



The VLEG based production and maintenance process for Web-based learning applications

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ABSTRACT

For the realization and maintenance of high quality and complex Web-based applications there is a need to use sound Web-engineering principles. This paper presents an application for the realization, management and maintenance of Web-based learning applications. Web-based learning applications are very important for the area of E-Learning, which is a field of increasing importance for E-Commerce.

1. INTRODUCTION

In many cases there is a lack of systematic approaches to the development of Web-based systems [MuDe99]. Due to the increasing complexity of Web-based applications there will be an increasing demand for methods and tools, that support the efficient development of Web-based applications. By using adequate methods and tools the costs and time to develop and maintain a Web-based application can be decreased enormously. Furthermore the quality of the resulting Web-based applications will be much higher. [ChZh99]

This paper introduces an architecture of a special kind of Web-based application, a Web-based learning application, the production process of the Web-based application, the architecture of a tool that plays an important part in the production process and the overall process model. The product model of the Web-based learning application is modelled with the well known OOHDM method. The process model can be applied to different kinds of Web-based applications. The importance to differentiate between a product model and a process model is stressed in [Gini98] and [LoHa99]. The tool that plays a very important part in the production process is called the *Virtual Learning Environment Generator* (VLEG). It is a tool for the realization, management and maintenance of Web-based learning applications. Examples of products produced by the VLEG are Web-based learning applications of the project WINFOLine. WINFOLine is a well known german teaching cooperation of the universities of Göttingen, Leipzig, Kassel and Saarbrücken. The following figure 1 shows the situation at the beginning of the WINFOLine project, after the requirements of the Web-based applications had been defined. Figure 2 shows briefly the development method chosen to produce and maintain the Web-based applications.

Figure 1: The situation at the beginning

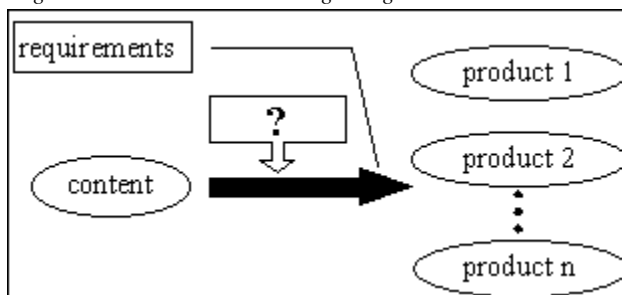
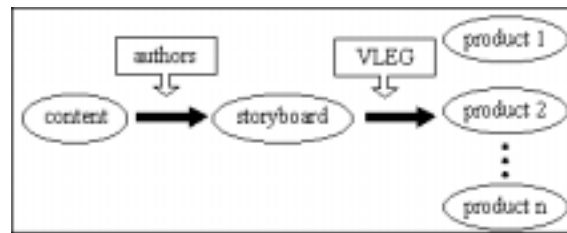


Figure 2: The chosen development method



2. ARCHITECTURE OF THE WEB-BASED LEARNING APPLICATIONS

This chapter presents the architecture and some typical features of Web-based learning applications that are produced by the VLEG.

2.1 Features of the Web-based learning applications

The Web-based learning applications contain the content, communication services and numerous features to support the learning process. Students are able to configure the Web-based learning application according to their learning styles. One of the most important possibilities to configure the Web-based learning application is that students can choose between several output alternatives, e.g. slides, slides and audio, slide and text or slides, text and audio. The following figure shows a sample configuration with slide and text.

Figure 3: Screenshot of a VLEG product (<http://winfoline.wirtschaft.uni-kassel.de/intranet.htm>)

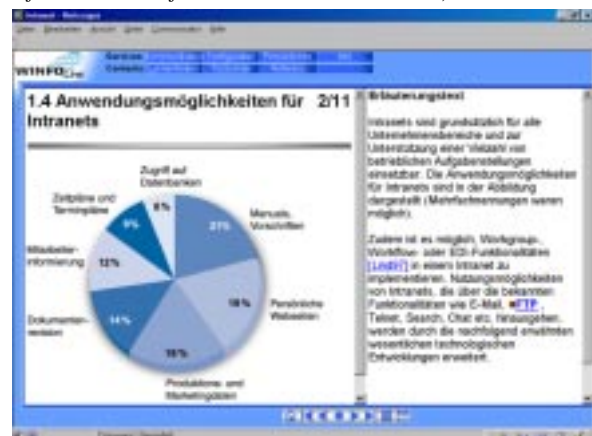


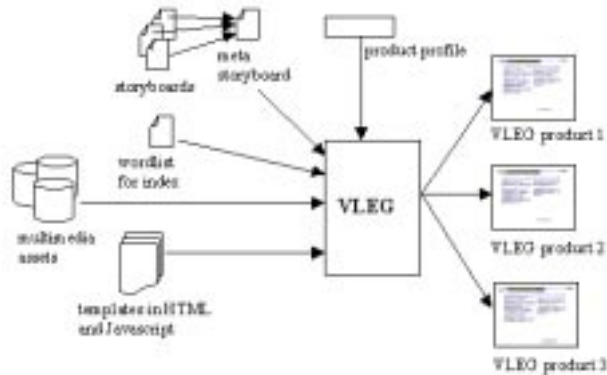
Figure 6: A unit of a storyboard



3.2 The production process

Authors of VLEG products write, modify and manage storyboards. In the meta storyboard the authors decide which storyboards to combine in order to produce a VLEG product. The following figure shows the input and output relation of the VLEG:

