IEEE P1484.12/D6.1

18 April2001

Draft Standard for Learning Object Metadata

Sponsored by the
Learning Technology Standardization Committee
of the
IEEE

Introduction

(This introduction is not part of IEEE P1484.12, Learning Object Metadata.)

Metadata is information about an object, be it physical or digital. As the number of objects grows exponentially and our needs for learning expand equally dramatically, the lack of information or metadata about objects places a critical and fundamental constraint on our ability to discover, manage and use objects.

This standard addresses this problem by defining a structure for interoperable descriptions of learning objects.

Participants

At the time this standard was completed, the working group had the following membership:

Wayne Hodgins, *Chair*

Carlos C. Amano
Thor Anderson
Patricia Barkman
Bill Blackmon
Debbie Brown
Peter Brusilovsky
J. Richard Burke
Mike Collett
Ben Copeland
Phil Dodds
Erik Duval
Frank Farance
Mike Fore
Paul Foster
Vladimir Goodkovsky
Martha Gray
Jack Hyde
Chad Kainz
Ian Kegel
Roger Lange
John Manion
Jon Mason
Ed Matlack
Ralf Matlack
Cindy Mazow
William A. McDonald
Bill Melton
Yves Nicol
Claude Ostyn
Bruce Peoples
Mike Pettit
Tom Probert
Roy Rada
Dan Rehak
Tyde Richards
Kevin Riley
Robby Robson
Randy Saunders
Jim Schoening
Kathy Sinitsa
Gayle Stroup
Joshua Tonkel
Brendon Towle
John Tyler
Tom Wason
Eamonn Webster

Steve White
Ian Wright

The following persons were on the balloting committee: (To be provided by IEEE editor at time of publication.)

Acknowledgements

Contents

Learning Object Metadata

1. Overview

1.1 Scope

This standard specifies a conceptual data schema that defines the structure of a metadata instance for a learning object. For this standard, a learning object is defined as any entity, digital or non-digital, that may be used for learning, education or training.

For this standard, a metadata instance for a learning object describes relevant characteristics of the learning object to which it applies. Such characteristics can be regrouped in general, educational, technical and classification categories.

The conceptual data schema specified in this standard will allow for linguistic diversity of both learning objects and the metadata instances that describe them.

The conceptual data schema defined in this standard specifies the data elements of which a metadata instance for a learning object is composed.

This standard will be referenced by other standards that will define the implementation descriptions of the data schema so that a metadata instance for a learning object can be used by a learning technology system to manage, locate, evaluate or exchange learning objects.

This standard does not define how a learning technology system will represent or use a metadata instance for a learning object.

1.2 Purpose

The purpose of this standard is to facilitate search, evaluation, acquisition, and use of learning objects, for instance by learners or instructors. The purpose is also to facilitate the sharing and exchange of learning objects, by enabling the development of catalogs and inventories while taking into account the diversity of cultural and lingual contexts in which the learning objects and their metadata will be exploited.

By specifying a common conceptual data schema, this standard ensures that bindings of Learning Object Metadata will have a high degree of semantic interoperability. As a result, transformations between bindings will be straightforward.

The intent of this standard is to specify a base schema, which can be used to build on as practice develops, for instance in order to facilitate automatic, adaptive scheduling of learning objects by software agents.

2. References

This standard shall be used in conjunction with the following publications. When the following standards are superseded by an approved revision, the revision shall apply.ISO 639, <to be completed>

ISO 646, <to be completed>

ISO 3166, <to be completed>

ISO 8601, <to be completed>

ISO/IEC 10646-1:1993, Information technology — Universal multiple-octet coded character set — Part 1: Architecture and basic multilingual plane

MIME types, <to be completed>

3. Definitions

3.1 category (LTSC Learning Object Metadata): A group of related data elements.

3.2 LOM data element: A data element for which the name, explanation, size, ordering, value space, and datatype are defined.

3.3 datatype: A property of distinct values, indicating common features of those values and operations on those values.

3.4 langstring: A datatype that represents one or more character strings. A langstring value may include multiple semantically equivalent character strings, such as translations or alternative descriptions. *See also:* datatype.

3.5 reserved data element: An element of a data structure that is not defined and is not permitted within an instance of the data structure.

3.6 smallest permitted maximum: For implementation-defined values, the smallest permitted maximum value. (see also clause 4.5)

3.7 value space: The set of values for a given datatype (ISO/IEC 11404:1996). NOTE:-- In LOM, a value space is typically enumerated outright, or defined by reference to another standard.

