Prospects and Limits of Conceptual Models for WBT Course Production

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Abstract: This paper is based on experiences with the production of web-based training (WBT) courses for a course of studies in medical computer science. Course production is regarded as software development process, which starts with conceptual models shaping the design and defining the way the software product is presented to the user. This paper reports experiences with conceptual design models and shows the danger of being insufficient or incorrect.

INTRODUCTION

Our project "Distance Education in Medical Computer Science" (started in January 1999) aims at providing a complete course of studies for the specialization of students in medical computer science, offered at a virtual university. Our responsibility is to transfer the linear text documents (mostly MS-Word format) into hypermedia networks and multimedia courses, which means practicing reverse engineering for WBT course development.

PROBLEMS WITH CONCEPTUALIZING WBT COURSES

The transfer of a text document to hypermedia means transformation of format, gain of flexibility, interaction capabilities and so on. Hypermedia and multimedia courses can be used in ways beyond the intentions of the content author. On the other side, people occupying other roles in the development process, like multimedia designers, or quality managers do not know about the content domain or didactic aspects. The static version, which the content author had in mind, has only one dimension of presentation. Accordingly, the semantic (content) structure and the didactic structure of the course are intertwined. Most authors are not able to separate both structures in a way applicable for hypermedia production and vice versa the multimedia experts are normally no experts in the semantic domain or in didactics, therefore, they can hardly explain their needs to the content authors. This lack of knowledge in each others domain results in unintended course structures, unnecessary restrictions or other mismatches. A similar problem arises if the author for example has to start with specifying a semantic model and then would have to design for different learner groups.

Furthermore, we found in our projects, that media designers, producers, and content authors often have insufficient, incomplete, and partly incorrect models about the learners, the task and the situation of use. The models vary at different times during the period of course production.

COURSE PRODUCTION AS SOFTWARE DEVELOPMENT PROCESS

Our approach to course production as practised in our projects is to regard the production of hypermedia and multimedia WBT courses as a software development process. As for many other software systems, it is also true for the development of WBT courses: To realize a user and task adequate human-computer-system, developers have to take into consideration all system components: user, task and situation in order to form a conceptual model that is as adequate as possible [1]. The conceptual model of the developers shape the software product, in our case the WBT course, and therefore, will decide how usable and user-friendly the WBT course will be and how adequately it will support learning processes.

Figure 1 shows the different models we have to deal with in the context of WBT course production. First of all there is the developer's mental model the design process starts with. In the case of WBT course development we have to deal with diverse developers. In our project there is the conceptual models of the content author, of the designer, of the HT/MM producer and of the quality manager. Furthermore, there is the learner's mental model

about the application domain, how the WBT course is implemented and how it supports learning processes. And last but not least, there is the system's model, which contains the way the application domain is implemented and sometimes information on the user's interaction with the system. Each model represents the complex domain of interaction with WBT courses from a certain perspective and in a specific way.

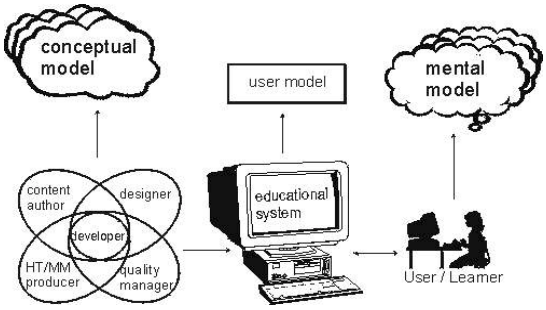

Figure 1 : Models in the context of WBT course production

Mismatches between these models lead to usability problems of the software product. Above all, the importance of the developer's conceptual model for shaping the software product has been noticed for other kinds of software applications for a long time [2], [3]. According to our view, this holds true for WBT courses as well.

CONCEPTUAL MODELS OF DEVELOPERS

A fundamental problem for the development process is, that the developers need substantial and relevant information about the user, the task and the situation of use. They need this information from the very beginning of the design process in order to specify the requirements and shape the WBT course adequately. However, in practice content authors start course production in the traditional way and produce a linear document that includes their conceptual model about domain knowledge and about teaching strategies. This production methods corresponds to the production of traditional lectures for classroom teaching. These courses will not match the situation of use in the virtual university of the future. Lectures on demand have to serve the needs of different user groups and different situations of use. The attributes for users, the task and the situation of use will differ [4] and should have an adequate representation in the conceptual model of all authors. A severe drawback with this situation is, that it is impossible for a content author (and also for the other developers) to take into consideration all these attributes at one time.

In some way, of course, the author is aware of the situations of use and the complexity involved. This might be the reason, why the conceptual model about the user group and the assigned attributes differ from phase to phase of the development process. This is a problem as well. If the conceptual model of the developers includes a prospective mental model of the user and if the design is based on this model, then it will be clear that varying the conceptual model during the development process will result in an inconsistent WBT course, which will be hard to understand and will not support learning processes.

FUTURE WORK

The conceptual models of the diverse developers shape the WBT course and determines the way the educational system is presented to the user and determines if it supports learning processes. Therefore, it is important for the developers to have sufficient and appropriate knowledge about the user, the task and the situation and it is also important that the conceptual models of the diverse authors can be communicated and complement each other during the design process.
With this background we are working on methods to adequately represent conceptual knowledge for the design process [5]. We also want to offer ways to communicate relevant knowledge components between all developers through the whole development process.

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