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WORKSHOP

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AGREEMENT

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English version

Recommendations on a Model for expressing learner competencies

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Foreword

In order to avoid that European service providers will have to develop their own line of services, platforms and courseware concepts in contradiction to International Standards to cope with European privacy or security demands, the development of European profiles as part of future international standards is urgently required.

The decision for this work item was taken by the Learning Technologies Workshop meeting on 4-5 April 2002.

The work was split into the production of two complementary CWAs:

- Recommendations on a model for expressing learner competencies (this CWA).
- Guidelines for the production of learner information standards and specifications

The document has been developed through the collaboration of a number of contributing partners, representing a wide mix of interests, from universities to commercial companies representatives. The names of the individuals and their affiliations that have expressed support for this CWA is available from the CEN/ISSS Secretariat

The final endorsement round for this CWA was started on the 2003-11-24 and closed on 2003-12-08. The final text of this CWA was submitted to CEN for publication in 2004-01-19.

Introduction

Every organisation or enterprise engaged in the fields of formal education, technical, vocational or corporate training, staffing or workforce development creates its own competency definitions and structures.

In fact, several entities have already undertaken the design and implementation of digital repositories in order to support the storage, search, retrieval and management of these definitions, thus dealing with issues ranging from learning resource discovery to accreditation or skill gap analysis. However, these repositories do not exchange information in a standard way, as they all use different information models or assumptions.

We suggest the Reusable Definition of Competency or Educational Objective (RDCEO) specification to be used as the means of defining and referencing competency or educational objective instances in a standardized way and thus enable the exchange of information between organisational entities according to the individual models adopted. This CWA deals with issues and recommendations concerning the application of the RDCEO specification for the creation of competency repositories, to be used within a European context.

1 Scope

The development of data models, protocols and bindings that are capable of dealing with specific European requirements and concerns for expressing competencies that at the same time guarantees the secure handling of personal information in open and distributed learning environments.

The information relative to the general learner profiles is handled separately in the CWA learner profiles.

This work shall serve as input to ISO/IEC JTC 1 SC 36, its Working Group 3 "Participant Information" and WG 4 "Management and Delivery".

2 Normative References

This CEN Workshop Agreement incorporates by dated or undated reference, provisions from other publications.

These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications do not apply. However, parties to agreements based on this CWA are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies.

1. Reusable Definition of Competency or Educational Objective <http://imglobal.org/competencies/index.cfm>
2. IEEE 1484.12.1-2002, Final Draft Standard for Learning Object Metadata
http://ltsc.ieee.org/wg12/files/LOM_1484_12_1_v1_Final_Draft.pdf
3. CEN/ISSS CWA 14871, Controlled Vocabularies for Learning Object Metadata - Typology, impact analysis, guidelines and a web based Vocabularies Registry
<http://www.cenorm.be/cenorm/businessdomains/businessdomains/informationstandardsystem/elearning/learning+technologies+workshop/index.asp>

3 General references

1. CEDEFOP: European Centre for the Development of Vocational Training
<http://www.cedefop.gr>
2. The Technical Working Group on transparency of vocational qualifications
<http://www2.trainingvillage.gr/etv/transparency/index.asp>
3. Council of Europe – European Language Portfolio – Self-Assessment Grid
<http://culture2.coe.int/portfolio/>

4 Terms and Definitions, and abbreviations

4.1 Terms and Definitions

Reusable Definition of Competency or Educational Objective: This specification provides a means to create common understandings of competencies that appear as part of a learning or career plan, as learning pre-requisites, or as learning outcomes. The information model in this specification can be used to exchange these definitions between learning systems, human resource systems, learning content, competency or skills repositories, and other relevant systems. RDCEO provides unique references to descriptions of competencies or educational objectives for inclusion in other information models.

4.2 Abbreviations

RDCEO Reusable Definition of Competency or Educational Objective

CWA CEN Workshop Agreement

IEEE Institute of Electrical and Electronics Engineers, Inc.

LOM Learning Object Metadata

IMS IMS Global Learning Consortium, Inc.

LIP Learner Information Package

5 Issues and Recommendations

This part of the document deals with issues and recommendations concerning the application of the RDCEO specification for the creation of repositories of competency definitions, to be used within a European context.

5.1 Application Profile

The RDCEO information model provides a set of elements that cover the identification, description and definition aspects of a competency or educational objective. Moreover, it includes an optional metadata mechanism based on the IEEE LOM for the provision of additional information.

