

# Modelling Competency upon dotLRN

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**Abstract.** In this paper we introduce how competences can be modelled in a learning environment and the first steps to apply them in dotLRN. Therefore, a general description of the two approaches created for modelling competencies on a learning environment context is presented, i.e. the IMS Reusable Definition of Competency or Educational Objectives (IMS-RDCEO) [7] approach generated by the IMS Global Learning Consortium and the Ontology-based Competency Management approach [1,13] developed at Alcalá University in Spain. The combinations of both approaches are to be used as the base to develop a package for dotLRN. This package will allow to specify competencies that take advantage of the minimalist character and the possibility to acquire new knowledge about the user characteristics using IMS-RDCEO and the semantic added by the Ontology approach. Finally, we propose the deadlines we are committing to perform this implementation for dotLRN.

**Keywords:** Competency, dotLRN, ontology, educational specifications and standards, IMS, IMS-RDCEO.

## 1. Introduction

Nowadays the academic sector and the industry haven't had a strong relationship, due to the fact that formation programs don't answer to the economic and social dynamics of the countries. In order to adjust the quality level and relevancy of the formation programs the Competency-Based Learning approach has been created.

This paradigm is used by enterprises to support their human talent administration programs. It consists in defining and monitoring the achievements of the employees' competencies to facilitate processes such as: selection, training, promotion, and planning of human resources.

There are many definitions about competency [9,12,14]. However, many of them point out to identify appropriate performances that should be demonstrated by a person on a specific context. This performance should be adjusted to quality parameters, previously defined by a particular productive sector [9].

A proper definition of competency should take into account at least four elements: a description, associated performance criteria, ranges of application and the necessary definition of evidences to evaluate the competency.

The generation of approaches for modeling competencies on learning virtual environment has been motivated by the incremental usage of the information and communication technologies supporting formation processes over the world. Two of

these approaches are IMS Reusable Definition of Competency or Educational Objectives (IMS-RDCEO) [7], created by the IMS Global Learning Consortium, and the Ontology – Based Competency Management described in [1,13] and development at Alcalá University.

## 2. Specifications to model competences

IMS Reusable Definition of Competency or Educational Objectives (IMS-RDCEO) [7] is a general framework to define and reuse competencies on learning distributed environments, and the second is a semantic approach to modeling competencies to the Knowledge Intensive Learning Organization.

### 2.1 IMS Reusable Definition of Competency or Educational Objectives.

(IMS-RDCEO) is a minimalist but extensible-based XML data model to define competencies or learning objectives. Figure 1 shows a schema about the model proposed by IMS. A first advantage of this model is that it can achieve clearly definition of competencies. It does not adjust to particular curricular models and depending of the author, many characteristic elements of the competency can be considered.

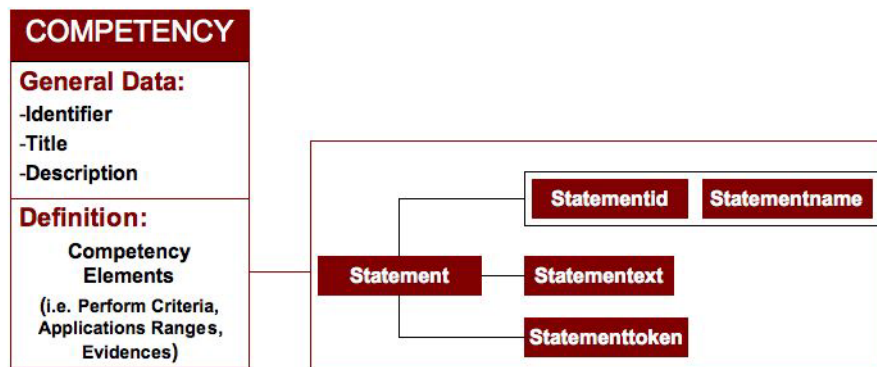


Fig. 1. Specification IMS-RDCEO Review

A second advantage of IMS-RDCEO is to provide clearly mechanisms to establish relationships with other specifications that the Consortium has developed. This facilitates to develop the Gap Analysis to find differences between the acquired competencies and the lack of competencies. In this way, these results can be related to another knowledge specifications about the users such as their profile (IMS-LIP [3] and IMS-AccLIP [4]), system interaction records with the (IMS-LD [2], or SCORM [1]) or their performance in the evaluation process (IMS-QTI [6]).