4. Overview of the Metadata Structure

4.1 Basic metadata structure

Data elements describe a learning object and are grouped into *categories*. The Base Scheme (clause 6) consists of nine such categories:

a)   The *General* category groups the general information that describes the learning object as a whole.

b)   The *Lifecycle* category groups the features related to the history and current state of this learning object and those who have affected this learning object during its evolution.

c)   The *Meta-metadata* category groups information about this metadata record itself (rather than the learning object that this record describes) .

d)   The *Technical* category groups the technical requirements and characteristics of the learning object.

e)   The *Educational* category groups the educational and pedagogic characteristics of the learning object.

f)   The *Rights* category groups the intellectual property rights and conditions of use for the learning object.

g)   The *Relation* category groups features that define the relationship between this learning object and other targeted learning objects.

h)   The *Annotation* category provides comments on the educational use of the learning object and information on when and by whom the comments were created.

i)   The *Classification* category describes where this learning object falls within a particular classification system.

Collectively, these categories form the Base Scheme. The last category, Classification, enables an end user to classify a learning object according to arbitrary classification structures. As any classification can be referenced, this category provides for a simple extension mechanism.

4.2 Data elements

Categories group data elements. For each data element, the base scheme defines:

- *name:* the name by which the data element shall be referenced;

- *explanation:* the definition of the data element;

- *size:* the number of values allowed;

- *order:* whether the order of the values is significant (only applicable for data elements with multiple values);

- *value space:* the set of allowed values for the data element - typically in the form of a vocabulary or a reference to another standard (see clause 3.3);

- *data type:* a set of distinct values;

- *example*: an illustrative example.

Both the size and data type information can include smallest permitted maximum values.

Some data elements contain sub-elements. Data elements with sub-elements shall not have values directly; only data elements with no sub-elements shall have values directly. Data elements with sub-elements shall have values indirectly only, through their sub-elements. As an example, 7:2:Relation.Resource has a value indirectly only, through 7.2.1:Relation.Resource.Identifier, 7.2.2:Relation.Resource.Description and 7.2.3:Relation.Resource.CatalogEntry. The latter data element in turn contains sub-elements, and thus has a value indirectly only, through 7.2.3.1:Relation.Resource.CatalogEntry.Catalog and 7.2.3.2:Relation.Resource.CatalogEntry.Entry only. (See clause 4.3 for the interpretation of data elements with sub-elements that have list values.

4.3 List values

In some instances, a data element contains a *list of values*, rather than a single value. This list shall be one of the following types:

- *ordered:* the order of the values in the list is significant. For example, in a list of authors of a publication, the first author is often considered the more important one. As another example, in a hierarchical classification structure, the order is from more general to more specific.

- *unordered:* the order of the values in the list bears no meaning. For example, if the description of a simulation includes three short texts that describe the intended educational use in three different languages, then the order of these texts is not significant. They may appear in any order without loss of information.

A list of values shall contain at least one value. Implementations may use a list of zero length for internal operations, but a zero length list value shall not be distinguishable from no value. Where a value is intended to be present in an implementation, a zero-length list shall not be valid as a final value.

If a data element with sub-elements contains a list of values, then each of these values shall be a tuple of sub-elements. For example, the base scheme specifies that the data element 1.3:General.CatalogEntry contains an unordered list of values for the sub-elements 1.3.1:General.CatalogEntry.Catalog and 1.3.2:General.CatalogEntry.Entry. This means that the value of the data element 1.3:General.CatalogEntry is an unordered list of pairs of the form (1.3.1:General.CatalogEntry.Catalog, 1.3.2:General.CatalogEntry.Entry). In this case, each 1.3.1:General.CatalogEntry.Catalog value determines the catalog from which the corresponding 1.3.2:General.CatalogEntry.Entry value comes.

4.4 Vocabularies

Vocabularies are defined for some data elements. A vocabulary is a recommended list of appropriate values. Other values, not present in the list, may be used as well. However, metadata that rely on the recommended values will have the highest degree of semantic interoperability, i.e. the likelihood that such metadata will be understood by other end users is highest.

The value of data elements with associated vocabularies shall be represented as a (source, value) pair.

- If the source is "LOMv1.0", then the value shall be contained in the vocabulary.

- If the source is not "LOMv1.0", then the value should not be contained in the vocabulary.

As an illustration, we give examples of the different cases for the data element 5.2:Educational.LearningResourceType:

- If the value is just contained in the vocabulary, for instance "Questionnaire", then this would be represented as ("LOMv1.0", "Questionnaire"). This option is preferred if the values in the vocabulary can adequately express the intended meaning.

