IEEE LOM is not an option. Lessons to learn

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Abstract

Although some projects and most LMS still rely on IEEE LOM, this standard is not yet an option. We suggest some lessons to learn.

Introduction

Although some projects on accessibility (for example EU4ALL) and most LMS still rely on IEEE LOM, we show that this standard is not yet an option, and that we should learn some lessons from its application.

The investigation is a descriptive review of IEEE LOM application profiles (AP) all over profiles and their implementation on Learning Resource Repositories (LRR). The result is disappointing: most AP are not conformant with IEEE LOM base standard and their implementation on LRRs don't even follow the AP conditions. Black holes in conformance appear mainly in a bad use of controlled vocabularies (7 instances), which are extended with new words created adhoc; modifications in value space and data type of data elements (8 instances), and in the definition of data types or value spaces for aggregate data elements in the base schema.

On another hand, the visualization of metadata records in LRR is far from being satisfactory. Almost none shows the records in an XML format, and so hinders reuse and a deep understanding of data.

Methodology

We identified relevant AP based on a literature search through key actors, European projects, and bibliographic databases. As a complement, questionnaires and interviews have been used to gather information from AP holders.

We choose AP which were based uniquely or mostly on (one of the versions of) IEEE LOM. No restrictions have been imposed on the practice community, nor in the scope of AP, nor in country of origin. The only required feature is that the APs are currently active.

AP Code	Val	AP long name
ABCore	b	Digital Learning Object Metadata (ABCore)
ANZ-LOM	C	ANZ-LOM: Metadata Application Profile
ARIADNE LOM	B	ARIADNE LOM Application Profile
BEN	B	BEN (BIOSCI EDUCATION NETWORK) METADATA SPECIFICATION
BIO@GRO	C	BIO@GRO IEEE LOM APPLICATION PROFILE
COSMOS	B	COSMOS IEEE LOM Science Education Application Profile
DETLRM	C	DETLRM Application Profile
eAccess2Learn	C	eAccess2Learn IEEE LOM Competence-related Application Profile
Eleonet Metadata	B	Eleonet Metadata Application Profile
GLOBE Metadata	B	GLOBE Metadata Application Profile Specification Document
Healthcare LOM	B	Healthcare LOM
ICOPER LOM	B	ICOPER LOM Application Profile
Intergeo Metadata	B	Intergeo Metadata Specication
ISRA Core	C	ISRA Core
Kentucky	B	Kentucky Learning Depot
LRE	B	Learning Resource Exchange Metadata Application Profile
LOM-CH	B	LOM-CH. Metadaten-Spezifikation für die Beschreibung von elektronischen Lehr- und Lernressourcen
LOM-DE	C	LOM-DE: Specification of a LOM Profile for German metadata exchange
LOM-ES	B	LOM-ES V.1.0.
LOM FR	A	LOM FR (NF Z76040)
MACE	B	MACE application profile
ManUeL	C	ManUeL
NL LOM	A	NL LOM
NORLOM	B	NORLOM. Version 1.1
Normetic	A	Normetic. Versió 1.2
OpenScout	B	OpenScout Application Profile
Organic.Edunet	C	Organic.Edunet Application Profile
OSR	A	OSR IEEE LOM Application Profile
Rural-eGov	B	Rural-eGov IEEE LOM AP
SREB-SCORE	A	SREB-SCORE Initiative
TrAgLor	A	TrAgLor LOM AP
VET	c	VET Metadata Application Profile. Version: For all types of resources

Table 1. Final list of application profiles

We then selected one Learning Resource Repository for each IEEE LOM AP. All the LRRs analysed offer openly accessible resources, including in this category those which require a "public" registration. Resources could belong to one institution, or to several, depending on federation or harvesting technologies.

When an AP has been implemented in several LRRs, one of them has been selected based on the following criteria: University oriented over lower studies; broad content oriented over specialized.