In order for the implementation and accommodation of competency or educational objective definition objects within repositories to be less ambiguous, a minimum set of additional metadata elements should be proposed and agreed upon. An initial proposal, based on the LOM, could contain the following elements:

- *Life Cycle. Contribute with subelements Role, Entity and Date*
Elements for holding authorship and temporal information for the creation of an RDCEO.
- *Relation. Kind and Relation. Resource (including all subelements as in IEEE LOM)*
Elements for defining the relationship between an RDCEO and other RDCEO objects. The Relation element, as explained in detail in the following paragraph, can be used for:
 - Relating definitions to their prior versions
 - Creating taxonomies and maps of definitions for classification or complex definition specification purposes
- *Classification (including all subelements as in IEEE LOM)*
Element for defining where an RDCEO falls within a particular classification system.

In addition, the resulting application profile should provide mechanisms for specifying metrics and values for competencies.

5.2 Relations between RDCEO objects – a distributed approach

Competencies are rarely considered in isolation. They are usually related to other competencies. Within the following paragraphs, we reflect on the nature of relations between definitions of competencies (RDCEO objects), imposed by real life applications and industry needs. Moreover, we present a suggestion for the expression of these relations in the RDCEO information model through its additional metadata mechanism, and more specifically, through the incorporation of the IEEE LOM Relation element.

5.2.1 Versioning

Definitions of competencies or educational objectives (RDCEO objects), when created, are assigned a unique identifier. This provides an unambiguous referencing mechanism enabling both interoperability with other applications and expression of links and relations between relevant definitions. It is important that every definition, according to the RDCEO specification, is persistent, in the sense that once created it cannot be undone, since that could result in dangling references. In the case of obsolete definitions, new versions should be created, referring to the deprecated ones. Thus, versioning information is a very important issue.

5.2.2 Creation of Maps and Taxonomies

Definitions of competencies or educational objectives are reusable.

At a first level, they are reusable by reference in other definitions that constitute umbrella/higher level definitions. Such interconnections serve the formation of maps or taxonomies of definitions that can be used for classification or complex competency definition purposes.

At a second level they are reusable by reference in other Learning Technology Standards or specifications, like the IEEE LOM, IMS LIP etc.

The following is a distributed approach representing repositories of RDCEO objects with emphasis on the identification of possible relationships between these objects.

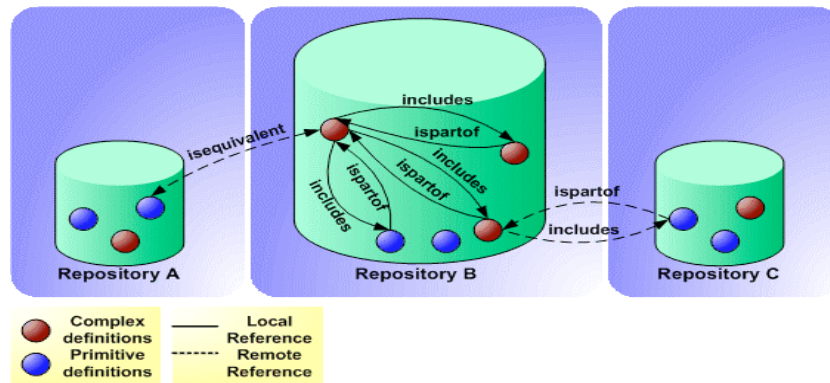


Figure 1. Relationships of RDCEO objects in distributed repositories

Figure 2 depicts a context specific example (proficiency in the English language) of possible relationships between definitions created by several organisations¹

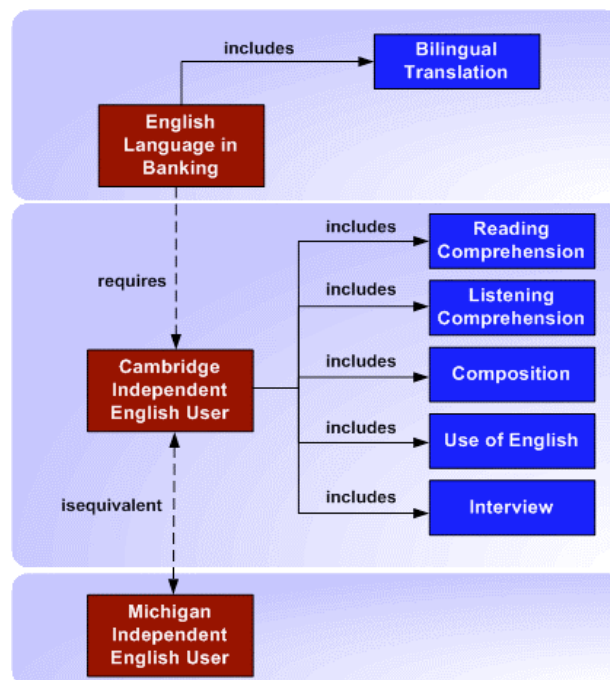


Figure 2. Map of RDCEO objects for definitions of Proficiency in English

¹ Compiled by reference to the Self-Assessment Grid developed by the Council of Europe for the European Language Portfolio and its application by the University of Cambridge - English for Speakers of Other Languages)

In order to address these issues, at the RDCEO information model level, we propose the following values for describing the kinds of relations between RDCEO objects.