- If the user wants to assign a value that is not part of the list given for 5.2:Educational.LearningResourceType, then the user may designate the value as, for instance, ("http://www.vocabularies.org/ LearningResourceType", "MotivatingExample"). This option provides more flexibility to the indexer of learning objects, at the expense of 'semantic interoperability'. User defined values will not be used consistently throughout the larger community. In the example above, a URI was used to indicate the source of the vocabulary. This approach is certainly good practice, but using a URI is not a requirement.

4.5 Smallest permitted maximum values

In the base scheme (clause 5), smallest permitted maximum values are defined for:

- *data elements with a list value:* All applications shall support at least that number of entries for the list. In other words: an application may impose a maximum on the number of entries it supports for the list value of that data element, but that maximum shall not be lower than the smallest permitted maximum value.

- *data elements with data type Characterstring or* LangString*:* All applications shall support at least that length for the Characterstring value (either directly or contained in the LangString) of that data element. In other words: an application may impose a maximum on the number of characters it supports for the characterstring value of that data element, but that maximum shall not be lower than the smallest permitted maximum value for the data type of the data element.

Note: The intent is for the smallest permitted maximum values to cover more than 99% of all cases.

4.6 Character sets

This standard defines a conceptual structure for learning object metadata. It does not deal with representation issues, which will be dealt with in separate documents. The base scheme does specify external standards to which any characterstring representation should conform. (In the case of non-restricted characterstring values, reference is made to the repertoire of ISO/IEC10646-1.) Whatever decisions are made in documents that deal with representation, such decisions shall be taken with a view to support multiple languages.

4.7 Representation

For each of the data elements, the specification includes the data type from which it derives its values, such as LangString or Date, etc. These will be defined separately, and will be implemented in a particular way in a particular system. In order to maximize interoperability, future work may define a common representation for these data types. In the absence of such a common representation, an exchange format, such as XML, would allow systems with different representations to achieve interoperability through a conversion process.

5. Conformance

A strictly conforming LOM metadata instance shall consist solely of LOM data elements. A conforming LOM metadata instance may contain extension data elements. Extension data elements shall not replace data elements in the LOM structure. NOTE--All data elements in the metadata instance should describe characteristics as defined by this standard.
(For example, the user shall not abuse the title data element to describe the fonts used in the document.) Abusing data elements would compromise semantic interoperability.

NOTE--An organization/application can allow extensions and refer to LOM conformance in addition to conformance to something else.

6. Base Scheme

Table 1 defines the base scheme structure.

Table 1 - Base Scheme

Nr	Name	Explanation	Size	Order	Value space	Data type	Example
1	General	This category groups the general information that describes this learning object as a whole.	1	N/A	-	-	-
1.1	Identifier	A globally unique label that identifies this learning object. This data element is not and shall not be used, because there is no specified method for the creation of a globally unique identifier.	1	N/A	-	Reserved	-
1.2	Title	Name given to this learning object.	1	N/A	-	LangString (smallest permitted maximum: 1000 char)	-

10

1.3	Catalog Entry	This data element defines an entry within a catalog (i.e. a listing identification system) assigned to this learning object. This sub-category shall describe this learning object according to some known cataloging system so that it may be externally searched for and located according to the methodology of the specified system. This sub-category should be used as a functional replacement for the currently reserved data element 1.1:General.Identifier, as that is currently reserved. NOTE--One of the catalog entries could be generated automatically by a tool.	smallest permitted maximum: 10 items	No.	-		-	-
1.3.1	Catalog	The name of the catalog (i.e. listing identification system).	1	N/A	Repertoire of ISO/IEC 10646-1	Characterstring (minimum-maximum: 1000 char)	ISBN, ARIADNE
1.3.2	Entry	Actual string value of the entry within the catalog (i.e. listing identification system).	1	N/A	-	LangString (smallest permitted maximum: 1000 char)	(en,2-7342-0318), (fr,LEAO875)

1.4	Language	The primary human language *or languages* used within this learning object to communicate to the intended user. NOTE--An indexation tool may provide a useful default.	smallest permitted maximum: 10 items	No	LanguageID = Langcode ('-'Subcode)*, with Langcode a two-letter language code as defined by the code set ISO 639 and Subcode a country code from the code set ISO 3166. NOTE:--The approach adopted is compatible with that of the xml:lang attribute and is defined by RFC1766. NOTE:--ISO 639 deals with 'ancient' languages, like Greek and Latin. The language code should be given in lower case and the country code (if any) in upper case. However, the values are case insensitive. 'None' shall also be an acceptable value.	Characterstring (smallest permitted maximum: 100 char)	"en", "en-GB", "de", "fr-CA", "it"
1.5	Description	A textual description of the content of this learning object.	smallest permitted maximum: 10 items	No	-	LangString (smallest permitted maximum: 2000 char)	-
1.6	Keywords	Keywords or phrases describing this learning object. This data element should not be used for characteristics that can be described by other data elements.	smallest permitted maximum: 10 items	No	-	LangString (1000 char)	-
1.7	Coverage	The span or extent of such things as time, culture, geography or region that applies to this learning object.	smallest permitted maximum: 10 items	No	-	LangString (smallest permitted maximum: 1000 char)	(en,Circa, 16th century France)

