A SMO interaction and management model for iDTV applications
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Abstract
This paper deals with interactive multimedia applications design whose main function is growing due to the users' needs that expect increasingly complex scenarios under a high level of interactivity. Digital media technology is becoming an integral part of our daily activities. Using multimedia objects in building rich and interactive content for iDTV (Interactive TV) is a complex task.

In order to facilitate the way in which the user can freely interact with those multimedia objects makes the applications have to know how to adapt for the situations in order to improve the interaction. In such a context, we believe that the fact to converge on the principles of the smart multimedia objects is the right solution. Then we suggest, by the means of new approach,* the modelling of adaptable and reusable multimedia content called smart multimedia object (SMO) approach.

1. Introduction
Nowadays, the world of interactive TV applications is growing due to the users' needs that expect increasingly complex scenarios under a high level of interactivity. In fact, with the leap of the interactive television technologies, a number of advanced applications and new interaction forms become possible.

The TV industry is facing the introduction of new, innovative technologies and a transformation of the value chain and interactive digital TV (iDTV) applications need to deal with high levels of complexity. Such complexity must be transparently treated, implying the need for an additional and specialized software layer between the operating system and the applications. The different ways that the user can exploit to interact with the video make a need on how the composed multimedia objects can automatically adapt to the dynamic situations in order to improve the interaction means.

This report is organised as follows, section 2 presents the related works that are close to our research efforts. An overview of the SMO-IDTV framework, introducing the basic concept and features and its model with the architecture is described in section 3. Finally, section 4 concludes with some remarks.

2. Related Works
A number of major initiatives and projects have been established to investigate or to develop strategies for designing a multimedia application that needs to deal with high levels of complexity. A multimedia system for interoperable communication of complex scenes contains audio, video and graphic materials which are arranged and defined as individual objects [1][2][4]. In most of literary works, the scene is accompanied with a description, which describes how the objects should be combined in space and time in order to form the scene intended to by the author. In the presentation of multimedia scene, the user's interaction is possible within the limits set in the scene description [1][6][7][8][9].

A new form of the interaction becomes possible with the new interactive video technologies. The user can interact with the video, and then the application can be adapted to different situations [3]. RAMO [5] has the concept of reactive and adaptive multimedia objects, which lays down the foundation of a new approach for implementing the next generation of interactive and immersive multimedia applications and has an object-oriented approach. The OMMA [6] is an object-oriented approach based on the Unified Modelling Language (UML) for modelling structure and dynamic behaviour of a Multimedia information system. JiTVPlayer: a multi-device player tool is used to present multimedia objects (audio, video and data) and to allow the viewer's interaction; [10] the combination of television and Internet gives broadcasters the opportunity to reach a much bigger and diverse audience. The benefit of avatars has been widely researched [9].
3. The “SMO-IDTV” Framework

Our approach of research implies two phases of conception. The first one is related to the specification and the conception of multimedia objects. It principally indicates how the organization of these smart multimedia objects “SMO” is carried out and how to identify them under an innovative ITV conceptual framework proposal. It offers new content creation opportunities to support enhanced digital services for Web & iDTV consumers, with high interactivity and contents’ animation capabilities. The concept is based on the notion that a new dimension of interactivity can be achieved by enabling multimedia objects to fulfill the following criteria:

- To become fully autonomous;
- To be independent from predefined scenarios.

The second phase suggests a method of the use of these multimedia objects in this framework. In other words, this method aims to the configuration and the management of multimedia objects, which we qualify of "smart". Concretely, we suggest developing the adaptive middleware that intends to integrate these SMO in the actual framework.

The “SMO-iDTV” Model

General

The SMO-iDTV model promotes the build of dynamic multimedia presentations with new levels of interactivity and immersion of end-users. It specifies the design and development process of applications based on autonomous and living intelligent multimedia objects (SMO), from their authoring up to their rendering.

Organization of scenes

The model proposes the setting up of applications as a composition of multiple multimedia scenes. A SMO-iDTV Application handles the management of scenes, information requests towards the rendering platform or distant resources’ repositories for instance. A SMO-iDTV Scene manages its objects’ dynamic composition, the graphical and audible layout or high level objects’ conflicts solving for instance. Scenes are populated by SMO-iDTV objects they supervise. The formers are derived into two main kinds: Contextual and Embedded Multimedia objects (CMMO and EMMO). The Embedded SMO-iDTV Objects are dedicated to the establishment of multimedia contents and their management, i.e. alteration of metadata descriptions, of the multimedia contents, and of its own processes to be fully dynamic. They emulate self-animated entities via sensorial representations and life-like behaviors. Contextual SMO-iDTV Objects are backstage managers of Scenes. They articulate and support objects organization, e.g. relaying of objects messages, retrieving of matching properties with neighbor objects, leading of collective tasks, or management of end-user interactions. SMO-iDTV Scenes differ from other SMO-iDTV objects due to their role in the application. They can be considered as Contextual objects or as a composition of Contextual objects. Whatever their kind, Embedded SMO-iDTV Objects, Contextual objects, or Scene, the SMO-iDTV objects rely on a common functional architecture.

![Figure 01: Formal example of a composition model for SMO-iDTV-based applications](image-url)
4. Conclusion
The proposed framework, called SMO-iDTV, provides an underlying infrastructure for using a methodology based on intelligent multimedia objects. It’s intended to the configuration and management of resources and components of the middleware layer of the multimedia platforms, making easier design and development of middleware and application components. By comparison with other existing approaches; SMO-iDTV is putting forward a new way to support configuration and management of multimedia objects.

10. References