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

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

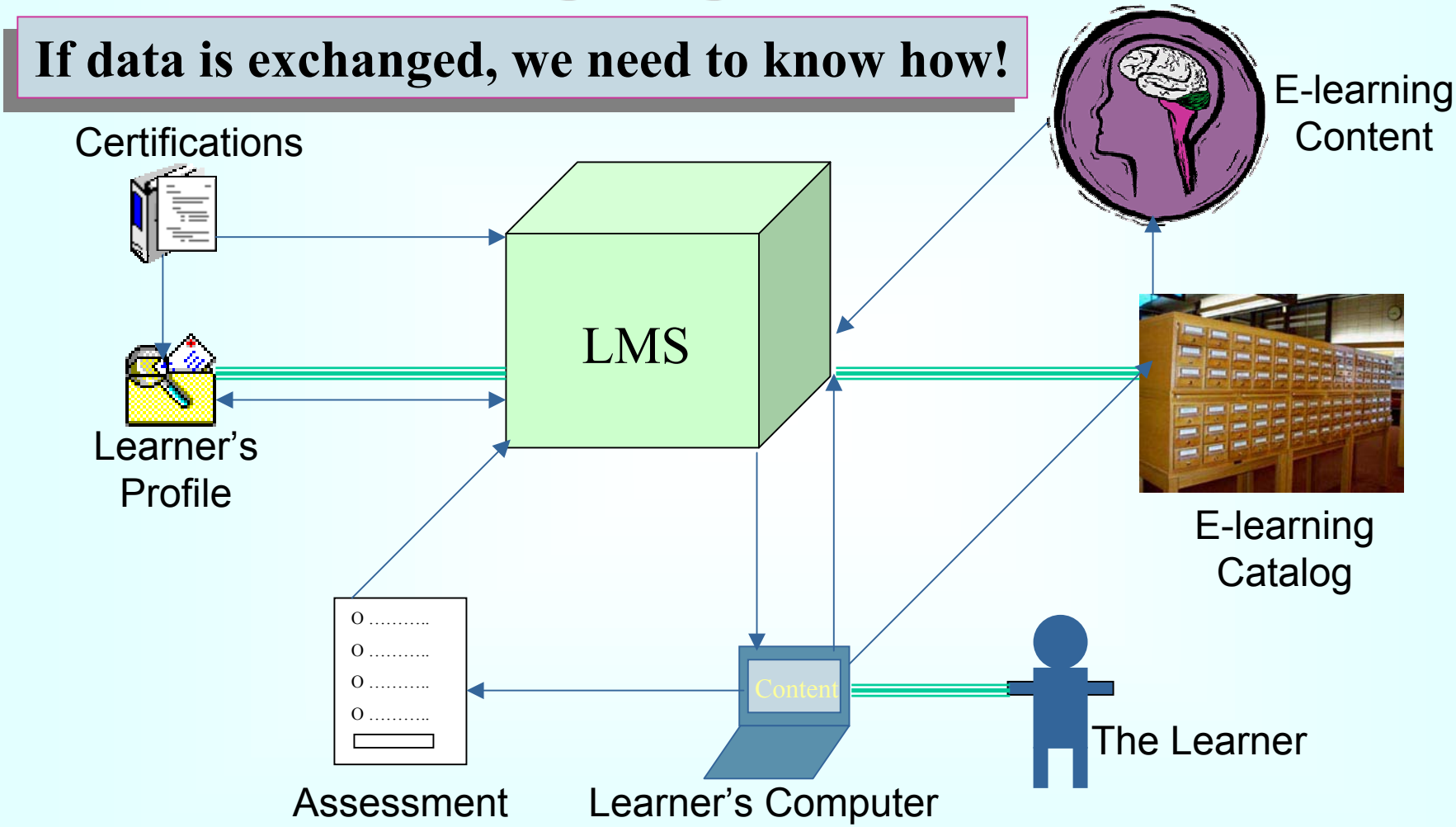
Learning System Standards
content
metadata
LMS data model

Internet Technologies
HTML
HTTP
XML
JAVA/JavaScript
...

But not Internet standards
(others are doing that)

Exchanging Data – How?

