Standards in eLearning –
an Overview

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Table of Contents

1. Standards and Why We Need Them
2. Kinds of Standards
3. Standards and Specifications Dealing with Metadata
4. Other Specifications
5. Future Developments
6. Conclusion
Do you know your size?
# Standards and Why We Need Them

## Adult Men‘s and Women‘s Shoe Size

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Standards and Why We Need Them

Standards help to
• tear down barriers
• establish semantic and technical interoperability
• increase the freedom of choice
➢ Take the DIN A4 paper sheet format as an example
Kinds of Standards

There are standards and specifications:

• *de jure* standards
  – DIN (national standards)
  – CEN/ISSS (European standards)
  – ISO (international standards)

• specifications and *de facto* standards
  – W3C
  – IEEE
  – OASIS
Standards and Specifications Dealing with Metadata

Metadata is the most advanced area in terms of standardization of learning technologies.

- There are several standards and specifications dealing with metadata:
  - Dublin Core
  - Learning Object Metadata (LOM)
  - IMS Meta-data Specification
Standards and Specifications Dealing with Metadata

What is metadata?

• Data about data
  ➢ more precisely: data describing other data

• Attribute/value pairs

We distinguish between

• Syntax of metadata

• Semantics of metadata (metadata about special resources)
Standards and Specifications Dealing with Metadata

Dublin Core Metadata

- Dublin Core Metadata Initiative
- „Mother of all metadata specifications“
- ISO Standard
- Dublin Core Metadata Element Set
- Supplemental elements
- Arbitrary element order and occurrence
Standards and Specifications Dealing with Metadata

Dublin Core Metadata Element Set

title coverage subject description
date rights publisher contributor
date creator source
identifier type format
relation language
Standards and Specifications Dealing with Metadata

Pros:

- Simplicity (usable for non-experts)
- Semantic compatibility (beyond disciplines)
- Internationally approved
- Extensible
- ISO standard
- Compatible with RDF
  ➢ can be used in the web
Cons:

- Dublin Core is non-specific
  - Semantic compatibility
  - Arbitrary element order and occurrence
- Dublin Core has too few metadata elements – especially when dealing with eLearning content

eLearning metadata specifications
Standards and Specifications Dealing with Metadata

Learning Object Metadata (LOM)

• Institute of Electrical and Electronics Engineers (IEEE) Learning Technology Standards Committee

• IEEE P1484.12 Learning Object Metadata Working Group since 1999

• Official IEEE standard since 06/2002

• Derived from Dublin Core
Learning Object Metadata (LOM)

- Components for learning can be divided into
  - metadata
  - content itself (learning objects)
- Complex learning objects are composed of smaller learning objects

- Modularity of content
- *Everything* is a learning object – even non-digital resources (books, services, living persons)
The properties of a learning object are organized in nine categories:

- General
- Lifecycle
- Meta-Metadata
- Technical
- Educational
- Rights
- Relation
- Annotation
- Classification
Pros:
- Several metadata categories and elements
- Support of modular content
- High flexibility
- Extensible
- Adopted by numerous consortia
Standards and Specifications Dealing with Metadata

Cons:

- Very document-centric
- No content model
- Educational category is far from being complete
- Classification category is insufficient
- Up to now no official binding
Standards and Specifications Dealing with Metadata

IMS Meta-data Specification

- National Learning Infrastructure Initiative (NLII)
- IMS Project
- One of several specifications developed by IMS
  - IMS Content Packaging Specification
  - IMS Question & Test Interoperability Specification
  - IMS Learning Design
Standards and Specifications Dealing with Metadata

IMS Meta-data Specification

- Based on LOM
  - Version 1.2.1 conforms to LOM WD 6.1 (05/2001)
Standards and Specifications Dealing with Metadata

Pros:

• Based on LOM
• XML binding available
• Coordination with other IMS specifications
Standards and Specifications Dealing with Metadata

Cons:

- XML binding not very sophisticated
- Additional expenditure for authors
- Only future versions will fully comply to official LOM XML binding and specification
Other Specifications

- IMS Content Packaging Specification
- IMS Question & Test Interoperability
- ADL SCORM
Other Specifications

