E-Learning and the Digital Library:

Opportunities for Collaboration

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Presentation Overview

- Why should E-Learning standards matter to the Library?
- Strategic Issues/Opportunity
- About IMS
  - Organization
  - Specifications
  - Collaborators
- IMS and Digital Library Convergence Points
- Q&A
Why should e-learning standards matter to the library?

Case of MIT:

MIT’s Open Courseware Initiative needs a digital repository for their course materials.

Should they use IMS specs to interoperate with LMS vendors, or METS to interoperate with library digital repositories, both, neither?
Strategic Issues and Opportunity

Issues

• E-learning systems are expanding across the enterprise.
• Interoperability with the library is a requirement.
• Content scaling issues (archival access, large collection access, cataloging etc.) will become critical.

Opportunity

• Collaboration between E-learning and Digital Library groups creating specifications for interoperability can
  – Leverage expertise
  – Increase interoperability
  – Provide greater value to shared constituencies
About IMS

Non-profit worldwide consortium
  • 54 contributing members
  • 75 developers network members
  • Sectors represented: Standards bodies, Domain consortia, Learning providers, Government agencies, Content providers, Technology vendors, Researchers, Labs & Test beds

Creates e-learning specifications
Fosters collaboration between e-learning constituencies focused on specific segments of the market (K-12, HE, Training)
IMS Contributing Members
(a partial list)

- ADL, UKeUniversities, Ufi, U-Cal Berkeley
- Industry Canada, MIT, Giunti Interactive Labs, Fretwell-Downing, Thomson Learning
- Apple, Microsoft, Oracle, Cisco, IBM, Sun
- Saba, NetG, Can Studios, Question-Mark
- Blackboard, WebCT, CIC
- SCT, Eduprise, EDUCAUSE, PeopleSoft
- BECTa, JISC, DEST, Open University, ETS
- Texas Instruments, Boeing… and more.
E-Learning Specifications

Completed Specifications
- Content Packaging
- Meta-Data
- Enterprise
- Learner Information
- Question and Test

Specifications in Progress
- Simple Sequencing
- Digital Repositories
- Learning Design
- Accessibility
Content Packaging (v1.1.2)

Provides a way to package learning information and meta-data:

- Packaged Learning Objects
- Bundled Question and Test Objects
- Learning Information Packages
- Sequencing Information
- Learning Design Support
Meta-Data (v1.2.1)

A structured way to add information to content to facilitate search and delivery:

- Organized into 13 types of information
- Extensible to include new elements
- Now standardized by the IEEE’s Learning Object Metadata standard
Enterprise (v1.1)

Facilitates the transfer of organizational information about students and groups:

- Support for record synchronization
- Defines a person and group membership
- Demographics
- Growing international support
Learner Information (v1.0)

Used to manage a learner’s profile (and as such it complements the IMS Enterprise specification). Provides a means to describe a person and collect information about them:

- Can also describe content developers, etc.
- Specify affiliations and groups
- Manage identity and identifiers
- Future support for accessibility-based preferences
Question and Test (v1.2)

Comprehensive support for the description and delivery of online tests:

• Support for question banks and random tests
• Strong multimedia support
• Selection and ordering
• Scoring calculations
• Result reporting
Simple Sequencing

A means to specify the sequencing of learning content:

• Support for flow and choice
• Limited support for adaptive learning
• Score rollups
• Integrates with content packaging
• Final Release due January 2003
Digital Repositories Interoperability (DRI)

Provides a basic interface recommendation to allow the following operations:

• Federated data-base architecture
• Search / Retrieve / Update
• Based on XQuery and Z39.50
• Final specification due by end of 2002
RDCEO v1.0

The ‘Reusable Definitions for Competency and Education Objectives (RDCEO)’ specification was issued in October 2002. It supports:

- A package for competencies
- Portable competency definitions
- Relationships to taxonomies
- Prerequisites and conditionals
- Separating completion from evaluation
Learning Design

Provides a means to specify:

- Roles and participants
- Resources needed
- Instructional design approach
- Integrates with content packaging
- Final specification due by end of 2002
Accessibility

Work is now complete on the “Guidelines to Developing Accessible Learning Applications” - see IMS website http://www.imsglobal.org/accessibility/index.cfm

Currently working on Accessibility issues in the IMS LIP specification.

