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Creating New Learning Experiences on a Global Scale

Second European Conference
on Technology Enhanced Learning, EC-TEL 2007
Crete, Greece, September 2007, Proceedings

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Volume Editors

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Preface

You are holding more than 500 pages of combined wisdom on Technology Enhanced Learning (TEL) in your hands!

With the advance of metadata, standards, learning objects, Web 2.0 approaches to rip, mix and burn learning, wikis, blogs, syndication, user-generated content, Web-based video, games and the ubiquitous availability of computing devices we can and have to offer more flexible learning services on a global scale. As one of the objectives of the 7th Framework Program of the European Commission puts it: We need "responsive environments for technology-enhanced learning that motivate, engage and inspire learners, and which are embedded in the business processes and human resources management systems of organizations." An important challenge is to form a bridge between informal learning strategies of the knowledge society and formal competence development programs of organizations.

After the success of EC-TEL 2006, the 2nd European Conference on Technology Enhanced Learning (EC-TEL 2007) provided a unique forum for all research related to technology enhanced learning, including its interactions with knowledge management, business processes and work environments. This is a competitive and broad forum for technology enhanced learning research in Europe and world-wide through specialized workshops, the doctoral consortium and the main conference. EC-TEL 2007 provided unique networking possibilities for participating researchers throughout the week and included project meetings and discussions for ongoing and new research activities supported by the European Commission.

Again this year, the TEL community was very active sending high-quality contributions on established and new research topics. We received 116 submissions. All of these were reviewed by at least three reviewers – many thanks to both the authors and the reviewers! Really!

After detailed deliberations, we selected 28 submissions as full papers: this means that EC-TEL 2007 had an acceptance rate of less than 25%! That is just one indicator of how this conference has already established itself in its second year as one of the main research venues in the field.

We also selected 18 submissions as short papers. Even though these papers did not pass the most strenuous scientific review process, each one of them included an idea that was certainly relevant to the community and we wanted to make sure that this idea could spread...

The program also included keynote presentations by two sources of inspiration for the field:

- Bruce Sterling, professor at the European Graduate School and "visionary in residence" at the Art Center College of Design in Pasadena, California is one of the early visionaries of the "Internet of Things." His famous speeches introduced new memes (like spime) that continue to be an inspiration for many researchers. Bruce is also a science fiction writer (http://blog.wired.com/sterling)!

- Hermann Maurer is professor of computer science at the Technical University Graz in Austria, with an impressive list of achievements in the form of numerous papers, books, companies and patents. Hermann is one of the pioneers of Technology Enhanced Learning in Europe and a widely acclaimed and sought after speaker. He is also a science fiction writer (http://www.iicm.tugraz.at/maurer)!

Other highlights in the program included:

- Global Experiences: The GLOBE consortium of learning repository networks (http://globe-info.org/) used its panel session to hold a public dialogue on your requirements for share and reuse and how it can address them. This will be a unique opportunity to learn more about this global community of repositories.
- Industry Meets Research: there was almost a full day of industrial sessions, where participants from IMC, BT, EADS, IDS, Synergetics and Giunti presented their experiences and lessons learned.
- Research funding opportunities: Several high-ranking officials from the European Commission presented their views on technology enhanced learning, with a specific focus on research funding, the 7th Framework Program calls and other funding instruments.

Preceding the program, a number of high-profile workshops and a doctoral consortium took place. The workshops focused on specific topics in a more interactive fashion. The doctoral consortium was a unique opportunity for advanced PhD students to present their work in progress in front of experienced and reputable researchers in the field of technology enhanced learning.

In conclusion, it may be useful to remind ourselves how important this work on technology enhanced learning is: if we get better at learning, we "get better at getting better." If we can help people to learn in more effective or efficient ways, then they will be able to deal better with many of the serious and difficult problems of our times.

We feel very privileged to have worked with all of you in making progress in the domain of technology enhanced learning – thank YOU!