During the period 29th August-8th October 2012, one search for each LRR has been performed to get 10 metadata records as samples. Search strategy has been based on one of the following criteria, in a descendent preference order:

- Criteria 1: learning resources first published during the 2012.
- Criteria 2: learning resources of the type “Lecture” (or equivalent in no English languages)
- Criteria 3: keyword “education” (or equivalent in no English languages)

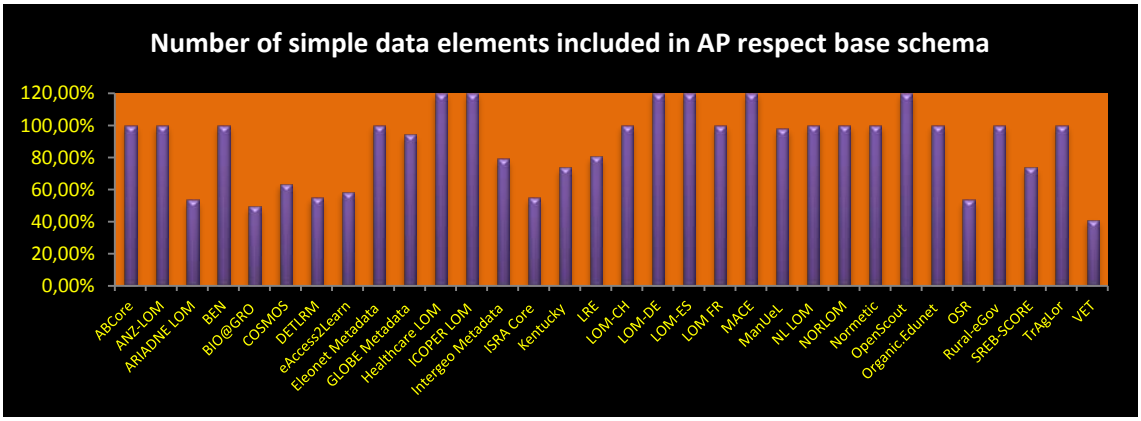
Analysis

The data was categorized as follows[1]:

a. Availability of documentation about scheme of metadata elements and data values, and metadata records in XML binding.
b. Availability of documentation about scheme of metadata elements and data values, and metadata records in some human readable format (not XML).
c. Availability of documentation about scheme of metadata elements and data values, but no metadata records, mostly due to LRR out of order during the test period.

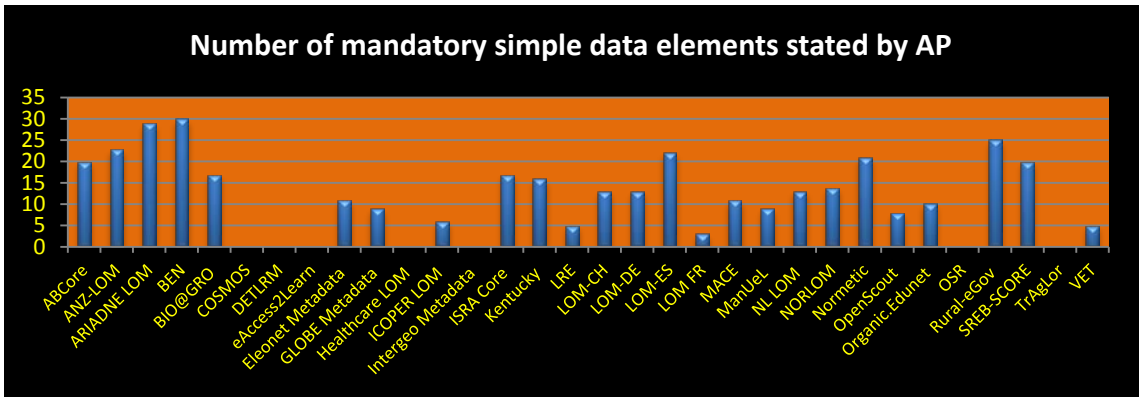
For each AP several data were collected:

- Number of simple data elements selected from the total simple data elements in the base Standard (58)



