Chapter 20
Document Model and Prototyping Methods for Web Engineering

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ABSTRACT

This paper proposes models for managing documents in a web engineering context. First, it proposes a document model to better manage multilingual composite documents. The approach, inspired by the FRBR report, is to group all versions, translations, formats, etc. of a document in a unique document tree, putting document data and metadata at the same level. Then it proposes a model for prototyping applications, using a combination of class-based inheritance and prototype programming principles. This model applies to document models, documents views and actions. Finally, it proposes a metadata management model, laying foundations for easier integration and management of information in web applications. The proposed models are implemented in the framework Sydonie and several applications are built with the model and framework.

1. INTRODUCTION

This article extends a communication that appeared in the Research Challenges in Information Science 2013 conference proceedings (Lecarpentier, Brixtel, Le Crosnier and Bazin, 2013). Our Document Models are presented here in a more in-depth manner, with information about our metadata management model and how our Document model is extended to the templates and action management.

As the web evolves, we need frameworks to manage documents, not only content. Documents are composite, multilingual, multimedia. They also include metadata for copyright management, archiving and reuse.

Web Designer's current practices include trial and error process and building upon existing blocks. Agile development methods are well suited for such an approach.

This article focuses on providing models for documents on the web and addresses the following issues with documents in web applications:

- **Multimodality:** A same "document" may be available in different versions (translations, formats, sizes, etc.);
- **Redundancy:** Avoid duplication of information when documents are available in different versions. For example if a document is available in HTML and PDF, most information and metadata is the same for the two versions, such as title, author, document language, classifications indices for example;
- **Prototyping:** Developers must have default document models, routines and default views to be able to quickly create application prototypes;
- **Metadata Management:** Applications must be able to provide comprehensive metadata; map data to the application model and embed metadata in documents.

We propose a set of models to answer the above issues and focus on documents and their metadata. First we propose an extensible document model. Based on previous work by librarians, our model considers a document as a tree structure composed of its various forms (abstracts, translations, formats, etc). The model includes ways to manage document data and metadata, putting them both at the same level within the document tree. Using enhanced object-oriented concepts, we propose a prototyping model that provides web designers with a highly flexible development environment. Finally, we propose a metadata management model to integrate document metadata in web pages and

documents. The proposed models are implemented in a free software web development framework called Sydonie[1].

This paper focuses on the following aspects of the framework: Sydonie's document model, its prototyping model and metadata management, and is structured as follows. The next Section gives an overview of related work in the MDWE field and CMS industry. The following Section presents our document model, how document data and metadata is captured and introduces our model for prototyping applications. The next Section gives some implementation details. Then, we present how the framework manages metadata and the benefits of the approach. Finally, we present an informal evaluation of the approach and a discussion of our model. This article concludes with a summary of the contributions and an overview of future work.

2. RELATED WORK

Building web applications has become a complex task. Designers have to manage client side and server side programming, user interaction and so on. Over the years, Web Engineering has become a discipline (Murugesan & Deshpande, 2001), and most applications implement design models and concepts (Gellersen & Gaedke, 1999). To address the complex tasks of designing web applications, MDWE approaches aim to model an application's concepts. The design is then mapped into an implementation to deliver the application, using a top-down process. On the other hand, CMS are commonly used in the web development community to create web applications. They provide functionalities to easily create and publish content. Predefined document types and ready-to-use modules allow for customization of the web site or application. CMS usually focus on content creation and publication, and allow

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