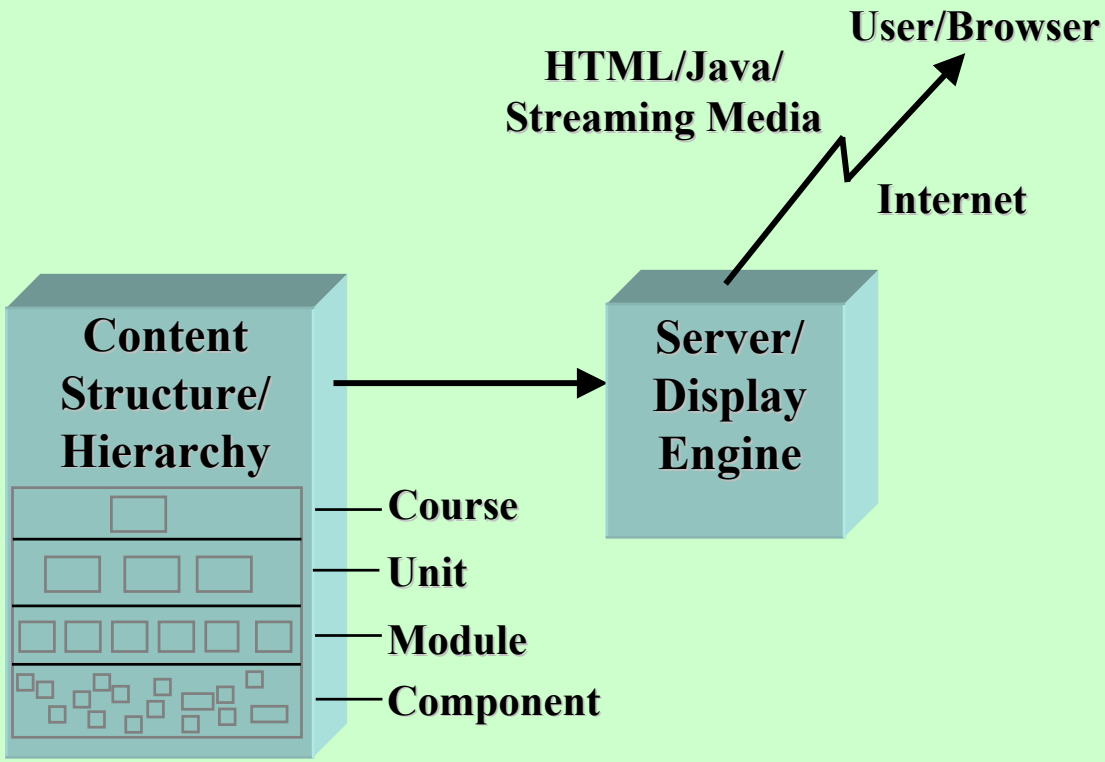
If data is exchanged, we need to know how!



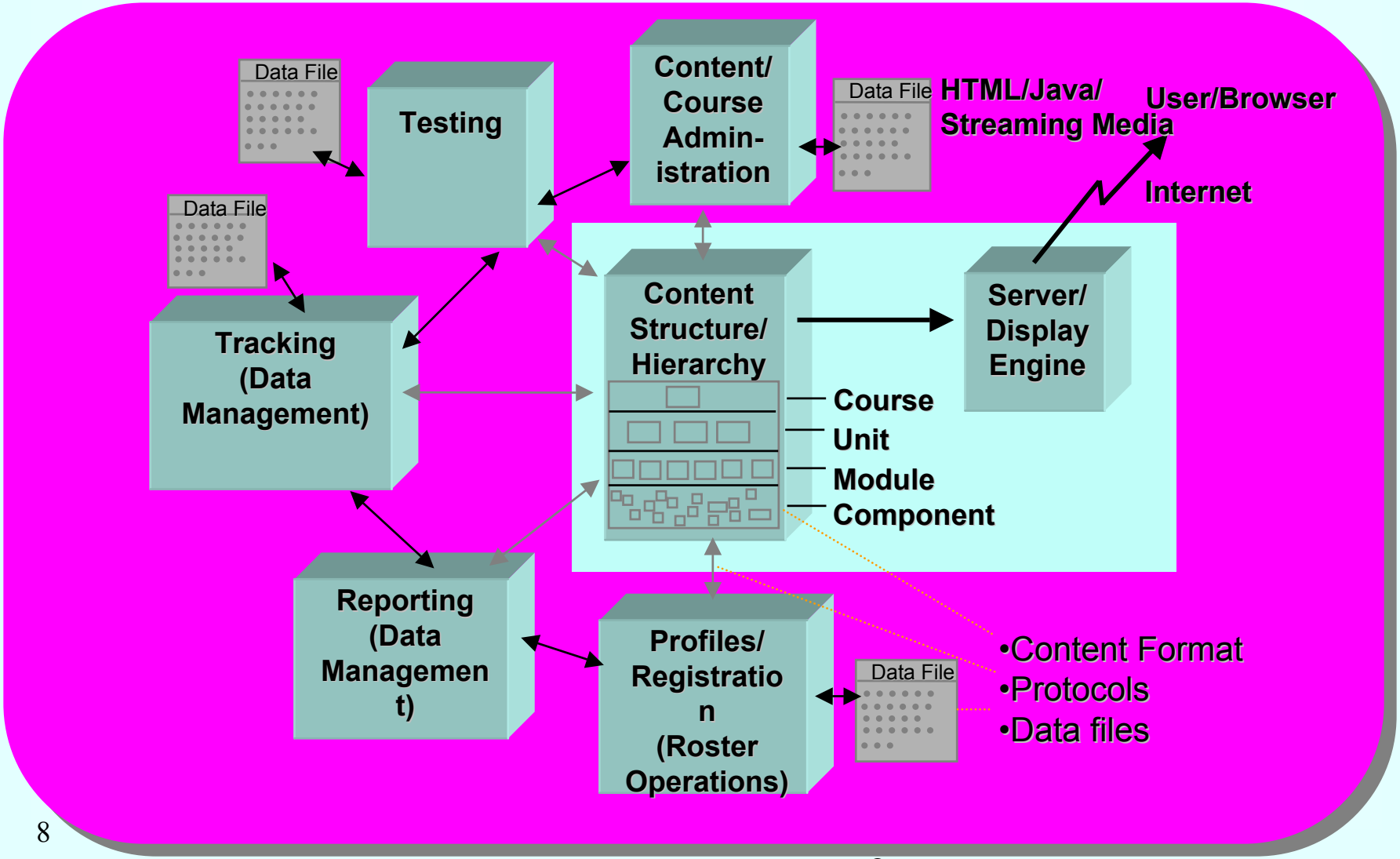
Exchanging Data – Where?

