Adopting and Building Standards for SCORM Implementation

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Shareable Content Object Reference Model

The Advance Distributed Learning (ADL) Shareable Content Reference Model (SCORM) is an e-learning standard initiative begun by the United States government to "give e-learning a collection of standard practices that can be generally accepted and widely implemented" (ADL, 2004 b, p. 21). The primary function and purpose of SCORM is to set the standards for content-to-Learning Management System (LMS) communication. In publishing these standards, ADL works closely with international standards organizations such as: Alliance of Remote Instructional Authoring and Distribution Networks for Europe (ARIADNE), Aviation Industry Computer Based Training (CBT) Committee (AICC), Institute of Electrical and Electronic Engineering Learning Technology Standards Committee (IEEE LTSC), and IMS Global Learning Consortium, Inc. (IMS).

SCORM describes the technical requirements for lesson reusability. However, SCORM alone does not standardize the instructional design process to ensure reusability. ADL has designed SCORM to fit a wide range of training situations and permit mapping of any stakeholder’s specific instructional design model (ADL, 2004b). This means organizations implementing SCORM must adopt or build instructional design standards to ensure maximum reusability.

SCORM Standards

The SCORM 2004 standard is a library of four publications which provide background information (ADL, 2004b) and standards for the Content Aggregation Model (CAM) (ADL, 2004a), Run-Time Environment (RTE) (ADL, 2004c), and Sequencing and Navigation (SN) (ADL, 2004d). This library of standards provides detailed, technical guidelines for designing a SCORM-compliant learning environment.

Although technical in nature, the SCORM library gives a solid foundation for instructional designers and training managers. The overview discusses the history, foundations, and goals of SCORM. It also introduces the other three books. It provides a great starting point for understanding SCORM.

The RTE describes the basic nuts-and-bolts of the courseware-to-LMS communication. Although these specifications are critical for building LMSs and courseware authoring tools, they provide little useful information for instructional designers. However, instructional designers should understand the basic methods for content aggregation and configuration that are critical for SCORM compliance.

The CAM is the centerpiece of SCORM. It identifies the organization of the basic learning object within SCORM – the Shareable Content Object (SCO). This standard also describes the SCORM Extensible Markup Language (XML) attributes within the Learning Object Metadata (LOM) required for courseware. Instructional designers must understand SCO organization to manage content design, but do not necessarily need to know the extensive list of LOM.

The SN standard describes courseware branching and flow, and all instructional designers should understand it. The SN describes how instructional designers can sequence content through a set of learner or system-initiated navigation events. Instructional designers must understand the sequencing and navigation rules to ensure compliant instructional organization, structure, and navigation.
As shown, the SCORM standard is extremely detailed and specific, but makes up only part of the requirements for implementing the standard. SCORM provides the technical, not instructional foundation for courseware development. It gives instructional designers only a starting point. The organization must adopt or build organizational standards to describe their vision of a SCO and define the instructional look and feel of their courseware.

**SCO Definition**

The SCO is the building block of SCORM, but ADL provides little in describing what a SCORM lesson or SCO looks like. ADL has left SCORM flexible to meet individual organizational design standards and styles. In SCORM, the smallest instructional unit is the SCO. The SCO "represents the lowest level of granularity of learning resources that can be tracked by an LMS" (ADL, 2004b, p. 36). SCOs are relatively small, stand alone, and are designed for reuse in other lessons. This is the limit of what SCORM provides for describing a SCO.

To maximize SCO reusability, organizations must adopt or build an instructional strategy and description of a SCO to meet their organizational training philosophy. This standardization allows learning objects from one lesson to seamlessly fit other lessons. Currently, there are few SCO (learning object) models. The leading example is the Cisco Systems, Inc. Reusable Learning Object (RLO) strategy (Cisco Systems, Inc., 2003b).

**Cisco Systems RLO Strategy**

The Cisco Systems RLO strategy is arguably the most publicized description of learning objects (or SCOs). This strategy is used by Cisco Systems and others to provide technical training for technicians and soft-skills training for sales and client relationship (Barritt and Alderman, 2004). This RLO strategy provides a detailed template for constructing learning objects with reusability as the central theme.

This strategy creates lessons from groups of learning objects that contain one of five object types: concept, fact, procedure, process, or principle (Cisco Systems, 2003a). Each object is stand alone and contains a predetermined sequence of content. A learning object from one lesson can seamlessly fit into another.

**COLD COLA Learning Object Model**

An example of an organizationally designed learning object model is COLD COLA. COLD COLA is a mnemonic for Characteristics, Operation, Limitations, Diagnostics and Characteristics, Operation, Limitations, Abnormal/emergency procedures. This model represents a combination of instructor-lead teaching techniques modified for learning objects, including use in e-learning. This model is designed for maintainer and operator system training. It was designed specifically for aircraft maintenance and pilot training, but also works well for other types of system training.

Table 1 identifies the sections of the COLD COLA model and the associated elements. Each section represents a single SCO within a lesson. Each lesson contains four SCOs, COLD for maintenance and COLA for operators. As designed, the model meets the organization's unique instructional requirements while maximizing reusability.
Table 1. Sections and elements of COLD COLA learning object model

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Operation</th>
<th>Limitations</th>
<th>Diagnostics</th>
<th>Abnormal/Emergency Procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td>System overview</td>
<td>System operation</td>
<td></td>
<td>Built in test</td>
<td>Known conditions</td>
</tr>
<tr>
<td>Location</td>
<td>System interaction</td>
<td></td>
<td>System indications</td>
<td>System indications</td>
</tr>
<tr>
<td>Components</td>
<td>Button-ology</td>
<td></td>
<td>Troubleshooting</td>
<td>Procedures</td>
</tr>
<tr>
<td>Sub-systems</td>
<td>Scenarios</td>
<td></td>
<td>Repair</td>
<td>Scenarios</td>
</tr>
</tbody>
</table>

Industry Specific Models

As SCORM grows, industries and organizations will continue to develop and adapt learning object models to maintain reusability within an organization or between organizations. However, no one model can meet the instructional requirements of all organizations. As learning object development continues, I believe specific industries will design learning object models that address industry specific learning activities, such as case study lessons for management and law professions.

Organizational Look and Feel

Many organizations place a premium on maintaining a consistent look and feel for all of their courseware. Inconsistency can add to learner frustration and greatly reduce the sense of professionalism in the courseware. However, like the SCO definition, SCORM provides little guidance on the look and feel of conformant courseware. It is left up to the organization to adopt or build onscreen specifications. This design guide provides all the information and specifications for creating content and displaying it on screen. The design guide should include, at a minimum, specifications for:

- Screen resolution
- Background color
- Text size and color
- Screen composition (where to locate text and graphics)
- Screen title location and format
- Navigation bar format, location, and function
- Language usage (including voice, tense, and use of acronyms)
- Media formats and usage
  - File formats
  - Object shapes and colors
  - File naming conventions

The design guide should be as specific as possible and erase all gray areas. It should allow a vendor or in-house team to build courseware without a noticeable change in look and feel from one source to the other.

Conclusion

Implementing SCORM is not as simple as adopting a conformant LMS and creating or adopting compliant courseware. Each organization must adopt or build their own descriptions for their courseware. Each organization's needs are different and no one model will fit all instructional strategies or circumstances. To maximize reusability, each must adopt one model, or family of models, and maintain consistent look and feel.
References


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