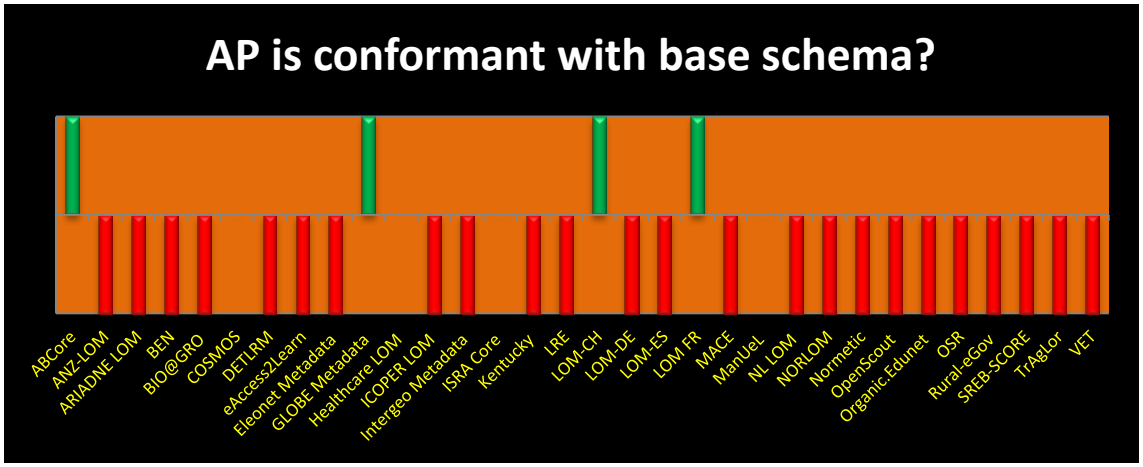
- Number of mandatory (required) simple data elements in the AP.

[1] Find complete data at http://bd.ub.edu/adaptabit/ca/content/pmid-2011-plantilles-accessibles-la-doc%C3%A8ncia



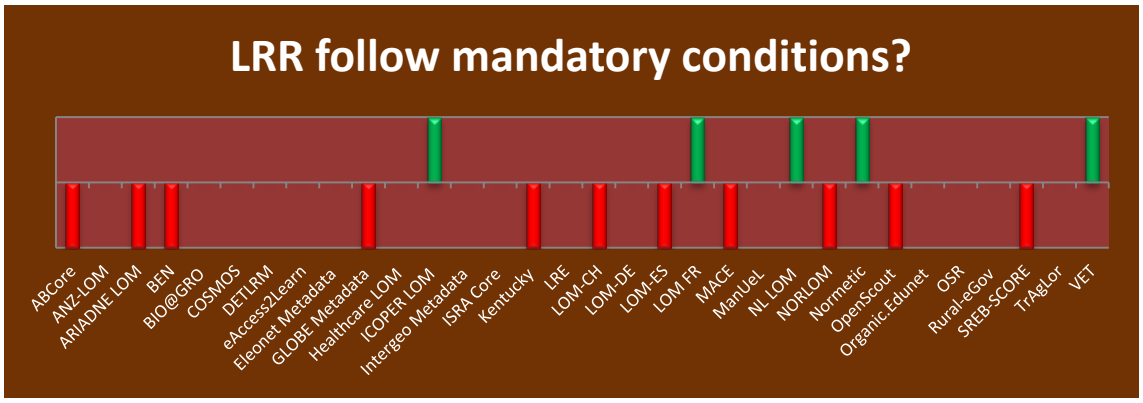
- Modifications that are not allowed by the base standard, based on *Guidelines and support for building application profiles in learning* (2006) and Manouselis, Najjar, Kastrantas, Salokhe, Stracke and Duval (2010). The modifications are:

    - Altering the relative location of an existing data element (e.g. moving a parent element to a child one)
    - Creating a new element that mimics the semantic intent of an existing element
    - Changing the meaning of an existing element
    - Changing the name of an element
    - Extending a schema other than at a specified extension point
    - Extending cardinality of an element
    - Adding new items in a controlled vocabulary list
    - Extensions to the LOMv1.0 base schema shall retain the value space and data type of data elements from the LOMv1.0 base schema.
    - Extensions shall not define data types or value spaces for aggregate data elements in the LOMv1.0 base schema.