IMS Content Packaging Specification

- Distribution and Exchange of learning objects
- XML manifest
- PIF

![Diagram showing structure information and reference to physical files]
Other Specifications

Pros:
• Container format for exchange and distribution
• XML binding available
• Coordination with other IMS specifications
Other Specifications

Cons:

• Need of two additional files
  – Manifest file
  – Package Interchange file
Other Specifications

IMS Question & Test Interoperability Specification

• XML language for describing questions and tests
• Interoperability of content within assessment systems
Other Specifications

Pros:
• XML binding available
• Allows for the distribution of test items
• Coordination with other IMS specifications
Other Specifications

Cons:

• Specification is very complex
  ➢ huge overhead
Other Specifications

ADL SCORM

- Advanced Distributed Learning Initiative (US government, industry and universities)
- Sharable Content Object Reference Model
- Collection of several specifications, organized in „Books“
  - Book 1: Overview
  - Book 2: Content Aggregation Model
  - Book 3: Run-Time Environment
Other Specifications

Book 1: Overview

• „Model that *references* a set of interrelated technical specifications and guidelines“

• Combination of specifications developed by groups such as IMS, AICC, ARIADNE, IEEE LTSC
Other Specifications

Book 2: SCORM Content Aggregation Model

- Sequencing and Navigation (partly IMS and ADL)
- Content Structure (derived from AICC)
- Content Packaging (IMS Content Packaging)
- Meta-Data (LOM WD 6.1/IMS XML Binding)
Other Specifications

The SCORM Content Model consists of

- Assets (basic media, text)
- Sharable Object Content (SCO, collection of one or more Assets)
- Content Aggregation (content structure)
Other Specifications

SCORM Content Structure

- Course
  - Module 1
    - Lesson 1
    - Lesson 2
  - Module 2
    - Lesson 1
    - Lesson 2
      - Part 1
    - Assessment (Leistungsnachweis)
Other Specifications

SCORM Content Structure

- Organization
  - Item
    - Item
    - Item
    - Item
      - Item
    - Item
      - Item
    - Item
  - Item
    - Item
    - Item
      - Item
    - Item
      - Item
    - Item

Resource ➔ Sharable Content Objects (SCO)
Resource ➔ Sharable Content Objects (SCO)
Resource ➔ Sharable Content Objects (SCO)
Resource ➔ Asset
Resource ➔ Sharable Content Objects (SCO)
Other Specifications

SCORM Sequencing and Navigation

• LMS specific rules
• Provides the means to conditionally branch from one learning resource to other learning resources
• Only a limited system of sequencing and navigation exists by now
Other Specifications

Book 3: SCORM Run-Time Environment

Data Model (from AICC)
Launch, Communication API (from AICC)
Other Specifications

SCORM Runtime Environment provides

- A common way to start learning resources
  - Launch
- A common mechanism for learning resources to communicate with an LMS
  - Application Program Interface (API)
- A predefined language or vocabulary forming the basis of communication
  - Data Model
Other Specifications

Pros:

- Integrative model
- XML bindings available
Other Specifications

Cons:

• Some specifications are outdated
• Interoperability problems possible
• Implementation very complex
  (Run-Time Environment)
IMS Learning Design

• Language for modeling units of study, describing a learning process

• Integration of the Educational Modeling Language (EML, Open University of the Netherlands) and existing IMS specifications
  – Content Packaging
  – Meta-data
  – Simple Sequencing
Other Specifications

Domain of LOM
Other Specifications

Pros:

• Integrative view of (e)learning
• Didactical and pedagogical concepts taken into account
• XML binding available
**Other Specifications**

Cons:

- Bleeding edge specification
  - Some parts are subject to change in the future
- Very complex
- Some concepts are incomplete
Future Developments

• IMS Learning Design is the first step into the future of eLearning specifications
• Other specifications will follow
  ➢ DIN EBN Didactical Object
Conclusion

There are many different eLearning specifications but

• In the field of metadata everything concentrates on LOM
• Recent developments target on integrative models, taking didactical concepts into account
Conclusion

and

none of the specifications contains a content model!
Thank you very much for your attention!