12

1.8	Structure	Underlying organizational structure of this learning object.	1	N/A	Collection Mixed Linear Hierarchical Networked Branched Parceled Atomic	Vocabulary	-
1.9	Aggregation Level	The functional granularity of this learning object.	1	N/A	1 = the smallest level of aggregation, e.g. raw media data or fragments. 2 = a collection of atoms, e.g. an HTML document with some embedded pictures or a lesson. 3 = a collection of level 2 learning objects, e.g. a 'web' of HTML documents, with an index page that links the pages together or a course. 4 = the largest level of granularity, e.g. a set of courses that lead to a certificate.	Vocabulary	-
2	Life Cycle	This category describes the history and current state of this learning object and those who have affected this learning object during its evolution.	1	N/A	-	-	-
2.1	Version	The edition of this learning object.	1	N/A	-	LangString (smallest permitted maximum: 50 char)	3.0, (en,1.2.alpha), (nl,voorlopige versie)
2.2	Status	The state or condition of this learning object.	1	N/A	Draft Final Revised Unavailable	Vocabulary	-

2.3	Contribute	This data element describes those people or organizations that have affected the state of this learning object during its evolution (includes creation, edits and publication). NOTE:--This sub-category is different from 3.3:MetaMetaData. Contribute.	smallest permitted maximum: 30 items	No	-		-	-
2.3.1	Role	Kind of contribution. At least the Author(s) of the learning object should be described.	1	N/A	Author Publisher Unknown Initiator Terminator Validator Editor Graphical Designer Technical Implementer Content Provider Technical Validator Educational Validator Script Writer Instructional Designer		Vocabulary	-

2.3.2	Entity	The identification of and information about people or organizations contributing to this learning object, most relevant first. If 2.3.1:LifeCycle.Contribute.Role equals Author, then the entity or entities shall be a person or persons. If 2.3.1:LifeCycle.Contribute.Role equals Publisher, then the entity shall be an organisation. If the entity is an organisation, then it should be a university department, company, agency, institute, etc. under whose auspices the contribution was made.	smallest permitted maximum: 40 items	Yes	Vcard	Characterstring (smallest permitted maximum: 1000 chars)	-
2.3.3	Date	The date of the contribution.	1	N/A	-	Date	-
3	Meta-Metadata	This category describes this metadata record itself (rather than the learning object that this record describes). This category describes such things as who created this metadata record, how, when and with what references. This is not the information that describes the learning object itself.	1	N/A	-	-	-
3.1	Identifier	A globally unique label that identifies this metadata record. This is not and shall not be used, as there is no specified method for the creation of a globally unique identifier.	1	N/A	-	Reserved	-

3.2	Catalog Entry	This sub-category defines an entry within a catalog (i.e. listing identification system), given to the metadata instance. This category should describe this metadata instance according to some known cataloging system so that it may be externally searched for and located according to that system. This data element may be used as a functional replacement for the currently reserved data element 3.1:MetaMetaData. Identifier. NOTE:--One of the catalog entries may be generated automatically by an indexation tool.	smallest permitted maximum: 10 items	No	-	-	-
3.2.1	Catalog	The name of the Catalog (i.e. listing identification system). NOTE:--Generally system generated.	1	N/A	Repertoire of ISO/IEC 10646-1	Characterstring (smallest permitted maximum: 1000 char)	Ariadne
3.2.2	Entry	Actual string value of the entry in the Catalog. NOTE:--This data element is usually generated by the system.	1	N/A	-	LangString (smallest permitted maximum: 1000 char)	(en,KUL532)
3.3	Contribute	This sub-category describes those people or organizations that have affected the state of this metadata instance during its evolution (includes creator and validator). NOTE: This data element is different from 2.3:Lifecycle.Contribute.	smallest permitted maximum: 10 items	Yes	-	-	-