## 2.2 Ontology – Based Competency Management

The Ontology – Based Competency Management approach [1, 13] intends to define a semantic with a close language to the working world. It improves some of the limitations present on the IMS specification. In this approach, it is more important the definition of the desirable performances (demonstrated by employees on concrete situations at work) than certain characteristics of the individual such as knowledge or skills that the person should put on play in those situations.

This ontology gives a better definition of the types of relations and hierarchies among competencies. It extends the measure scales of the instruments to evaluate the acquisition of the competencies. In the figure 2 the different elements of the ontology are shown.

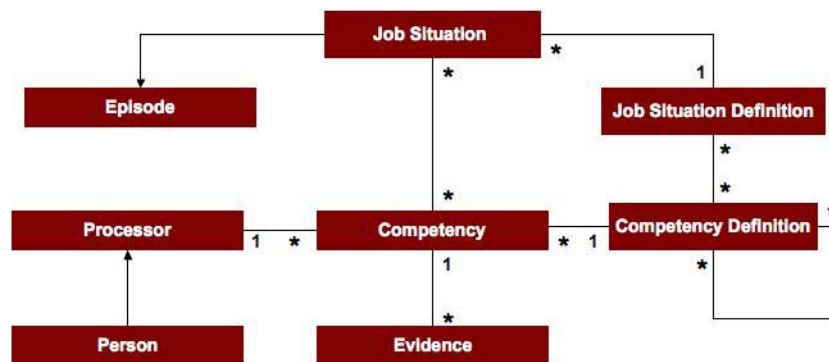


Fig. 2. Basic Ontology Elements

A first version of the ontology was implemented on OILED [13]. Afterwards, in LUISA Project, a new version of the ontology was generated on WSML [1].

## 3. Discussion on the implementation

Considering 1) that the IMS-RDCEO specification facilitates establishing relations with other specifications that can guarantee a more complete user modeling, and 2) the Ontology – Based Competency Management approach describes important elements that should be considered in organizational learning environments, we are interested in developing a dotLRN XML–based package to specify the data structure to model the competencies associated to a course.

The reasons for dotLRN choice are:

1. dotLRN is a product from the free software development community called OpenACS. It facilitates the implementation and integration of the functionality to be developed on a clearly established software framework.
2. The wide support and the implementation of learning standards such as IMS-CP [8], IMS-LD [2], IMS-QTI [6], and IMS MD [5], adds an

important level of semantic to the application. It increases the capacity of the system to look into the completely user's records in order to generate adaptive functionality.

The dotLRN Competency Package will use: a) the registered student interactions through their experience on the course, specially on the IMS-LD, LORS (SCORM) y Assessment (IMS-QTI) packages, b) the student interactions on the collaborative services such as discussion forums and storage area, c) the results of the aDeNu Group in EU4ALL Project [12] regarding the characterization of the student using IMS-AccLIP specification.

These specifications will be used with the purpose of generating a dynamic user model and the appropriate adaptation variables. In this way learning paths can be adjusted to satisfy students learning needs. Those paths are to be generated through indicators about the achievement level of the competencies on the learning environment.

The generation of those indicators is based on the analysis proposed in [1] about the Competency-based approach to organizational learning. It requires an explicit model for linking competency definitions to the objectives of the learning activities. This is possible in dotLRN by using the mentioned specifications to achieve a clearly specification of the competency.

To arrange, schedule, carry out, and evaluate the learning activities and relate them to the definition of competencies make possible the generation of necessary indicators to support adaptations decisions. The better learning path generated help users to acquire some demanded competencies for concrete work situations.

The implementations of the approach will increase the interoperability of the system and allows the students and teachers import/export their competencies among other systems that implement the specification.

To develop the component, we have defined some activities and dates:

ACTIVITY	DELIVERY DATE
REQUIREMENT MODEL	15-05-2007
Use Case Description	
Conceptual Class Diagrams	
DESIGN MODEL	01-06-2007
Class Diagrams	
Activity Diagrams	
Data Model	
Interfaces among components	
IMPLEMENTATION MODEL	01-08-2007
Prototype	
TEST MODEL	15-08-2007
Test Design	
Test Execution	
Contribution to the OpenACS/dotLRN community.	01-09-2007

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<sup>1</sup> <http://adenu.ia.uned.es/adaptaplan/>