

Getting Started with eLearning Standards

The eLearning industry continues to expand every day, and the standards necessary to create this type of content can be complicated. Experienced computer-based training (CBT) developers or novice Web-based eLearning developers alike will benefit from these guidelines. This primer will help you identify and implement the key capabilities of each standards body and their respective specifications. With this understanding, you will be better equipped to improve your eLearning development and delivery. Please note that this document offers only a broad overview of applying the standards, and developers may wish to read this technical paper: [Getting Started with Content Development for an LMS](#).

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Standards: Key Organizations and Specifications

Before an eLearning guideline can become a “standard,” it is called a “specification.” Specifications are reviewed by an accredited organization, such as the IEEE. The following summaries explain the organizations and their key contributions to eLearning.

Advanced Distributed Learning (ADL) www.adlnet.org

The ADL is a U.S. government-sponsored organization that researches and develops specifications to encourage the adoption and advancement of eLearning. The purpose of the ADL is to ensure access to high-quality education and training materials that can be tailored to fit individual needs and made easily available. The ADL’s combination of research and recommendation helps turn the specifications into standards.

The most widely accepted ADL publication is the ADL Shareable Content Object Reference Model (SCORM). The SCORM specification combines elements of IEEE, AICC and IMS specifications into a consolidated document that can be easily implemented. The ADL adds value to existing standards by providing examples, best practices and clarifications that help suppliers and content developers implement eLearning specifications in a consistent and reusable way.

Aviation Industry CBT Committee (AICC) www.aicc.org

Created in 1988, the AICC is an international group of technology-based training professionals. They create CBT-related guidelines for the aviation industry. Their goal is more cost-effective, efficient and sustainable training. Though they publish a variety of recommendations—including hardware and software configurations—their computer-managed instruction (CMI) guidelines have had the greatest impact.

For instance, the AICC CMI001 Guidelines for CMI Interoperability provides guidelines to help you create content that will communicate with the broadest base of CMI and learning management systems (LMS). This group also encourages sustained training through the aviation industry both now and in the future.

Institute for Electrical and Electronic Engineers Learning Technology
Standards Committee (IEEE LTSC)
www.ltsc.ieee.org

The IEEE is an international organization that develops technical standards and recommendations for electrical, electronic, computer and communication systems. IEEE specifications are already widely adopted and becoming international standards. Within the IEEE, the Learning Technology Standards Committee (LTSC) provides specification that address best practices, which can be tested for conformance.

The most widely acknowledged IEEE LTSC specification is the Learning Object Meta-data (LOM) specification, which defines element groups and elements that describe learning resources. The IMS and ADL both use the LOM elements and structures in their specifications.

IMS Global Consortium (IMS)
www.imsproject.org

The IMS is a consortium of vendors and implementers who focus on the development of XML-based specifications. These specifications describe the key characteristics of courses, lessons, assessments, learners and groups. In addition, the XML specifications and Best Practices Guidelines provide a structure for representing eLearning meta-data (defined as data about the data). This group offers a disciplined approach for describing the various resources and provides a common set of elements that can be exchanged between multiple systems and products. Describing eLearning resources helps you search through them for existing resources, exchange resources and data with others, and better manage the maintenance of these resources through their life cycles. The most widely acknowledged IMS specifications are as follows: IMS Meta-data, IMS Content Packaging and IMS QTI (Question and Test Interchange).

Topics addressed by Standards

This document addresses the three main areas of concern across all organizations and their specifications:

- **Communication Interface or API**—how resources communicate with other systems
- **Meta-data**—how to describe eLearning resources in a consistent manner
- **Packaging**—how to gather resources into useful bundles

Communication Interface or API

The communication interface is how learning resources exchange information dynamically, such as while student is taking a lesson. Currently, both the AICC and the ADL specify communication interfaces, while IEEE and IMS specification do not yet explicitly identify a communication interface.

For content developers, the most widely accepted communication protocol is Hypertext AICC Communication Protocol (AICC HACP). The AICC CMI guidelines describe a common set of data records about student performance and lesson history that are useful for tracking student performance across sessions. The AICC also manages an independent test lab that certifies compliance with the AICC LAN or HACP protocols for either content or management systems.

The trend among LMS vendors is toward an alternate AICC communication protocol that is also shared with the ADL, called “API Communication,” and often referred to informally as the LMS API since the functions used are all named “API.LMSfunctionname”. This API is the run-time communication specified in the ADL SCORM document, and acceptance and implementation are accelerating rapidly.

In the first three years after the original AICC protocol was published, only a handful of commercial products supported it. However, after just two years, dozens of commercial products include support for the ADL communication protocol. The AICC test lab does not currently provide certification testing for the API communication interface, but the ADL publishes a test suite and works toward certification testing.