3.3.1	Role	Kind of contribution. Exactly one instance of creator should exist.	1	N/A	Creator Validator	Vocabulary	-
3.3.2	Entity	The identification of and information about the people or organizations contributing to this metadata instance, most relevant first.	smallest permitted maximum: 10 items	Yes	VCard	Characterstring (smallest permitted maximum: 1000 char)	-
3.3.3	Date	The date of the contribution.	1	N/A	-	Date	-
3.4	Metadata Scheme	The name and version of the authoritative specification used to create this metadata instance. NOTE:--This data element may be user selectable or system generated. If multiple values are provided, then the metadata instance shall conform to multiple metadata schemes.	smallest permitted maximum: 10 items	No	Repertoire of ISO/IEC 10646-1	Characterstring (smallest permitted maximum: 30 char)	LOM-1.0
3.5	Language	Language of this metadata instance. This is the default language for all LangString values in this metadata instance.	1	N/A	see 1.4:General.Language NOTE:-- For this data element, 'none' shall not be an acceptable value.	Characterstring (smallest permitted maximum: 100 char)	-
4	Technical	This category describes the technical requirements and characteristics of this learning object.	1	N/A	-	-	-
4.1	Format	Technical data type(s) of (all the components of) this learning object. This data element shall be used to identify the software needed to access the learning object.	smallest permitted maximum: 40 items	No	MIME types based on IANA registration (see RFC2048) or 'non-digital'	characterstring (smallest permitted maximum: 500 char)	video/ mpeg, application/ x-toolbook, text/ html

4.2	Size	The size of the digital learning object in bytes. Only the digits '0' through '9' should be used; the unit is bytes, not Mbytes, GB, etc. This data element shall refer to the actual size of this learning object. If the learning object is compressed, then this data element shall refer to the uncompressed size.	1	N/A	ISO 646, but only the digits '0'..'9'	Characterstring (smallest permitted maximum: 30 char)	-
4.3	Location	A string that is used to access this learning object. It may be a location (e.g. Universal Resource Locator), or a method that resolves to a location (e.g. Universal Resource Identifier). Preferable Location first. This is where the learning object described by this metadata instance is physically located.	smallest permitted maximum: 10 items	Yes	Repertoire of ISO/IEC 10646-1	Characterstring (smallest permitted maximum: 1000 char)	http://host/id
4.4	Requirements	This sub-category describes the technical capabilities required in order to use this learning object. If there are multiple requirements, then all are required, i.e. the logical connector is AND.	smallest permitted maximum: 40 items	No	-	-	-
4.4.1	Type	The technology required to use this learning object, i.e. hardware, software, network, etc.	1	N/A	Operating System Browser	Vocabulary	-

4.4.2	Name	Name of the required technology to use this learning object. NOTE:--The value for this data element may be derived from 4.1:Technical.Format automatically, e.g., "video/mpeg" implies "Multi-OS".	1	N/A	if Type='Operating System', then: PC-DOS MS-Windows MacOS Unix Multi-OS None if Type='Browser' then : Any Netscape Communicator Microsoft Internet Explorer Opera Amaya	Vocabulary	-
4.4.3	Minimum Version	Lowest possible version of the required technology to use this learning object.	1	N/A	Repertoire of ISO/IEC 10646-1	Characterstring (smallest permitted maximum: 30 char)	-
4.4.4	Maximum Version	Highest version of the technology known to support the use of this learning object.	1	N/A	Repertoire of ISO/IEC 10646-1	Characterstring (smallest permitted maximum: 30 char)	-
4.5	Installation Remarks	Description of how to install this learning object.	1	N/A	-	LangString (smallest permitted maximum: 1000 char)	-
4.6	Other Platform Requirements	Information about other software and hardware requirements.	1	N/A	-	LangString (smallest permitted maximum: 1000 char)	sound card, runtime
4.7	Duration	Time a continuous learning object takes when played at intended speed. This data element is especially useful for sounds, movies or animations.	1	N/A	-	Date	PT1H30M, PT1M45S

5	Educational	This category describes the key educational or pedagogic characteristics of this learning object. This is the pedagogical information essential to those involved in achieving a quality learning experience. The audience for this metadata includes teachers, managers, authors and learners.	1	N/A	-	-	-
5.1	Interactivity Type	The flow of interaction between this learning object and the intended user. In an expositive learning object, the information flows mainly from this learning object to the learner. Expositive documents are typically used for learning- by- reading. In an active learning object, information also flows from the learner to this learning object. Active documents are typically used for learning- by- doing. Activating links to navigate in hypertext documents is not considered as an information flow. Thus, hypertext documents are expositive.	1	N/A	Active Expositive Mixed Undefined	Vocabulary	Expositive documents include essays, video clips, all kinds of graphical material and hypertext documents. Active documents include simulations, questionnaires and exercises.