And thank you also to our sponsors and media partners, like IMC, L3S, EA-TEL, PRO-LC, Know-Center and elearning Europe!

September 2007

Wolfgang Nejdl
Erik Duval
Ralf Klamma
Barbara Kieslinger
Martin Wolpers

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EC-Tel 2007 was organized by the Professional Learning Cluster (PRO-LC) and the European Association of Technology Enhanced Learning (EA-TEL).

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From a Specific Tracking Framework to an Open and Standardized Attention Environment Based on Attention.XML

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Abstract. This paper addresses the challenge of providing users with personalized learning resources by gathering and sharing attention information. Starting from our previous works related to the tracking of learning objects' exploitation within learning systems, we suggest here an extension of this framework based on the Attention.XML standard to offer the opportunity to share attention information between various and heterogeneous applications. An Attention.XML service based on web technologies has been elaborated and integrated within the existing architecture, thus offering standardization and availability to the global environment. This approach makes it easy to integrate existing learning environments and tools, and thus facilitates the generation of attention data specific to these applications.

Keywords: personal learning environment, attention metadata, Attention.XML, information model.

1 Introduction

Providing personalized data or resources currently represents an important challenge, as the number of tools and initiatives dealing with this topic illustrates it. A step towards the achievement of this process consists in collecting, analyzing and exploiting attention information resulting from users' activities. Attention data are bits of information about how users choose to interact with software, be it accessible through the internet or not [4], and make it possible to provide tools and services able to find out what a user is paying attention to. Quality and relevance of attention information are critical. Indeed, the more systems know about users' interests, the more they will deliver relevant and personalized resources to end-users. It is thus necessary to design and deploy open systems able to manage and share attention information with others environments.

The authors set up in [5] and [6] a tracking framework based on a model driven approach together with an object oriented database that provides a means to capture usage information about Learning Objects (LO) from different Learning Management Systems (LMS) and Learning Object Repositories (LOR) in order to analyze the usage patterns of the users through a management application. However, the

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non-standard format of attention information stored into this database limits the possible use of this information by others systems, because existing applications should be reprogrammed to understand and treat information. Moreover, some standardization efforts dealing with attention are being led within the computer community. Among these efforts, is the Attention.XML standard [3] suggested by Steve Gillmor that allows to keep tracking on what users visit, read, download, etc. This standardization will lead to the opportunity to share attention information between various and heterogeneous applications.

To contribute to this objective, this paper shows how our tracking framework can be exploited to generate attention metadata that are compliant with the Attention.XML standard. For readability reasons, the section 2 reminds the model driven approach and points out information available within this framework, whereas section 3 introduces Attention.XML by presenting its organization and properties. The mapping between our information model and Attention.XML elements, together with some extensions that enrich the collection and management of attention metadata are exposed in the section 4. The implementation of this mapping is depicted in section 5 and validates the theoretical proposition. Finally we conclude before exposing some further works.

2 Our Model Driven Approach

In order to offer a mechanism for tracking learning objects' usage and users' activities within heterogeneous systems such as LMS or LOR, we suggested a model driven approach based on the Common Information Model (CIM) suggested by the Domain Management Task Force [13]. This last exploits object concepts like classes, attributes, methods, associations or inheritance for systems, networks and applications management, and is characterized by an extensible approach that allows to build generic models related to a domain more specific to a project or environment.

Therefore, we built an information model according to the CIM specification and describing the systems, resources and users interacting within a learning environment. The model is divided in two generic models collaborating together: the environment model focuses on learning systems and resources, whereas the user model aims at describing users and theirs interactions with these systems and resources. Figure 1 shows the resulting information model.

The aim of this paper is not to precisely describe classes and associations depicted in Figure 1; we invite lecturers to read [5] and [6] for more details about the whole information model. Basically, the user model aims at describing identity, roles and accounts of users, whereas the environment model allows to retrieve:

- Resources stored within a specific learning object repository, or the LOR hosting a given learning object.
- Courseware deployed within a specific learning management system, together with the LMS integrating a given courseware.
- Labels (or comments) and ratings characterizing a specific resource, and learning objects or courseware that are associated with a given label or rate level.