- ✓ 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

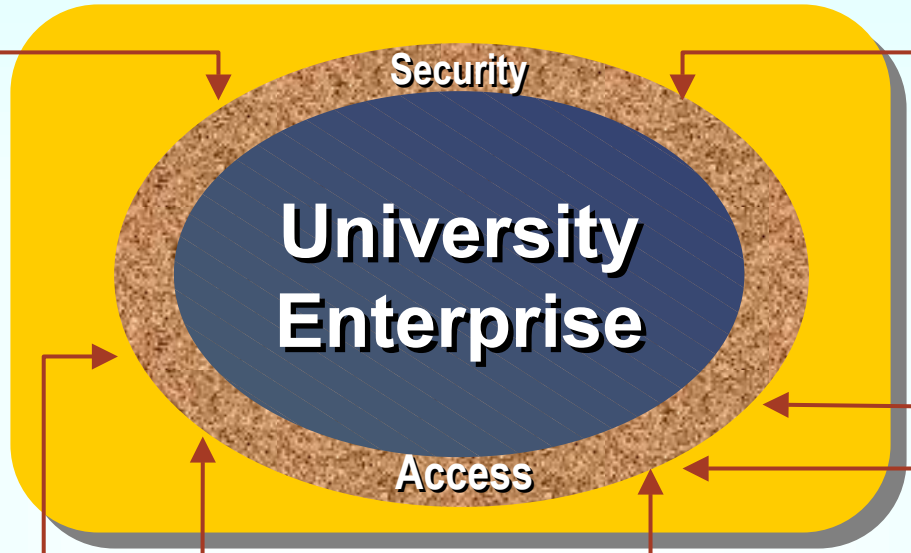
Simple CMS Model



Learning Management System



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

Medicine

Pre-Packaged Solutions & Tools

Docent/HP

Pensare

Click2learn.com

SmartForce

Lotus

Ninth House

Blackboard.com

SkillSoft

Macromedia

Digital Think

Fine Arts

Technology Focus

CMS + LMS
+
KMS
+
Repositories

Education Focus

Headlight.com

Eduprise.com

TrainingNet

MindLever.com

Learn2.com

KnowledgePlanet.com

eMind.com

HungryMinds.com

Engineering

Arts & Science

Custom Solutions &
Consulting Services

The Standards Process

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®…

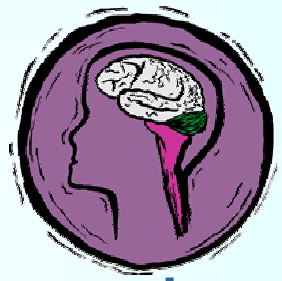
Sharable Content Object - Reference Model

