Corporate Training and Education Technology Standards

The 10th International Conference on Information Systems Analysis and Synthesis: ISAS 2004
and
International Conference on Cybernetics and Information Technologies, Systems and Applications: CITSA 2004
July 23. 2004

G.A. Redding
Institute for Defense Analyses
Standards = Organizational Imperative...

- Learning Resource Center
- Accreditation
- Digital Libraries
- SCORM
- ADL
- EPSS
- WBT
- IMS Project
- Registration/Certification
- Knowledge Management
- VTC
- VTT
- Teacher Training
- Distributed Training
- Distance Learning
- Help Desk
- IVT

multiple independent initiatives
E-Learning Objectives

1. WHAT are E-learning Standards?
   – Identify key set of E-learning Standards, state their purpose, and determine scenarios & technology to which they apply.

2. WHY are they important?
   – Communicate the advantages of using standard-compliant products to:
     • Customers
     • Colleagues
     • Decision makers

3. HOW do they work in theory and in practice?
   – Articulate the main features and applications of:
     • Learning Object Metadata
     • AICC CMI Specifications
     • SCORM Runtime API
     • IMS Packaging
ADL Standards Focus

ADL is focusing on web-based **learning system** standards

Learning System Standards
- content
- metadata
- LMS data model

Internet Technologies
- HTML
- HTTP
- XML
- JAVA/JavaScript
- ...

But **not Internet** standards (others are doing that)
Exchanging Data – How?

If data is exchanged, we need to know how!

Certifications
Learner’s Profile
Assessment
Learner’s Computer
Content
E-learning Catalog
E-learning Content
LMS

The Learner
Exchanging Data – Where?

- Encoding certifications & competencies
- Exchanging learner profile information
- Labeling content (metadata)
- Querying a catalog
- Portable content that runs on any LMS
- Communicating between an LMS and content
- Encoding assessment tests
- Communicating the results of assessment tests
Simple CMS Model

- Content Structure/Hierarchy
  - Course
  - Unit
  - Module
  - Component

- Server/Display Engine

- HTML/Java/Streaming Media

- User/Browser

- Internet
Learning Management System

- Profiles/Registration (Roster Operations)
- Content/Structure/Hierarchy
- Testing
- Tracking (Data Management)
- Reporting (Data Management)
- Content Format
- Protocols
- Data files
- Server/Display Engine
- HTML/Java/Streaming Media
- User/Browser
- Internet
- Course
- Unit
- Module
- Component
- •Content Format
- •Protocols
- •Data files
LMS Components

Developer
- Authoring Tools
- Instructional Design
- Change Control Process
- Adult Learning Theories
- Collaborative Tools
- Intellectual Property Rights

Information Technology
- Integration Infrastructure
- Security
- System Operations

System Maintenance
- Site Modifications and Upgrades
- Operation and Maintenance
- Publish and Update Courseware

EPSS Knowledge Management Databases
- Learning Objects
- Chat Sessions
- Whiteboard Presentations
- Collaborative Files

Student/Instructor
- Course Catalog
- Search Features
- Synchronous and Asynchronous Learning
- Test and Course Results
- Collaborative Tools
- Skills History

Student Administration
- Student Training Records
- Student Registrations and Personal Data
- Skill History
- Evaluation Results
- Finance & Accounting

System Administration
- Sign-On and Logins
- Help Desk
- User Maintenance

Needs of Total Learning Environment
Functional Alignments

Pre-Packaged Solutions & Tools

- Docent/HP
- Click2learn.com
- Lotus
- Blackboard.com
- Macromedia
- Headlight.com
- TrainingNet
- Learn2.com
- eMind.com

CMS + LMS + KMS + Repositories

- Pensare
- SmartForce
- Ninth House
- SkillSoft
- Digital Think
- Eduprise.com
- MindLever.com
- KnowledgePlanet.com
- HungryMinds.com

Custom Solutions & Consulting Services

- Medicine
- Technology Focus
- Engineering
- Education Focus
- Fine Arts
- Arts & Science
Specifications & Standards

• Specifications are instructions
• If specifications are accepted and used, they become *de facto* standards
  – Most of us care most about *de facto* standards
• Formal standards bodies create *formal standards*.
  – Requires consensus
  – Process has withstood legal challenges
  – Formal standards have legal weight and stability
  – Formal standards have conformance statements
Standards Development

1. Specification
2. Implementation & Testing
3. Improvement
4. Industry Support
5. Standardization

This process has feedback as well as feed forward loops.

