

## Chapter 16

# Semantic Mapping between LOM – SCORM Content Package and MPEG–7 Concepts

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### ABSTRACT

*This chapter presents the current status of the efforts to harmonize MPEG-7 and SCORM Content Package (including the LOM description metadata, part of SCORM). In particular a model for the interoperability between these standards is developed. The MPEG-7 provides a standardized set of technologies for describing multimedia content, while SCORM is a collection of specifications for developing, organizing and delivering instructional content. The proposed model concerns the semantic mapping between the different elements of these standards, which are created to satisfy the specific needs of different communities. The followed approach is based on the main principles and procedures for metadata interoperability, such as on the crosswalking and mapping techniques. Moreover some empirical remarks conclude the mapping process.*

### INTRODUCTION

A content metadata standard is defined as an open specification that itemizes a set of elements and their meanings (Pierre, LaPlant, 1998); it is developed to support a specific community of interest. It is known that already a large number of metadata standards have been developed and many more are underway. Some examples of very familiar standards are Dublin Core, USMARC,

Federal Geographical Committee (FGDC), Global/Government Information Locator Service (GILS), Multimedia Content Description Interface (MPEG-7), IEEE Learning Objects Metadata (LOM -representing the metadata part of SCORM). The developing of these standards according to the specific requirements of their communities may cause problems from the point of view of someone who wants to seek and retrieve information in different environments, because he has to face different metadata sets, and so, must

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have different tools in order to deal with them (Peig, Delgado, Pérez, 2001).

We understand then that information must be made available in accordance with a number of related metadata standards, so that it can reach the broadest community of users. As the number, size, and complexity of metadata standards continues to grow, supplying the metadata for each standard becomes more and more time consuming and tedious. With so many metadata schemes, how will chaos can be avoided? How can we ensure that systems that use different metadata schemes will be interoperable, in other words that information collected by one organization for a particular purpose can be exchanged, transferred or used by another organization for a different purpose (Hodge, 2005).

This chapter presents a model for the interoperability between MPEG-7 and SCORM Content Package and MPEG-7 and LOM (representing the metadata part of SCORM). The main objective is to solve an interoperability problem between digital library and eLearning metadata standards. These standards have been developed independently, although nowadays there is a need for the creation of educational repositories. More specific this study presents the first step of solving the interoperability problems between audiovisual digital libraries and eLearning applications, in order to support the modular development of personalized learning experiences. Library systems and e-learning systems actually need to interact in a variety of ways so that the eventual user begin to find new ways of developing learning activities which in turn influence the way he uses, or wishes to use, learning and information content.

The effort of harmonize a standard which describes multimedia content and a standard which develops, organizes and delivers instructional content has as a final aim the creation of a model which will allow users, that participate in eLearning activities, to browse and retrieve audiovisual objects, stored and managed by digital libraries, that match their interests, and use them as learning

resources (Christodoulakis, Arapi, Moumoutzis, et al. 2006).

Some scenarios emphasizing the need of interoperability between information systems and e-learning systems are as follows (McLean & Lynch, 2004):

- A lecturer wishes to add a seamless link from the course management system to a specific library e-reserve article, then add another link to a broad-ranging search across various repositories for students to search for other similar articles with direct links to full-text versions of relevant articles, once discovered by student searches.
- A librarian wishes to ensure that digital rights, copyright and fair-use are properly managed within a collection of resources aggregated by a lecturer for use in the course management system, and then later to preserve any lecturer-created resources within the aggregation, as well as pointers to any external copyright materials.

An activity driven scenario can be depicted as follows:

- A student doing remedial mathematics has used a diagnostic test to identify key gaps in his/her basic mathematical concepts, at which point an automated search system seeks out the ideal mathematical remedial learning object to present to the student based on his/her weaknesses.

The first section of this chapter clarifies the main concepts and procedures, such as the notion of interoperability, of crosswalking, the procedure of element to element mapping, and a brief presentation of the involved standards MPEG-7 and SCORM Content Package. Then the mapping methodology of the mentioned standards is presented. The proposed methodology presents the mappings in different tables. The first table

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