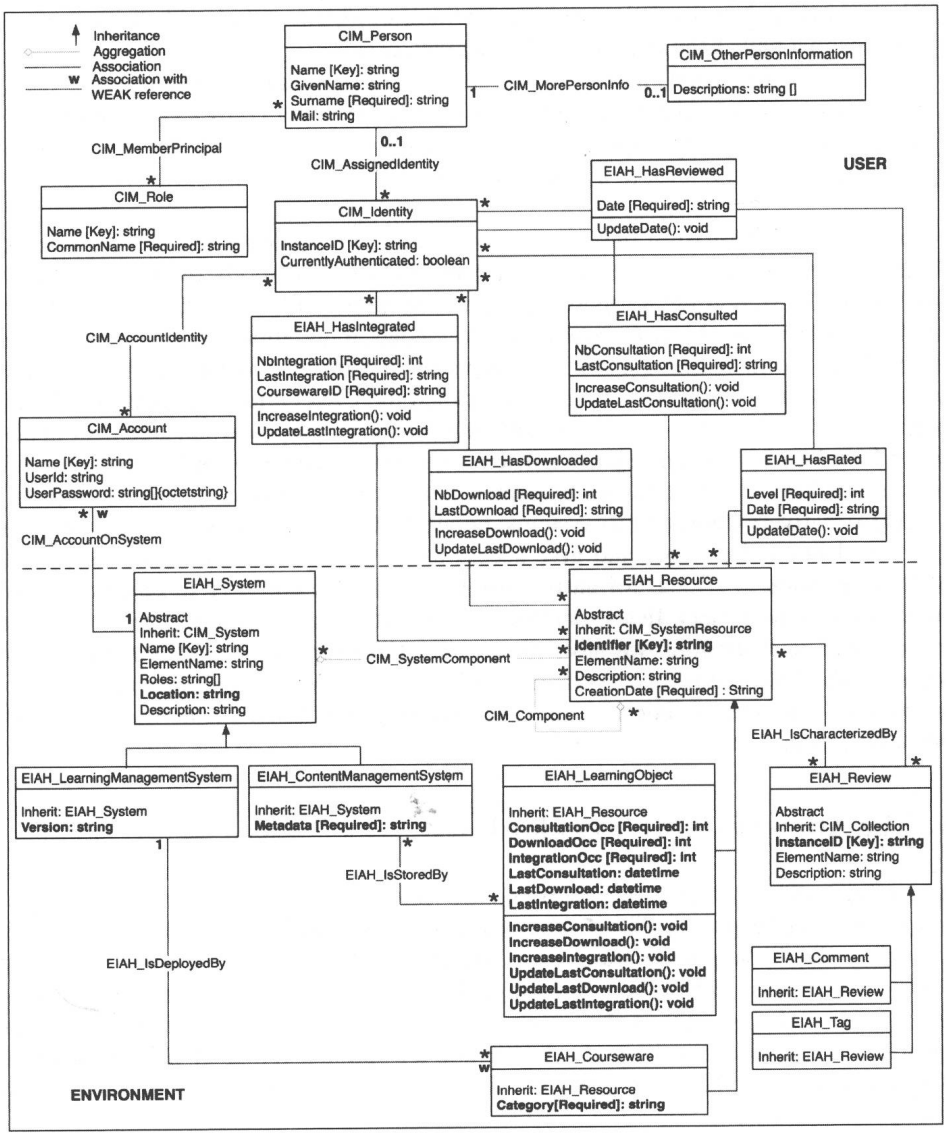

Fig. 1. Modeling a web-based learning environment

The various relations defined between the environment and user models offer the opportunity to get:

- Labels or comments specified by a specific user, and all users having specified a given label or comment.
- Users having consulted metadata related to a specific resource, or the set of resources that have been consulted by a given user.