Not all work has followed this process.
Customer Perspective

- Can buy one LMS and use any content
  - Wider choice
  - Lower cost
  - Quicker adoption of new content providers and technologies
  - Consistent user experience and higher quality
- Not locked in
  - Can replace LMS and keep content
  - LMS can interoperate with other systems
- Enterprise solution
  - Interoperability enables enterprise-level consistency
  - Longer lifetime of platforms
  - More efficient use of maintenance investment
Education Perspective

• Allows choice among delivery systems
• Reusability & Modularity
  – Makes content easier to customize
  – Parallels current practice of picking & choosing content
  – Increases audience for good content
• E-learning standards enable adaptivity
  – Faster and easier adoption of new technologies
LMS – Vendor Perspective

- No more one-off integrations
- Can compete with other LMS vendors on features, not content
- Can apply resources to LMS features, not multiple interoperability links
Content Production

- Reduce cost of production
  - programming is left up to LMS
- Ability to run on any LMS
  - Creates larger potential market
- Reusability & Modularity
  - Creates larger potential market
  - Increases value of good content
  - Offers opportunities to add value by assembly and sequencing
The SCORM®...

Sharable Content Object - Reference Model

• Integration of industry specifications from many other organizations - AICC, IMS, IEEE, ARIADNE, etc.
• Provides a unified learning content model
• Defines a standardized web “run-time” environment
• The first step on the path to defining a true learning architecture A reference model that defines a web-based learning “content model”
• A set of interrelated specifications designed to meet DoD’s high level “-ilities”
• A process to knit together disparate groups and interests
• A bridge from general emerging technologies to commercial implementations
• Establishes a process for certifying courses and content

...an evolving document to collect all the “bits and pieces” in one place
The ADL SCORM

- Sharable Content Object - Reference Model
- “Bookshelf” of specifications and standards
- Based on CMI
- Uses LOM and IMS content specs
- Wide adoption and large mind-share (e.g. RFP’s)
- Being productized by all major LMS vendors
- Content-LMS communication via SCORM JavaScript API

- Requires very little coding on content side.
- Content & structure separate but in one package.
SCORM

CONTENT AGGREGATION MODEL

- Course Structure Format - Derived from AICC
- Meta-data dictionary From IEEE

RUN-TIME ENVIRONMENT

- Meta-data XML Binding Best Practice From IMS

Content to LMS API From AICC
Content to LMS data model From AICC

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Other Specifications

- Learner profiles
- Competency definitions
- Agents/simulations
- Adaptive sequencing
- Architectural diagrams
- Platform profiles
- Glossaries
- Quality standards
- Rights managements
- Security
- System to system communication

The E-learning standards community is trying to follow the specification → implementation → standardization path in most of its work.

<table>
<thead>
<tr>
<th>Active in 2001</th>
<th>Expected 2002</th>
<th>Future Directions</th>
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<tbody>
<tr>
<td>LOM Data Model</td>
<td>LOM Bindings</td>
<td>CMI – based Content</td>
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<td>Content Packaging &amp; Sequencing</td>
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<td>Architectural Models; Glossary; “Meta-standards”</td>
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<td>Learner Information</td>
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<td>Identifiers; ad-hoc “Micro-standards”</td>
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Working Title

Content Object Repository
Discovery and Registration/Resolution Architecture
“CORDRA”
+++++
A Three Part Model

• CONTEXT
• DISCOVERY
• IDENTIFICATION/RESOLUTION
The “Problem Space”

- There are many specifications related to repositories
- None individually address the entire problem of finding and then retrieving *exactly* the right instructional material
- Many issues are not technical – they are “policy”
- The result: many incompatible repository systems of learning content that cannot be found, accessed or mined in an ADL environment
- **ADL needs a framework for building learning repositories that meet its requirements**
- **Other communities also need similar frameworks**
ADL’s Approach

• Articulate the high level requirements, policies and business rules for instructional content repositories that constrain the architecture such that it can be implemented consistently.

• Identify and relate the most relevant technologies and specifications that can be applied to the architecture (connect the dots).

• Define a framework on which a number of services may be built (but without defining the implementation of such services).

• Provide a model that can scale.
Enabling Services

• We need lots of services…
  – Policy enforcement
  – Resolution/retrieval
  – Authentication
  – Processing community specific business rules
  – “Smart” search/discovery
  – … many others

• We need a framework that enables such services
Some of the People We’re Working With

• CNRI (Corporation for National Research Initiatives)
• National Science Foundation
• U.S. Library of Congress
• DTIC (Defense Technical Information Center)/CENDI
• U.S. Military Services
• CDC (Center for Disease Control and Prevention)
• IRS (Internal Revenue Service)
• GPO (Government Printing Office)
• U.K. TSO (The Stationary Office)
• Medbiquitous (Professional medical education consortium)
• Many others…
Tentative Plans

VERY, VERY EARLY DAYS

- Gather and vet assumptions and requirements
- Study existing specifications (few if any new ones are required)
- Identify key policy issues and positions
- Identify business rules requirements
- Prototype the approach
- Develop guidelines for how the model might be adapted to other communities of practices