- 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

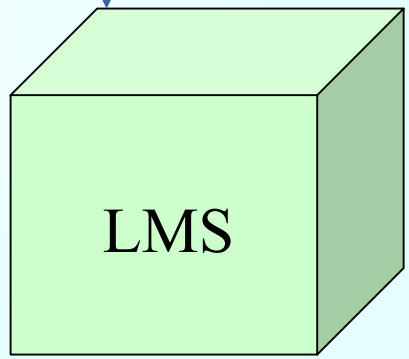
The ADL SCORM

- 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.*



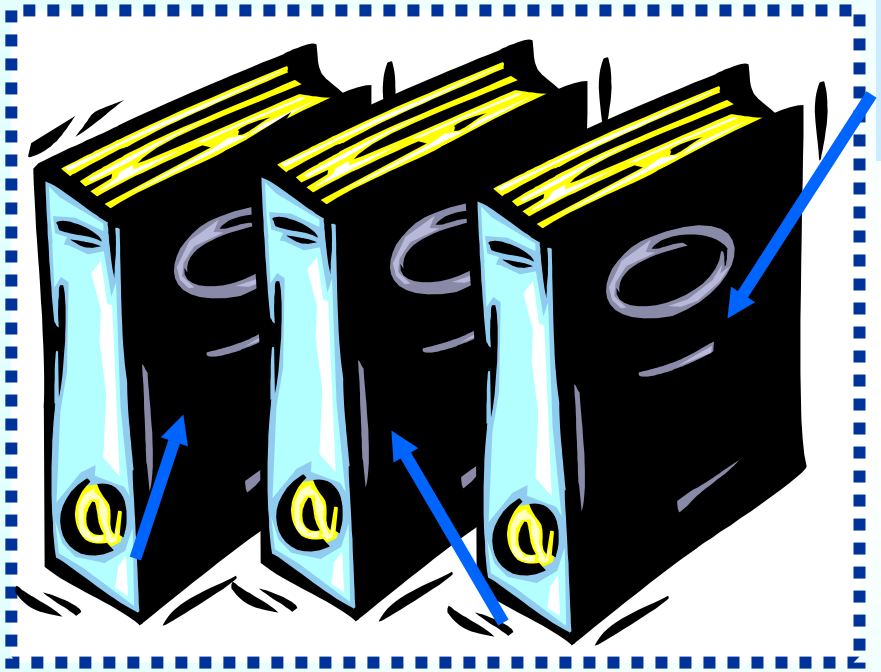
E-learning Content

JavaScript API

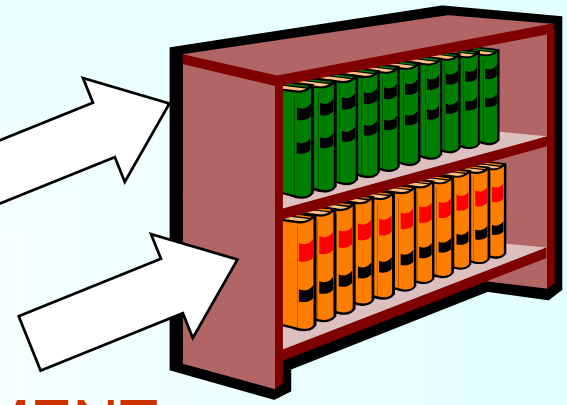


SCORM

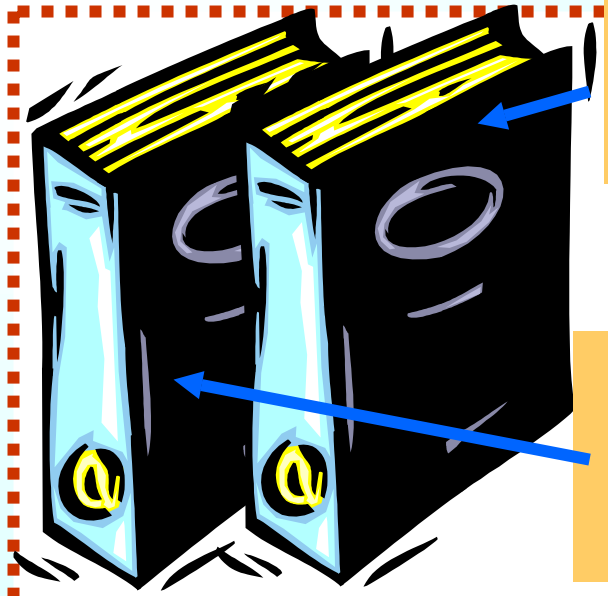
CONTENT AGGREGATION MODEL



Meta-data
XML Binding
Best Practice
From IMS



RUN-TIME ENVIRONMENT



Content to
LMS API
From AICC

Content to
LMS data
model
From AICC

Course Structure
Format -
Derived from
AICC

Meta-data
dictionary
From IEEE

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.

Active in 2001	Expected 2002	Future Directions
LOM Data Model		
LOM Bindings		
CMI – based Content		
Content Packaging & Sequencing		
Architectural Models; Glossary; "Meta-standards"		
Learner Information		
Identifiers; ad-hoc "Micro-standards"		

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

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