5.2	Learning Resource Type	Specific kind of learning object, most dominant kind first.	smallest permitted maximum: 10 items	Yes	Exercise Simulation Questionnaire Diagram Figure Graph Index Slide Table Narrative Text Exam Experiment Problem Statement Self Assessment	Vocabulary	-
5.3	Interactivity Level	The degree of interactivity between the end user and this learning object.	1	N/A	very low low medium high very high	Vocabulary	-
5.4	Semantic Density	Amount of information conveyed by this learning object as compared to its size or duration.	1	N/A	very low low medium high very high	Vocabulary	-

| 5.5 | Intended End User Role | Principal user(s) for which this learning object was designed, most dominant first.

A learner works with a learning object in order to learn something. An author creates or publishes a learning object. A manager manages the delivery of this learning object, e.g., a university or college. The document for a manager is typically a curriculum.

A typical example of a learning object whose intended end user is an author is an authoring tool, specifically an authoring tool for learning objects, like a questionnaire authoring tool, or a pedagogical simulation authoring tool.

NOTE:--In order to describe the intended end user role through the skills he is intended to master, or the tasks he is intended to be able to accomplish, the category 9:Classification can be used. | smallest permitted maximum: 10 items | Yes | Teacher
Author
Learner
Manager | Vocabulary | - |
| 5.6 | Context | The principal environment within which the learning and use of this learning object is intended to take place. | smallest permitted maximum: 10 items | No | Primary Education
Secondary Education
Higher Education
University First Cycle
University Second Cycle
University Postgrade
Technical School First Cycle
Technical School Second Cycle
Professional Formation
Continuous Formation
Vocational Training | Vocabulary | - |

5.7	Typical Age Range	Age of the typical intended user. This data element shall refer to developmental age, if that would be different from chronological age. NOTE:--The age of the learner is important for finding learning objects, especially for school age learners and their teachers. When applicable, the string should be formatted as minage-maxage or minage-. (NOTE:--This is a compromise between adding three subfields (minAge, maxAge and description) and having just a free text field.) NOTE:--More specific schemes for what this data element tries to cover (such as various reading age or reading level schemes, IQ's or developmental age measures) should be represented through the 9:Classification category	smallest permitted maximum: 5 items	No	-	LangString (smallest permitted maximum: 1000 chars)	7-9, 0-5, 15, 18-, (en,suitable for children over 7), (en,adults only)
5.8	Difficulty	This data element defines how hard it is to work through this learning object for the typical target audience.	1	N/A	very easy easy medium difficult very difficult	Vocabulary	-
5.9	Typical Learning Time	Approximate or typical time it takes to work with this learning object.	1	N/A	-	Date	PT1H30M, PT1M45S
5.10	Description	Comments on how this learning object is to be used.	1	N/A	-	LangString (smallest permitted maximum: 1000 char)	Teacher guidelines that come with a textbook.

5.11	Language	The human language used by the typical intended user of this learning object. NOTE:--As an example, for a learning object in French, intended for English speaking students, the value of 1.4:General.Language will be French, and the value of 5.11:Educational.Language will be English.	smallest permitted maximum: 10 items	No	See 1.4:General.Language	Characterstring (smallest permitted maximum: 100 char)	"en", "en-GB", "de", "fr-CA", "it"
6	Rights	This category describes the intellectual property rights and conditions of use for this learning object. NOTE:--The intent is to reuse results of ongoing work in the Intellectual Property Right and e-commerce communities. This category currently provides the absolute minimum level of detail only.	1	N/A	-	-	-
6.1	Cost	Whether use of this learning object requires payment.	1	N/A	yes no	Vocabulary	-
6.2	Copyright and Other Restrictions	Whether copyright or other restrictions apply to the use of this learning object.	1	N/A	yes no	Vocabulary	-
6.3	Description	Comments on the conditions of use of this learning object.	1	N/A	-	LangString (smallest permitted maximum: 1000 char)	-

7	Relation	This category defines the relationship between this learning object and other learning objects, if any. To define multiple relationships there may be multiple instances of this category. If there is more than one target learning object, then each target is covered by a new relationship instance.	smallest permitted maximum: 100 items	No	-	-	-
7.1	Kind	Nature of the relationship between this learning object and the target learning object, identified by 7.2:Relation.Resource.	1	N/A	Note: Based on Dublin Core: IsPartOf HasPart IsVersionOf HasVersion IsFormatOf HasFormat References IsReferencedBy IsBasedOn IsBasisFor Requires IsRequiredBy	Vocabulary	-
7.2	Resource	The target learning object that this relationship references.	1	N/A	-	-	-
7.2.1	Identifier	Unique Identifier of the target learning object. This is not and shall not be used.	1	N/A	-	Reserved	-
7.2.2	Description	Description of the target learning object.	1	N/A	-	LangString (smallest permitted maximum: 1000 char)	-

