



# An Introduction to SCORM

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# What is SCORM?

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- A collection of specifications adapted from multiple sources by Advanced Distributed Learning (ADL) to provide a comprehensive suite of e-learning capabilities that enable **accessibility**, **interoperability**, **durability**, **reusability**, and **cost effectiveness** of Web-based learning content.
- Brings other standards together:
  - AICC, IMS, IEEE, ARIADNE



# What does SCORM let you do?

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- Lets you make small independent learning objects called **Sharable Content Objects (SCOs)**
- Lets you easily combine and recombine these SCOs in different **Aggregations** (eg. courses) for different purposes.
- Lets you create learning content that is independent of any particular Learning Management System (LMS) implementation, but that still allows you to track the learner and sequence content.



## Why should you care?

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- The largest trainer in the world, the U.S. government (particularly the military) is increasingly requiring SCORM
- Is being implemented more and more by Fortune 500 companies
- Government grants increasingly including it as a requirement.
- Allows for efficient development of high-use online learning materials in Higher Education



# What is a SCO?

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- A cohesive collection of any kind of media that can be viewed in a web browser. Pedagogically, corresponds to a lesson addressing (ideally) one objective.
  - Web pages in a SCO contain JavaScript function calls that communicate (indirectly) with the LMS, setting data such as whether the user has viewed the SCO, for how long, their performance on learning interactions, and their mastery status.
  - SCOs are (ideally) described with XML metadata so that they can be indexed, searched, and accessed within an LMS or Content Repository.



# How do you combine SCOs to make an Aggregation (eg. course)?

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- Using the file **imsmanifest.xml**
  - Provides metadata describing the Aggregation as a whole
  - Lists all the files in each SCO used in the Aggregation
    - This allows for easier transfer and integration with other content
  - Describes the way those SCOs are organized within the course
    - This defines how the SCOs are presented (eg. a side frame Table of Contents listing)



# So how exactly does this work?

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- Instructional Designer (ID) makes a self-contained unit of instruction as a web page or resource or as a collection of web pages or resources.
- SCO cannot link to or even refer to any other SCO (except obliquely).
- Each SCO is required to make the JavaScript call to LMSInitialize() on launch and LMSFinish() on closing SCO
- SCO may also get or set values in the **CMI data model** using LMSGetValue() or LMSSetValue(). Examples include:
  - lesson\_status
  - score



# What are these JavaScript calls communicating with?

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- The LMS provides an **API Adapter**, which is usually an invisible Java applet located in the root frame of the browser
- The API Adapter serves as an intermediary between the SCO and the LMS.
- Internally, the LMS can keep track of things however it wants.
- The API Adapter receives the standard JavaScript SCORM API calls from the SCO and sends them on to the LMS, translated into a language the particular LMS can understand.
- This means the SCORM developer doesn't need to develop for a bunch of different LMSs



## If I can't link to other SCOs within a SCO, how do I move between SCOs?

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- SCORM takes care of intra-SCO navigation for you
- Based on your description of the organization of your Aggregation in the imsmanifest.xml file the LMS builds the navigational structures for you when you launch the Aggregation
  - Usually a Table of Contents frame with previous and next buttons in a frameset page, but is LMS-dependent.



## How do you take your aggregation and use it in an LMS?

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- Package your content as a Package Interchange Format (PIF) file
  - A PIF is just a zip file containing all the web pages, xml data files and other assets contained in your aggregation
- LMS should provide a way to import the PIF file usually through some sort of web interface



# Advantages

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- Frees you from dependence on a particular LMS
- Encourages reuse
- Creates an object economy for learning content (eventually)
- Encourages structured instructional design



## Disadvantages

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- Makes developing content based on learner and context analyses more challenging.
- Makes scaffolding challenging
- Does not easily accommodate group work or communication
- Does not easily accommodate instructor-led or blended learning
- Presentation issues inhibit reuse



