Multichannel Publication of Interactive Media Documents in a News Environment

Tom Beckers
Ghent University-IBBT
Sint-Pietersnieuwstraat 41
Ghent, Belgium
tom.beckers@xmt.be

Nico Oorts
VRT
Auguste Reyerslaan 52
Brussels, Belgium
nico.oorts@vrt.be

Filip Hendrickx
IMEC
Kapeldreef 75
Leuven, Belgium
filip.hendrickx@imec.be

Rik Van De Walle
Ghent University-IBBT
Sint-Pietersnieuwstraat 41
Ghent, Belgium
rik.vandewalle@ugent.be

ABSTRACT

Multichannel publication of multimedia presentations poses a significant challenge on the generic description of the presentation content and the system necessary to convert these descriptions into final-form presentations. We present a solution based on the XiMPF document model and a component based system architecture.

Categories and Subject Descriptors

H.5.1 [**Information Interfaces and Presentation**]: Multimedia Information Systems; J.7 [**Computers in Other Systems**]: [Publishing]; H.5.4 [**Information Interfaces and Presentation**]: Hypertext/Hypermedia—*Architectures*

General Terms

Design, Languages, Experimentation, Management

Keywords

Multimedia, multichannel publication, framework, device independence, standards, XML, interactivity

1. INTRODUCTION

The emergence of powerful networked devices such as mobile phones, personal digital assistants and set-top boxes brings about a dramatic diversification of the means of multimedia consumption. Web Information Systems need to be able to select and adapt content in order to target diverse types of client devices taking into account the delivery channel properties and user preferences.

In this paper, we focus on the key challenges raised in the development of a novel publication framework. The first challenge comprises the development of a multimedia presentation description model. We facilitate the reuse of multimedia resources and presentational information across heterogeneous consumption platforms through the integration of several existing description languages for structure, layout, synchronization and interactivity in a high level description model.

The second challenge relates to the development of the publication engine. We developed a component based system within the Apache Cocoon environment. This is demonstrated in an interactive, multimedia news environment where

news content is delivered to a web browser, a television set-top box and a handheld device.
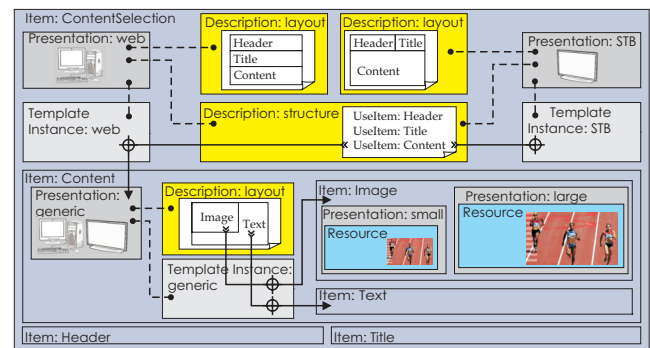
2. THE XIMPF DOCUMENT MODEL

Figure 1: A schematic outline of a sample XiMPF document representing a news presentation.

We have continued development of the XiMPF document model (see [1, 2] for more information and generic examples). It is fashioned after the MPEG-21 Digital Item Declaration (DID) model , but uses a semantically richer set of elements to structure and annotate the presentation content.

Figure 1 depicts a schematic outline of a XiMPF document containing a hierarchical structure of items. Two presentations are provided allowing publication to a set-top box or a web browser. They group references to descriptions and template instances (shown as dashed lines in the figure). Descriptions contain presentational information (relating to layout or interactivity for example). They include references to subitems allowing precise placement (in terms of context) of the subitem into the hierarchically higher construct. These references are resolved by use of the template instances (in the figure some of these resolutions are shown as arrowed lines). They link a reference to a specific presentation in an item or to this item (leaving the presentation selection to the publication engine). Both composite presentation fragments and atomic multimedia resources support automatic selection, transformation or adaptation to the target platform by the publication engine.