7.2.3	Catalog Entry	See 1.3:General.CatalogEntry.	smallest permitted maximum: 10 items	No	-		-	-
8	Annotation	This category provides comments on the educational use of this learning object, and information on when and by whom the comments were created. When multiple annotations are needed, multiple instances of this category may be used. This category enables educators to share their assessments of learning objects, suggestions for use, etc.	smallest permitted maximum: 30 items	No	-		-	-
8.1	Person	The person who created this annotation.	1	N/A	Vcard		Characterstring (smallest permitted maximum: 1000 char)	-
8.2	Date	Date that this annotation was created.	1	N/A	-		Date	-
8.3	Description	The content of this annotation.	1	N/A	-		Langstring (smallest permitted maximum: 1000 char)	-
9	Classification	This category describes where this learning object falls within a particular classification system. To define multiple classifications, there may be multiple instances of this category.	smallest permitted maximum: 40 items	No	-		-	-

9.1	Purpose	The purpose of classifying this learning object.	1	N/A	Discipline Idea Prerequisite Educational Objective Accessibility Restrictions Educational Level Skill Level Security Level	Vocabulary	-
9.2	Taxon Path	This sub-category describes a taxonomic path in a specific classification system. Each succeeding level is a refinement in the definition of the higher level. There may be different paths, in the same or different classifications, which describe the same characteristic.	smallest permitted maximum: 15 items	No	-	-	-
9.2.1	Source	The name of the classification system. This data element may use any recognized "official" taxonomy or any user-defined taxonomy. NOTE:--An indexation or query tool may provide the top-level entries of a well-established classification (LOC, UDC, DDC, etc.).	1	N/A	Repertoire of ISO/IEC 10646-1	LangString (smallest permitted maximum: 1000 char)	(en,ACM), (en,MESH), (en,ARIADNE)

9.2.2	Taxon	This sub-category describes a particular term within a taxonomy. A taxon is a node that has a defined label or term. A taxon may also have an alphanumeric designation or identifier for standardized reference. Either or both the label and the entry may be used to designate a particular taxon. An ordered list of taxons creates a taxonomic path, i.e. "taxonomic stairway": this is a path from a more general to more specific entry in a classification. A TaxonPath shall have a depth from 1 to 9. Normal values should be defined as values between 2 and 4.	smallest permitted maximum: 15 items	Yes	-		-	{[12,(en,Physics)], [23,(en,Acoustics)], [34,(en,Instruments)], [45,(en,Stethoscope)] } {[56,(en,Medicine)],. [67,(en,Diagnostics)]. [34,(en,Instruments)]. [45,(en,Stethoscope)] }
9.2.2.1	Id	The identifier of the taxon, such as a number or letter combination provided by the source of the taxonomy.	1	N/A	Repertoire of ISO/IEC 10646-1		Characterstring (smallest permitted maximum: 100 char)	320, 4.3.2 , BF180
9.2.2.2	Entry	The textual label of the taxon.	1	N/A	-		Langstring (smallest permitted maximum: 500 char)	(en, Medical Sciences)
9.3	Description	This is the description of the learning object relative to the stated 9.1:Classification.Purpose of this specific classification, such as discipline, idea, skill level, educational objective, etc.	1	N/A	-		Langstring (smallest permitted maximum: 2000 char)	(en, A medical instrument for listening called a stethoscope.)
9.4	Keywords	These are the keywords and phrases descriptive of the learning object relative to the stated 9.1:Classification.Purpose of this specific classification, such as accessibility, security level, etc., most relevant first.	smallest permitted maximum: 40 items	Yes	-		Langstring (smallest permitted maximum: 1000 char)	-

7. LangString

Table 2 defines the structure of a langstring item.

Table 2 - Langstring

Nr	Name	Explanation	Size	Order	Value space	Data type	Example
1	LangString	Phrase in a human language.	smallest permitted maximum: 10 items	No	-	-	-
1.1	Language	Human language of the character string . NOTE:--Indexation tool should provide useful default.	1	N/A	See 1.4:General.Language If no Language is specified, then LangString.String should be interpreted as a string in 3.5:MetaMetaData. Language.	Characterstring (smallest permitted maximum: 100 char)	"en", "en-GB", "de", "fr-CA", "it"
1.2	String	Actual character string. A character string shall contain at least one letter. Implementations may use a string of zero length for internal operations, but a data element with a zero length string shall not be distinguishable from a data element with no value. Where a value is required, a zero length character string shall not be valid as a final value.	1	N/A	Repertoire of ISO/IEC 10646-1	Characterstring	-

8. Date

Table 3 defines the structure of a date item.