## SCORM 1.2 vs. SCORM 2004

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- Current release of specification is 1.2
- Draft for SCORM 2004 (then 1.3) available for over a year
- Final release of SCORM 2004 just came out Jan 31
- Extensive support in LMS community for 1.2
- LMS support for SCORM 2004 expected in last quarter of this year
- 2004 is final major revision. There will be no SCORM 2006



## Differences: What 1.2 Can Do

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- Sequencing in 1.2 limited to making SCOs available based on the lesson status of SCOs defined as being prerequisites to the current SCO.  
For instance:
  - Only make SCO 2 accessible if SCO 1 has been passed
- Due to ambiguity in spec., nobody supports this.



## Differences: What 2004 Can Do

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- SCORM 2004 supports the more robust IMS Simple Sequencing
- Provides objective-based sequencing and branching. For example:
  - If Objective 2 and Objective 3 have been achieved to a sufficient level of mastery, whether that mastery was achieved in SCO 1,2, or 3, display SCO 4. Otherwise, display SCO 3 again.



## Advantages of 2004

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- Allows more fine-grained control over sequencing using SCORM
  - Previously, in 1.2, branching-type remediation had to occur within a SCO limiting its flexibility and opportunity for reuse
- 2004 encourages reuse of assets within SCORM



# Converting from 1.2 to 2004 shouldn't be hard

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- ADL has developed automated tools for converting 1.2 content to 2004 content.
  - API Wrapper Converter  
(<http://www.adlnet.org/index.cfm?fuseaction=DownFile&libid=729&bc=false>)
  - Runtime Wrapper Converter  
(<http://www.adlnet.org/index.cfm?fuseaction=DownFile&libid=730&bc=false>)
- This means that while content developed for 1.2 won't be able to take advantage of the increased flexibility of 2004, it will be usable when the transition is made.



# Tools: Making SCOs

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- Hard Coding
- SCORM Runtime Wrapper Dreamweaver Extension ([http://www.macromedia.com/cfusion/exchange/#loc=en\\_us&view=sn106&viewName=Exchange%20Search%20Details&authorid=30528273&page=0&scrollPos=0&subcatid=0&snid=sn106&itemnumber=3&extid=613906&catid=0](http://www.macromedia.com/cfusion/exchange/#loc=en_us&view=sn106&viewName=Exchange%20Search%20Details&authorid=30528273&page=0&scrollPos=0&subcatid=0&snid=sn106&itemnumber=3&extid=613906&catid=0))
- Various commercial products
  - Authorware (<http://www.macromedia.com/software/authorware>)
  - Toolbook (<http://www.sumtotalsystems.com/toolbook>)
  - Full List of Certified Tools (<http://www.adlnet.org/index.cfm?fuseaction=adoptersearch>)



# Tools: Content Packaging and Metadata

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- For creating imsmanifest.xml files
  - Recommended
    - The Reload Editor for SCORM 1.2 (<http://www.reload.ac.uk/editor.html>)
    - Reload 2004 (hopefully coming soon)
  - Not very good
    - Dreamweaver extensions
      - L5 SCORM Producer ([http://www.macromedia.com/cfusion/exchange/#loc=en\\_us&view=sn106&viewName=Exchange%20Search%20Details&authorid=61391453&page=0&scrollTop=0&subcatid=0&snid=sn106&itemnumber=0&extid=1019326&catid=0](http://www.macromedia.com/cfusion/exchange/#loc=en_us&view=sn106&viewName=Exchange%20Search%20Details&authorid=61391453&page=0&scrollTop=0&subcatid=0&snid=sn106&itemnumber=0&extid=1019326&catid=0))
      - Manifest Maker ([http://www.macromedia.com/cfusion/exchange/#loc=en\\_us&view=sn106&viewName=Exchange%20Search%20Details&authorid=63894966&page=0&scrollTop=0&subcatid=0&snid=sn106&itemnumber=1&extid=1012681&catid=0](http://www.macromedia.com/cfusion/exchange/#loc=en_us&view=sn106&viewName=Exchange%20Search%20Details&authorid=63894966&page=0&scrollTop=0&subcatid=0&snid=sn106&itemnumber=1&extid=1012681&catid=0))
    - Microsoft LRN Editor (no longer available)
  - LMS Specific Tools