Nr	Name	Value Space	Suggestions / Comments
5.3.x	Relation	-	
5.3.x.1	Kind	<p>Includes ispartof</p> <p>isversionof hasversion</p> <p>requires isrequiredby</p> <p>isa</p> <p>isequivalent</p>	<p>Part/Whole relations are those in which one RDCEO object is part of another</p> <p>Version relations are those in which one RDCEO object is an historical state or edition of another object by the same creator.</p> <p>Dependency relations are those in which one RDCEO object requires another object for its functioning or delivery.</p> <p>Parity relation between RDCEO objects</p> <p>Equivalence relation between RDCEO objects</p>
5.3.x.2	Resource	-	Subelements like in the IEEE LOM

5.3 Referencing of RDCEO objects by external applications

As mentioned earlier, RDCEO objects are reusable in reference by other Learning Technology standards or specifications.

IEEE LOM instances might by extension reference RDCEO objects in order to denote whether a learning object can serve for the acquisition of a specific competency or the accomplishment of a certain educational objective.

IMS Learner Information Package offers external referencing mechanisms to common competency definitions as a means for specifying learner competency profiles and/or educational goals in a standardized way.

In order to promote reusability of RDCEO instances, we should emphasize on the need to refer to external RDCEO definitions rather than describing competencies and goals within the instances of the referencing standards or specifications (e.g. LIP's competency and goal elements).

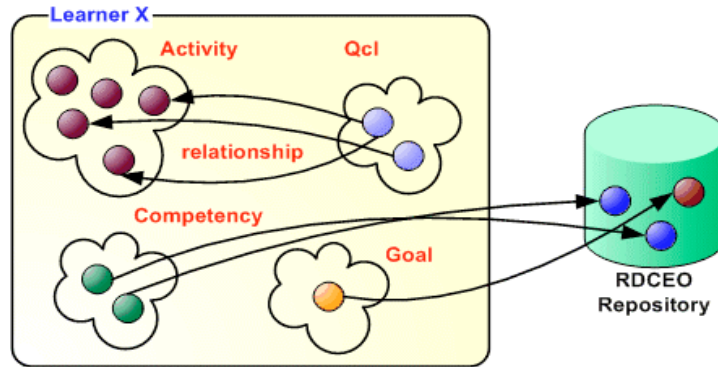


Figure 3. Referencing of RDCEO objects by LIP elements

5.4 Referencing of RDCEO objects by European transparency tools

A special application case is that of the emerging European transparency tools specifications developed by initiative of the CEDEFOP and the European Union in the framework of the Europass initiative (European Curriculum Vitae, Diploma Supplement, Certificate Supplement, European Computer Driving License, European Language Portfolio, Europass-Training). These specifications constitute conceptual views of the learner information space, each of which emphasizing on different aspects.

Most of the aforementioned transparency tools refer to learner competency records. Standardized competency definition repositories can act as pools of reusable objects to be referenced by these tools, thus enhancing their transparency qualities.

Our effort towards this direction should emphasize on the:

- Identification of parts of transparency tools that refer to individual learner information (personal data, activities, evidence of qualifications, etc.) and elaboration of mappings of these information to the IMS LIP specification.
- Identification of parts of transparency tools that could constitute common, reusable definitions of competencies or educational objectives (e.g. industry certificates) and elaboration of mappings of these definitions to the RDCEO specification.

6 Conclusion

The interoperability between European learning technology and relevant systems would significantly benefit from the consolidation of a European data model, capable of expressing competency information and associated metrics in a standardised way and providing necessary mechanisms for the creation of maps and taxonomies of competencies for classification or complex competency specification (e.g. industry certificates) purposes.

This approach, apart from enhancing the communication pathways among diverse technological systems, would also directly respond to the mandate for the establishment of a technical basis to support the implementation of the emerging “Framework for Transparency of Qualifications”, which aims at helping the European citizens to communicate and promote their qualifications and related skills, as well as the skills gained through working life, voluntary work and life in general.

In order to address the aforementioned needs, we recommend an extension of the work described in this CWA, with explicit emphasis on the following axes:

- Development of a European data model and guidelines for expressing, referencing and capturing measurable characteristics of simple and complex competencies.
- Elaboration of mappings between the related elements of the “Framework for Transparency of Qualifications” and the resulting data model, in collaboration with CEDEFOP and the “Technical working group on Transparency of Vocational Qualifications”.
- Identification of existing competency maps and taxonomies, and application of guidelines issued in the CWA 14871 on Taxonomies and Vocabularies, as a harmonisation paradigm for reference by developers.