- Users having downloaded a specific learning object, together with the set of resources that have been downloaded by a given user.
- Users having imported an external learning object (a resource stored within a LOR) into one or several courseware, and learning objects imported by a specific user.
- Rate levels defined by a specific user to learning objects, and the set of users having attributed a rate level to a given resource.

In order to benefit from the information model, we implemented the Web-Based Enterprise Management (WBEM) architecture [15] that supports the CIM concepts (see Figure 2). According to actions executed by users within a LMS or a LOR and involving a learning object (consultation, download, integration within a courseware, indexation), the matching classes and properties are instanciated/updated and stored within a CIM repository through an entity called the CIM Object Manager (CIMOM) and responsible for interactions with this repository. A graphical management application based on web technologies then sends queries to the CIMOM for providing users with tracking information that translates their activities related to learning objects.

CIM is natively dedicated to systems, networks and applications management, but it is not elaborated to share and give access to its management information. Indeed, such information is critical for an organization and does not have to be available to others systems and users. In our context, sharing attention information constitutes the main objective. Therefore, we have to open our tracking framework in order to give access to the CIM repository to others existing applications interested in attention information. This open solution is based on the Attention.XML standard presented in the next section.

3 The Attention.XML Standard

According to the Technorati Developers Wiki [3], Attention.XML is an open standard that helps users keep track of what they have read, what they are spending time on, or what they should be paying attention to. Attention.XML specially focuses on Really Simple Syndication (RSS) feeds and blogs. In Attention.XML all feeds and posts that users read are being tracked. For each post or feed it tracks how much time users spend on it, the last time they checked it and an optional rating of the information. Based on this it should be possible to advice users about information they should read and spend time on.

Table 1 illustrates elements included within the Attention.XML schema. We won't detail each property of this framework here, instead we invite the reader to visit [3] for a full explanation.

The choice of focusing on blogs and feeds is probably due to the huge number of blogs available on the web and resulting from the development of Internet. In addition, more and more web sites offer the opportunity to read news as RSS feeds, and most common email clients such as Thunderbird make it possible for users to subscribe to feeds. However, the need for attention within the e-learning context has already been highlighted by several projects and researchers. If one could log or maintain a history of users' interests and activities, and convey that back to a web based

Table 1. The Attention.XML schema

Group	Blog/Feed/Site	Post/Item/Page
title	title	Title
	url	permalink/guid
	alturls	Type
	etag	etag
	lastupdated	lastupdated
	dateadded	lastread
	dateremoved	duration
	lastread	followedlinks
	readtimes	rev/votelink
	userfeedtitle	tags
	rel/xfn	
	rev/votelink	
	tags	

system that could provide customized learning objects or resources, this might be quite powerful.

AtGentive [2], a project part of the FP6 framework of the European Community, contributes to this objective and investigates the use of artificial agents for supporting the management of the attention of young or adult learners in the context of individual and collaborative learning environments. The Contextualized Attention Metadata framework [10] outlines the need for Attention.XML metadata to collect and manage rich usage data, and to enhance users' models and feed personalization; this work has also been designed to bring the theoretical bases to bridge the gap between the estimated and the real knowledge in companies [16]. Attention.XML has also been exploited in [11] for providing a meaningful and scalable way to rank or recommend learning material.

To benefit from this standard and become interoperable with systems and approaches mentioned above, a mapping between the information model and the Attention.XML schema detailed in the section has been designed.

4 From the Model to Attention.XML

This section demonstrates how the model described in section 2 can be mapped to the Attention.XML standard. We first focus on the Attention.XML schema that can be built from our native information model, before supplying the model with extensions that make it more compliant with the Attention.XML format. Finally we suggest additional elements to include within the Attention.XML schema in order to bring it suitable properties to e-learning.

4.1 Generating an Attention.XML Schema

The first task to achieve consists in identifying the mapping of Attention.XML entities to classes included in our information model. From the Technorati point of view, a Group item is a set of blogs or feeds. In the e-learning context, an Attention.XML