The main difference between the AICC and the ADL view of the API communication interface is that the AICC specifies a larger set of data elements that can be communicated. The ADL uses a subset of this data, and also views this “vocabulary” as only one potential set of data elements. The ADL envisions other potential data bindings that may map different groups of data elements to the protocol. For now at least, the two overlap to a large degree.

Macromedia Authorware® 6 supports the AICC LAN protocol, and the Authorware AICC HACP protocol implementation was certified in August 2001 by the AICC. Macromedia Dreamweaver® and Dreamweaver UltraDev™ provide support for sending student performance data via the AICC HACP protocol through the free CourseBuilder extension for Dreamweaver and Learning Site extensions.

Likewise, Macromedia Flash™ developers can use the Flash Learning Extensions that are included with Macromedia Flash 5 to create interactions that send scores and complete student performance data. By downloading an update, a ready-made template is also available for quizzes.

Dreamweaver, Dreamweaver UltraDev and Macromedia Flash 5 also support the ADL SCORM Run Time Interface (RTI) API through extensions. The sample extensions provide the ability to quickly “wrap” existing HTML or Macromedia Flash movies so they not only comply with ADL minimum requirements, but they also send optional student performance information such as completion status.

All of the product extensions described above are available from the Macromedia Exchange at www.macromedia.com/exchange.

Meta-Data

Meta-data is helpful because it provides standard “buckets” for keeping data about almost any eLearning resource. For example, you can discover the amount of student contact time in a lesson, a brief description of the content, the language it was written in, who wrote it, and so on. This information is useful to others who may want to use this resource, and the information can be a consistent, sustainable data source for tracking throughout the design, development, delivery and maintenance life cycle.

Though the example cited refers to a course-level resource or learning object, similar data may be helpful for instructional media elements such as Macromedia Flash movies, graphics or even an HTML document. The IEEE Learning Object Meta-data (LOM) is the most broadly accepted meta-data standard, and it is included in key IMS and ADL specifications. If your content and process support IMS and ADL, then the IEEE LOM may be implicitly supported.

Authorware 6 includes the SCO Meta-data Editor, which is based on the IEEE LOM, IMS Meta-data and ADL SCORM Content-level Meta-data. This utility provides a familiar tab-based interface for entering all the appropriate meta-data elements, and then allows you to save that information as an XML file.

Packaging

Industry use of the term “packaging” often refers specifically to gathering and describing the resources for a course. However, “packaging” can also refer to the same aggregation process for almost any eLearning resource. For example, the IMS QTI specification can be considered a packaging specification for gathering individual items into pools and ultimately into a test. A larger packaging mechanism, such as IMS Content Packaging, could be used to gather multiple QTI files into a catalog of tests or perhaps a course that includes multiple tests.

Currently, the most relevant packaging specifications are the AICC Course Structure File (CSF) file format and the IMS Content Packaging Specification, which are explained and extended in the ADL SCORM document. The AICC Course Structure file provides advanced capabilities for representing lesson prerequisites, but the implementation requires a group of files organized as both Windows® INI files (or similar) and comma-separated value (CSV) data files. For this and many other reasons, most vendors are moving towards XML-based formats, such as those specified by the IMS.

The IMS Content Packaging Specification describes an XML file with three major divisions:

- **Meta-Data**—descriptive information about the entire course, using IEEE LOM elements
- **Table of Contents**—the lessons or other entry points into the resource used by the course
- **Resources**—a complete “packing list” of all the various files or URLs needed to deploy the course

The resulting XML file is called a “manifest.” Through the extensibility of XML and the mechanisms described by the IMS, you can create control documents that provide additional capabilities or clarifications to the core Content Packaging specification. The ADL has done this by defining a namespace for ADL-specific attributes and elements, making a schema document available. This document allows the validation of a manifest that follows both the IMS and the ADL specifications.

Authorware 6 includes a command utility to import and export basic interactions (test items) packaged with the IMS QTI Specification as an XML description of the item.

Dreamweaver and Dreamweaver UltraDev can use the ManifestMaker extension to generate a content packaging manifest that adheres to the ADL implementation of the IMS Content Packaging specification. The extension scans through the local copy of a Dreamweaver site, prompts you to enter meta-data and finally to select the table of contents items. Then the extension generates the complete XML for a basic manifest.

Conclusion

Standards for eLearning have arrived. Because they might overwhelm, we recommend that you focus on the capabilities they address—content communication, meta-data and packaging. Project managers and developers will both benefit from understanding how these capabilities support their needs. The specifications become the foundation of a project by providing consistent representation and communication of data used throughout the design, development, delivery and maintenance phases of an eLearning project.

In addition, the broad base of vendor support for these standards will provide an added bonus for the developer because content will be more quickly and easily deployed to a larger number of customers, regardless of LMS environment. Many of our products provide both built-in capabilities as well as downloadable extensions. These solutions create a more efficient workflow while insulating the developer from the often complicated details of eLearning standards specifications.