Investigating new work on Accessibility Meta-data.
DRI Spec: Use Cases Categories

Create and Modify Resources

Discover Resources

Notification of Modification of Resources
DRI Spec: Discovery Scenarios

A user (or software agent) searches a repository directly

A user conducts a search across repositories via a search gateway intermediary (acting as a translator)

A user conducts a search across repositories via an intermediary (acting as an aggregator)
Functional Architecture
Phase 1 Scope
Key Decisions Since DRI Base Doc Approval

- Alert/Expose out-of-scope
- Submit/Store addresses only content packaged learning objects
- Request/Deliver addresses only electronic access
• Integration of online information services with e-Learning provision

• Define interface to next-generation repositories for Learning Objects
DRI Spec: Proposed Future Work

Development of a cross-domain minimal search grammar (e.g. subset of XQuery)

Alert/Expose – define service

Request/Deliver - extend service
Future IMS Specs

Possible future work being discussed in IMS right now includes:

• Digital Rights Management
• Adaptive Testing
• Expanded Competency Management
• Accessibility Preferences
Future IMS Specs (cont’d)

Going beyond “data interoperability”

Supporting interoperable behaviors via interfaces, such as Java, Javascript, Web Services, etc.

Guided by a strategic technical plan based on a service model and abstract framework
IMS Service Access Point (SAP) Model
Current Collaborators

Advanced Distributed Learning Initiative (ADL)

Schools Interoperability Framework (SIF)

Open Knowledge Initiative (OKI)
ADL

Joint White House/Department of Defense initiative

Shareable Content Object Reference Model (SCORM) is ADL’s primary focus

SCORM defines a model for packaging learning content and a Javascript-based API to enable communication between learning content and the system that delivers it
ADL and IMS

ADL uses the following IMS Specs:

Content Packaging
IMS Meta-Data binding
IMS Simple Sequencing
ADL and IMS

IMS
  - Meta-data v1.2.2
  - Content Packaging v1.1.3
  - IMS QTI v1.2
  - Learner Information v1.0
  - Sequencing v1.0

SCORM
  (Info: current is v1.2)
  - Meta-data v1.2.1
  - Content Packaging v1.1.2
  - QTI
  - Learner Information
  - Sequencing

IEEE LTSC Standards
  - LOM v1.0

XML Binding

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OKI

OKI is defining an open and extensible architecture for learning technology that is specifically targeted for higher education.

OKI provides detailed specifications for interfaces among components of a learning management environment, and open source examples of how these interfaces work.
OKI Architecture

Educational Applications
- Educational Software
- Educational Software
- Educational Software
- Educational Software
- Educational Software

Learning Management System

Educational Services
- Content Mgmt API
- Course Mgmt API
- Assessm't API
- Comm's API
- Etc.

Shared Objects

Local Implementations

Common Services
- AuthN API
- AuthZ API
- DBMS API
- File API
- GUID API
- Rules API
- Logging API
- User Msg. API

Local Implementations

Institutional Infrastructure
- DB
- File Services
- Security
- Etc.
A Collaborative Development Model for Formal Learning Standards

- R&D Concepts
- User Needs
- IMS Spec Consortia
- ADL Testbeds Markets
- IEEE Standards Bodies
- Approved Standards
- Market-based Conformance Programs

Specifications
Implementations, Reference Models, Requirements
Standards
IMS and Digital Library Convergence Points

Items for Discussion:

Viewing e-learning specs as a special purpose use case.

How might IMS specs intersect with Library efforts, and how might we collaborate to mutual benefit?
Libraries have a tradition of collaborating with specialized groups (e.g. meta-data for geospatial data, video data, image data)

Should the library view e-learning as a special purpose use case?
IMS and Digital Library Convergence Points

Unique needs of e-learning community:

- Content Sequencing
- Discovery Meta-data
- Digital Rights
IMS and Digital Library Convergence Points

Common needs of e-learning and library communities:

- Web Service based Query Mechanisms
- Long-term Preservation
- Infrastructure Frameworks
IMS and Digital Library Convergence Points

Example of content packaging strategies:

• Wrap one specification package with another

• Translate one specification package into another

Remember: Internal data structure not same as transmission package structure
Both the E-Learning and Library Communities can benefit from interoperability with one another.

What are the options for collaboration?

- Appoint Liaisons
- Exchange Requirements
- Organize Strategy Sessions
- Initiate Joint Projects