# Tools: Sample SCORM Run-Time Environments

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- For playing SCORM conformant content
  - Reload's SCORM Player for SCORM 1.2 (<http://www.reload.ac.uk/scormplayer.html>)
  - ADL's Sample Run-Time Environment
    - SCORM 1.2 (<http://www.adlnet.org/index.cfm?fuseaction=rcdetails&libid=738&filterid=24&page=1&keywords=&applyto=libTitle,libAuthor,contentText>)
    - SCORM 2004 (<http://www.adlnet.org/index.cfm?fuseaction=DownFile&libid=740&bc=false>)
  - Microsoft's LRN Viewer (no longer available)



# Tools: Conformance Testing

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- SCORM Version 1.2 Conformance Test Suite 1.2.7  
(<http://www.adlnet.org/index.cfm?fuseaction=rcdetails&libid=736&filterid=24&page=1&keywords=&applyto=libTitle,libAuthor,contentText>)
- SCORM 2004 Conformance Test Suite 1.3.1  
(<http://www.adlnet.org/index.cfm?fuseaction=DownFile&libid=735&bc=false>)
- These are self tests. Official certification requires a paid manual check.



# Resources for learning SCORM

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- Cooking Up A SCORM  
([http://moodle.org/file.php/15/moddata/glossary/93/4132/CookingUpASCORM\\_v1\\_2\\_Draft\\_0\\_8\\_pif.zip](http://moodle.org/file.php/15/moddata/glossary/93/4132/CookingUpASCORM_v1_2_Draft_0_8_pif.zip))
- SCourse (<http://www.academiccolab.org/learn/>)
- Interoperability in Action – a Video Presentation  
(<http://x4l.virtualsite.co.uk/video/index.shtml>)
- The technical specifications for the standard
  - SCORM 2004  
(<http://www.adlnet.org/index.cfm?fuseaction=DownFile&libid=648&bc=false>)
  - SCORM 1.2  
(<http://www.adlnet.org/index.cfm?fuseaction=rcdetails&libid=40&filterid=24&page=1&keywords=&applyto=libTitle,libAuthor,contentText>)



# Example SCORM Aggregations

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- SCORM 1.2
  - Maritime Navigation Examples (<http://www.adlnet.org/index.cfm?fuseaction=rcdetails&libid=32&filterid=35&page=1&keywords=&applyto=libTitle,libAuthor,contentText>)
  - See Cooking Up a SCORM (previous slide)
- SCORM 2004
  - Photoshop Examples (<http://www.adlnet.org/index.cfm?fuseaction=DownFile&libid=641&bc=false>)
  - Sequencing Test Cases (<http://www.adlnet.org/index.cfm?fuseaction=DownFile&libid=707&bc=false>)



## Related Standards

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- AICC (<http://www.aicc.org>)
- IMS (<http://www.imsproject.org>)
- IEEE (<http://www.ieee.org>)
- ARIADNE (<http://www.ariadne-eu.org>)



# SCORM Learning Management Systems

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- Expensive
  - WebCT Vista  
([http://www.webct.com/software/viewpage?name=software\\_vista](http://www.webct.com/software/viewpage?name=software_vista))
- Less Expensive
  - knowledgeWorks  
([http://www.techniques.org/products\\_knowledgeworks.php](http://www.techniques.org/products_knowledgeworks.php))
- Free
  - Moodle (<http://www.moodle.org>)
- Full List of Certified LMSs  
(<http://www.adlnet.org/index.cfm?fuseaction=adoptionsearch>)