For the aggregation of textual and multimedia content, descriptions of structure, layout, synchronisation and behavior are used. We currently use available W3C technologies (XHTML, CSS, SMIL) supplemented with custom devel-
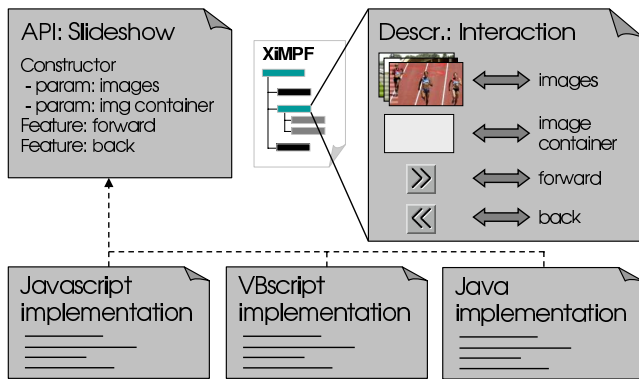
Figure 2: Interactivity is added to media content via an API defining the behavior, an interaction description in the XiMPF document linking parameters and features with specific XiMPF items and an implementation.

Figure 3: The publication framework based on Cocoon.

oped description languages where needed (e.g. interactivity). By not limiting the descriptive languages to be used, we guarantee a flexible and future-proof framework that will be able to cope with new target platforms.

The hierarchical structure of the XiMPF document, combined with the rigid separation of concerns into different description types maximizes the reuse of descriptions and content and minimizes the effort of supporting a new target device.

3. INTRODUCING INTERACTIVITY

Adding interactive behavior to media publications usually requires some form of programming. This often results in implementation code being spread across the entire publication. Such entanglement complicates adaptation of the document to support different platforms. It also interferes with reuse of the non interactive parts of the media publication, as these parts cannot be easily separated from the interaction code.

Our approach is based on a strict separation of the — possibly platform specific — implementation of the interactive behavior from the rest of the document. This ensures reusability of the rest of the media application. Three pieces of information are required to enable this separation (see figure 2).

1. An *API* defines the generic interface of the interactive behavior.

2. An *interaction description* in the XiMPF document links the parameters and features from the API with specific XiMPF items. These links are independent from the actual implementation of the interactive behavior.

3. An *implementation* of the API for a certain platform.

4. PUBLICATION FRAMEWORK

Our publication framework has been developed on top of the Apache Cocoon framework, an off-the-shelf web development framework build around the concepts of separation
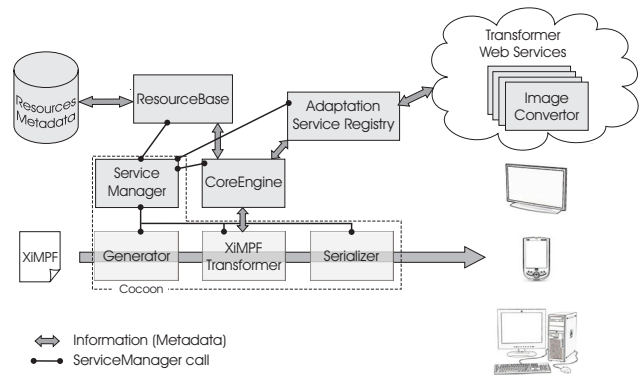
of concerns and component-based web development. By incorporating a specific transformer component into the XML processing pipeline, the system allows for XiMPF resolution by converting the different included descriptions to suitable output fragments and combining these into a platform specific output document. Other component extensions like the core engine, the database and the adaptation service registry offer support for intelligent media resource adaptation (by taking into account user preferences and client capabilities), caching and metadata storage (see figure 3).

5. CONCLUSION AND OUTLOOK

We have studied aspects of multichannel publications in a distributed environment. Through the implementation of a use case scenario — demonstrating a next generation news website — we proved the strength of the XiMPF document model by generating multichannel output destined for a web browser, a television set-top box and a handheld device. We established that our document model can be used as a compound document format combining MPEG-21, W3C and native descriptions. This allows reuse of multimedia resources and description language fragments. We managed to introduce interactivity into this document model in an implementation independent and reusable way. Finally, we built an extensible publication framework able to adapt media resources and descriptions, and generate the actual output documents.

6. ACKNOWLEDGEMENTS

7. REFERENCES

[1] S. Van Assche, F. Hendrickx, and L. Nachtergaele. Multichannel publication using MPEG-21 DIDL and extensions. In *Proceedings of the Twelfth International World Wide Web Conference*. W3C, 2003. Poster.

[2] S. Van Assche, F. Hendrickx, N. Oorts, and L. Nachtergaele. Multi-channel publishing of interactive multimedia presentations. *Computers & Graphics*, 2004(5):193–206.