

Chapter 11

Towards a Unified Multimedia Metadata Management Solution

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ABSTRACT

With increasing use of multimedia in various domains, several metadata standards appeared these last decades in order to facilitate the manipulation of multimedia contents. These standards help consumers to search content they desire and to adapt the retrieved content according to consumers' profiles and preferences. However, in order to extract information from a given standard, a user must have a pre-knowledge about this latest. This condition is not easy to satisfy due to the increasing number of available standards. In this chapter, we introduce some of the main de facto multimedia standards that cover the description, by means of metadata, of the content and of the use context (profiles, devices, networks...). We discuss then the benefits of proposing an integrated vision of multimedia metadata standards through the usage of a generic multimedia metadata integration system, and we expose the challenges of its implementation.

INTRODUCTION

Nowadays, with the vast expansion of the World Wide Web, several standards (such as MPEG-7(Chang, 2001), MPEG-21(Pereira, 2001), TV-Anytime (TV-Anytime Forum, 2003), etc.) have

appeared for enhancing the retrieval, the usage and the delivery of multimedia data over a variety of channels (Web, TV, mobile). Those standards introduce descriptions of the content itself and of the context in which the content was created or for which the content was designed. We call these descriptions *metadata* as they bring new knowledge about the content and the context

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seen as regular *data*. The metadata presented in various multimedia standards describe different kinds of multimedia contents (e.g., video, image, audio, etc.), devices consuming or transmitting these contents (e.g., networks, TV, mobile, etc.), services processing or dealing with them (e.g., search, adaptation, etc.) and finally environment of user consuming these contents (e.g., user profile, user preference, etc.).

The first category of metadata presented here above, which is about content, can be found in multimedia standards such as (MPEG-7, Dublin Core (Weibel, 1998) or TV Anytime), as well as in different ongoing research projects such as the one defended by the *CAM4Home Consortium*¹ which proposes a dedicated content description schema called *CAM Core Metadata* (ITEA2-CAM4Home, 2008). This kind of metadata provides explicit knowledge about the features of the content (genre, appearing concepts, etc.) and about the physical properties of the content (required bandwidth, required decoders, file size, resolution, etc.). This knowledge improves the search processes as it enriches the signal-based characterization of content, with explicit knowledge closer to user criteria (such as, meaning-full keywords). The content-related metadata can also be used in order to propose adequate adaptation processes as, depending on the type of content, specific techniques might apply better.

The last three categories presented above are about the context in which the delivery of multimedia content takes place. Standards such as MPEG-21, CC/PP (Klyne, 2004) or description schemes like CAM Supplementary Metadata schema proposed by the *CAM4Home Consortium*¹ cover context-related information. These metadata offer knowledge that can also be injected in search, retrieval and delivery processes. While doing search, systems could benefit from the information about the user access device in order to propose content that are compatible. While doing delivery, systems can interpret the capacity of the access device and the capacity of the delivery

network and it can use this information in order to adapt by simplifying accordingly the content (doing transcoding or transrating for videos, doing resolution reduction for images, doing filtering for complex documents such as web pages, etc.).

Considering the current state of art with regard to multimedia content and context descriptions, standards and consortium initiatives, taken all together, cover fairly well all aspects of the multimedia delivery problem. However, in order to take advantage of these entire standards one must have a strong and a very diversified pre-knowledge about a part or all of them. Besides the specific encoding proposed by each solution, those standards that are often created by specific multimedia communities (such as Multimedia Pictures Experts Groups – MPEG², World Wide Web Consortium – W3C³, Dublin Core – DC⁴, CAM4HOME Consortium – C4H⁵,...) have led to the availability of multiple terminological and syntactical resources in numerous domain of multimedia. These different types of metadata are encoded using existing description languages (e.g., XML Schema (Thompson, 2009) for MPEG-7 and TV-Anytime or RDF Schema (Brickley, 2004) for CAM Core Metadata and CAM Supplementary Metadata), different vocabularies and different ontologies depending on the community that has created them. These multimedia contents can also be enriched by other kind of metadata such as consumers' annotations (e.g., comments, social tags, etc.) which is free text added by consumers having different point of view and different understanding about multimedia content.

Dealing with knowledge from multiple independent metadata standards is one of the most important challenges in multimedia domain due to the semantic heterogeneity of information as mentioned here above. The creation, the delivery and the consumption of rich multimedia experiences between different entities in multimedia community (e.g., multimedia content consumers, commercial content providers, simple producer, etc.) requires that each of these entities must be

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