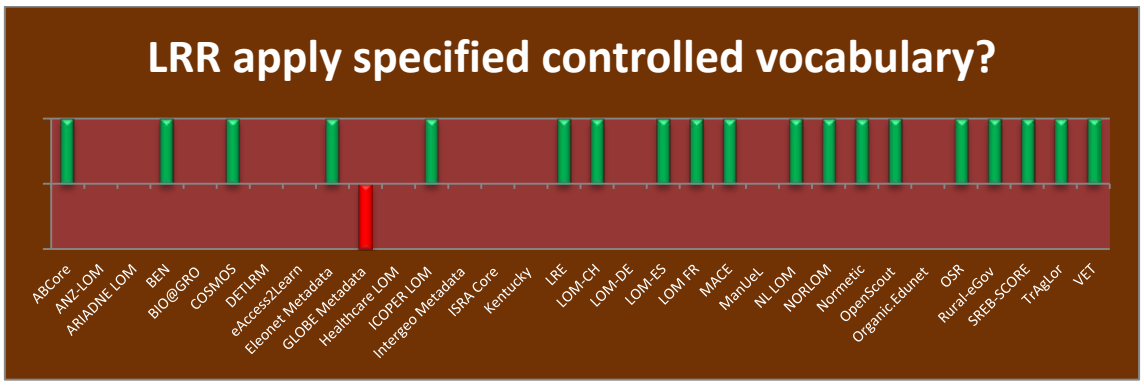


And also, the implementation on specific LRRs was analysed to answer the following questions:

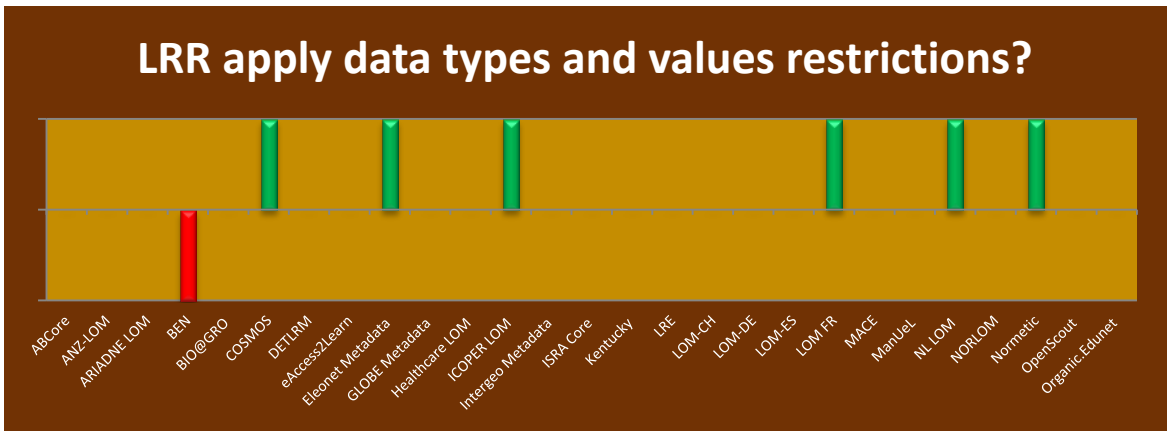
1. Metadata records respect mandatory conditions of simple data elements in the AP? It excludes conditional mandatory elements and rule based elements.



2. Metadata records in the LRR apply controlled vocabularies established by the AP?



3. Metadata records in the LRR respect requirement related to value spaces and data types in the AP?



Discussion

The review of IEEE LOM application profiles and their implementation on Learning Resource Repositories (LRR) show disappointing results, most APs are not conformant with IEEE LOM base standard and their implementation on LRR don't even follow the AP conditions. Black holes in conformance appear mainly in a bad use of controlled vocabularies (7 instances), which are extended with new words created adhoc; modifications in value space and data type of data elements (8 instances), and in the definition of data types or value spaces for aggregate data elements in the base schema.

The research encountered problems in gathering complete data as most retrieved records were not complete. XML visualization is completely suitable and easy to implement and helps reuse and a thorough understanding.

From these results, very consistent in their faults, we suggest some lessons to learn in new Learning Resources Metadata:

1. Keep them simple. Metadata is an "overhead" task which should be minimum and as automatic as possible.
2. Force conformance through XML schemas, semantic web vocabularies or other applied constraints
3. Set a standard for the display of records and their reusability.

References

Guidelines and support for building application profiles in e-learning: CWA 15555. Brussels: European Committee for Standardization, June 2006. ftp://ftp.cenorm.be/PUBLIC/CWAs/e-Europe/WS-LT/cwa15555-00-2006-Jun.pdf.

Manouselis, Nikos, Najjar, Jehad, Kastrantas, Kostas, Salokhe, Gauri, Stracke, Christian M., Duval, Erik: Metadata interoperability in agricultural learning repositories: An analysis, Computers and Electronics in Agriculture, 70, 302–320 (2010).