Figure 7: Input and output relation of the VLEG



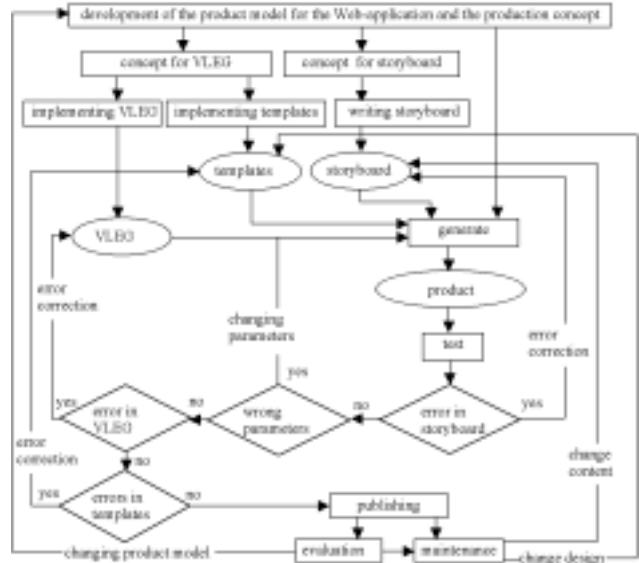
The product profiles are used for the setting up and the management of product configurations. A given product configuration determines the production process of a certain VLEG product. Template files and resource files can be changed by the authors. Therefore it is possible to change the look and feel as well as the functionality of the resulting VLEG products. The VLEG can handle several different sets of template files and resource files. Authors can develop special sets of template files and resource files for Web-based documentations, catalogues and other types of Web-based applications.

The VLEG is able to manage different variants of products. These variants can share resource intensive objects like multimedia assets. The VLEG product for the university course intranet for instance corresponds to a manuscript of 200 pages. The product intranet contains about 50 internal and 50 external hyperlinks that were manually inserted in the corresponding storyboards. By producing the VLEG product intranet, the VLEG created a hypertext with about 800 notes and 5000 hyperlinks. All internal hyperlinks were validated and all the hyperlinks within the slides and texts were semantically enriched by the VLEG during the production phase.

4. THE PROCESS MODEL

The process model shown in the following figure contains the authoring process for VLEG products as well as the development process for the VLEG tool and the template files.

Figure 8: Development process for the VLEG products



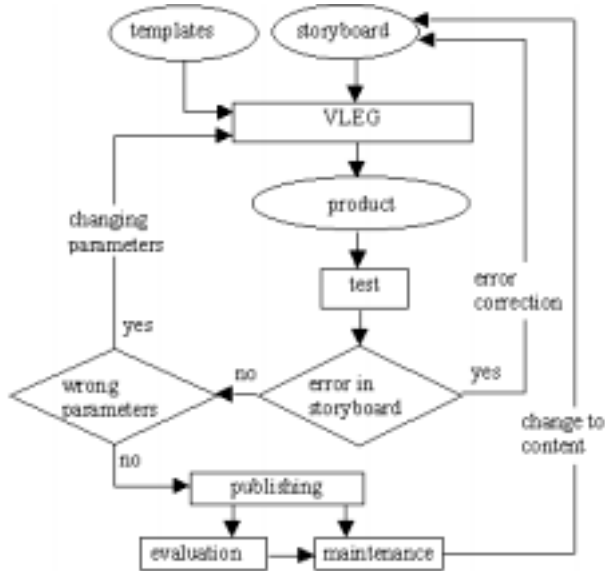
After implementing the VLEG, programming the template files and writing storyboards, it was possible to produce the described type of Web-based applications. Every Web-based application that is produced by the VLEG should be tested, before it is published. The following types of errors could occur:

1. error in storyboard (author)
2. wrong parameters in the product profile (author)
3. error in template files (author or programmer)
4. error in the VLEG tool (programmer)

Errors of type 3 will only occur if new template files are tested. Errors of type 4 could occur if the programmer tests new features for the VLEG tool. If errors of type 3 or 4 occur in other situations as well, this means that either the new template files or the VLEG tool have not been tested properly. After the final tests have been made, the VLEG product can be published. The VLEG products function on web servers and CD-ROMs. There is no need to do any web server specific or operating specific tests. The VLEG products are maintained by changing the storyboard and in rare cases by changing the template files.

The following figure shows the **authoring process**. The main task of an author is to write the storyboard. For the realization of the final Web-based learning application the author executes the VLEG tool, selects the appropriate product profile and activates the production process. If the author notices any mistakes in the storyboard he has to correct them, afterwards he has to restart the production process.

Figure 9: Authoring process for the VLEG products



5. CONCLUSION

For the realization and the management of highly complex and sophisticated Web-based applications the utilization of adequate software tools is necessary. The presented tool VLEG can be used to produce flexible, configurable Web-based learning ap-

plications as well as some other types of Web-based E-Commerce applications. The VLEG helps to reduce the development expense for Web-based learning applications significantly. In addition, the maintenance process is simplified. The VLEG products automatically have many sophisticated features and are especially well suited for Web-based learning. Two years of experience with the VLEG products and product evaluations show that they are highly accepted by different kinds of users.

6. REFERENCES

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