Table 3 - Date

Nr	Name	Explanation	Size	Order	Value space	Data type	Example
1	DateTime	Date expressed as per ISO 8601 standard.	1	N/A	Date and time values that can be represented in ISO 8601	Characterstring (smallest permitted maximum: 200 char)	1999-06-11
2	Description	Description of the date.	1	N/A	-	LangString (smallest permitted maximum: 1000 char)	('en','circa 1300 BC'), ('en','Fall Semester 1999')

9. Vocabulary

Table 4 defines the structure of a vocabulary item.

Table 4 - Vocabulary

Nr	Name	Explanation	Size	Order	Value space	Data type	Example
1	Source	"LOMv1.0", or an indication of the source of the value, for instance through a URI (see also clause 4.4).	1	N/A		LangString (smallest permitted maximum: 1000 char)	(en,LOMv1.0) "http://www.vocabularies.org/OSList
2	Value	The actual value. If the source is "LOMv1.0", then the value shall come from the list defined in the base scheme for the data element.	1	N/A	-	LangString (smallest permitted maximum: 1000 char)	(en,MacOS)

Annex A: Bibliography

(informative)

- Dublin Core Metadata Initiative: The Dublin Core is a metadata element set intended to facilitate discovery of electronic resources. < http://dublincore.org/ >

- ISO 639: This is an international standard for the representation of languages. Version 1 uses two-letter language codes, e.g. 'en' for English, 'fr' for French, 'nl' for Dutch, etc. These language codes are a basis for the IETF registry of language tags, as specified in RFC 1766: Tags for the identification of languages.

- ISO 646: This is an international standard that defines the ASCII character set.

- ISO 3166: This is an international standard for the representation of country names, e.g. 'BE' for Belgium, 'CA' for Canada, 'FR' for France, 'GB' for United Kingdom, 'US' for United States, etc. <http://www.din.de/gremien/nas/nabd/iso3166ma/codlstp1.html>

- ISO 8601: This is an international Standard that specifies numeric representations of date and time. The basic notation is YYYY-MM-DD where YYYY is the year in the usual Gregorian calendar, MM is the month of the year between 01 (January) and 12 (December), and DD is the day of the month between 01 and 31. <http://www.cl.cam.ac.uk/~mgk25/iso-time.html>

- ISO/IEC 10646-1: This is an international Standard that specifies a character set that relies on 32 bits, includes approximately 4 billion characters, of which the first 65536 are Unicode, the first 256 are ISO 8859-1, and the first 128 are ASCII.

- MIME type: Multipurpose Internet Mail Extensions extends the format of Internet mail to allow non-US-ASCII textual messages, non-textual messages, multipart message bodies, and non-US-ASCII information in message headers. <http://www.oac.uci.edu/indiv/ehood/MIME/MIME.html>

- RFC 1766: This Internet standard defines a language tag, referring to ISO 639 for the language, and to ISO 3166 for the country code. http://ds.internic.net/rfc/rfc1766.txt

- vCard: <http://www.imc.org/pdi/>: This standard defines how contact details for people and organisations can be represented.

Annex B: Complete Dublin Core Mapping

(Informative)

The Dublin Core defines 15 data elements. These data elements map directly to data elements defined in this standard, as illustrated in the table below.

Table B.1 - Dublin Core Mapping

DC.Identifier	1.3:General.CatalogEntry. 1.1:General.Identifier is currently a reserved term, as there is no specified method for the creation of a globally unique identifier.
DC.Title	1.2:General.Title
DC.Language	1.4:General.Language
DC.Description	1.5:General.Description
DC.Subject	1.6:General.Keywords or 9:Classification with 9.1:Classification.Purpose equals "Discipline" or "Idea".
DC.Coverage	1.7:General.Coverage
DC.Type	5.2:Educational.LearningResourceType
DC.Date	2.3.3:LifeCycle.Contribute.Date when 2.3.1:LifeCycle.Contribute.Role has a value of "Publisher".
DC.Creator	2.3.2:LifeCycle.Contribute.Entity when 2.3.1:LifeCycle.Contribute.Role has a value of "Author".
DC.OtherContributor	2.3.2:LifeCycle.Contribute.Entity with the type of contribution specified in 2.3.1:LifeCycle.Contribute.Role.
DC.Publisher	2.3.2:LifeCycle.Contribute.Entity when 2.3.1:LifeCycle.Contribute.Role has a value of "Publisher".
DC.Format	4.1:Technical.Format
DC.Rights	6:Rights
DC.Relation	7:Relation
DC.Source	7.2:Relation.Resource when the value of 7.1:Relation.Kind is "IsBasedOn".