

Navy Integrated Learning Environment (ILE) Technical Specifications and Guidelines



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Abstract

The Integrated Learning Environment (ILE) provides an environment that supports the seamless delivery and management of training in a “blended” training format. The ILE will provide the IT infrastructure necessary to provide and manage both self-paced and instructor lead training. Currently there exists multiple stove piped legacy systems that track, deliver and manage training and training support. Those individual systems must be “integrated” or bound together to present a single touch point.

The ILE strategy establishes a seamless training management and delivery capability in support of the Revolution in Training goals of providing the right training to the right people in the right amount at the point of need. Implementing the ILE requires the establishment of the appropriate IT infrastructure to establish and manage reliable and efficient capabilities to manage and support training accounts, opportunities and resources in multiple formats. Current legacy training management systems and new emerging technology systems must be fully and seamlessly integrated to provide a single access and management point for all events and activities.

This document outlines the technical specifications and guidelines required to insure the technical compatibility between instructional content and the Integrated Learning Environment. It is important to note that the technical guidance contained within this document must be used in concert with the broader guidance contained within the current release of the Navy ILE Content Development Rules, Best Practices and Examples document. It should also be noted that, in future releases of this document, the guidance provided will increase significantly in scope and level of detail. The intent of this initial release is focus strictly on providing the core guidance deemed most critical to insuring compatibility with the ILE.

The guidelines in this document and the associated Navy ILE Content Development Rules, Best Practices and Examples should be referenced and serve as the baseline for procurement contracts involving the acquisition, development and/or integration of any Navy Education and Training content, materials or assets.

ILE Architectural Overview

ILE currently consists of the following applications:

- Navy Knowledge Online (NKO) Portal-
 - Single point of entry to ILE.
 - Provides integration framework for legacy systems.
 - Appian Knowledge Management Portal
 - Located at <http://www.nko.navy.mil>.
 -
- Navy E-Learning Learning Management System (LMS)-
 - Contains the ILE master catalog for accessing informal education and training content.

- ThinQ Training Server Learning Management System
- Primarily manages learner lesson plans and training day to day progress
- Allows management of learning events
- Access via NKO

- Learning Content Management System (LCMS)-
 - Provides for creation, storage, reuse, management, and delivery of learning content.
 - OutStart Evolution Learning Manager
 - Provides a template-driven environment for fast, efficient and consistent authoring of knowledge based content.

- Corporate Enterprise Training Activity Resource System (CeTARS) –
 - Consolidation of independent schoolhouse and training information systems into a single source of classical instructor lead schoolhouse/training information systems.
 - CeTARS integrates these systems as a single source for schoolhouse/training information. As a single integrated system, the CeTARS mission is to provide improved training information availability, timely and accurate schoolhouse data and near real time student tracking to the Navy/Marine Corps training community.
 - CeTARS supports 100's of activities and schoolhouses via the Web, both within the expanded bandwidth of the CeNET community and Navy's Non-Classified Internet Protocol Router Network (NIPRNET) Wide Area Network (WAN) domain.
 - Can be located at <https://wwwnt.cnet.navy.mil/cetars/cetars.htm>

- Navy Training Management and Planning System (NTMPS)
 - Data warehouse for all training and education information including sailor entry for Electronic Training Jacket.
 - Can be located at <http://www.ntmps.navy.mil>

- Skill Object Data Mart
 - Repository of required skills, abilities, tasks and knowledge required to perform Navy jobs and duties.

- 5 Vector Model (5VM)

The 5 Vector Model (5VM) defines the parameters around which a Sailor's personal and professional development is designed. Eventually, the 5VM will change the promotion and detailing process. For more information on the 5VM, go to <http://www.excel.navy.mil/>. The 5 Vectors are:


 - Professional Development
 - Personal Development
 - Leadership
 - Certifications & Qualifications

- Performance

Delivery Environment

Unless individual delivery orders permit otherwise, vendors should design content for delivery via a web browser that is running on a PC configured in accordance with NMCI Gold Disk. Content developers **MUST NOT** design content requiring software components beyond those addressed in the following discussion on Gold Disk / Blue Disk contents.

Developers can expect client browsers will be configured in accordance with DISA's Configuration Guidance for Client Workstations and Applications To Implement the DoD Policy on the Use of Mobile Code Microsoft Windows 95/98/NT/2000-Based PCs Version 2, 07 April 2003. This document provides configuration guidance for browsers, e-mail products and office automation applications running on MS Win 95/98/NT-based PC Workstations. It is available at <https://iase.disa.mil/mcp/index.html>.

Other browser requirements:

- 128 bit encryption
- Java virtual machine and JavaScript enabled
- Cookies enabled
- MSIE 5.00.3809 or Sun Micro Systems JRE 1.3 or higher. Content should work with both versions

Workstation Minimum Hardware Specifications

Content providers should ensure their content runs as intended on systems meeting the following minimum hardware specifications.

- IBM compatible PC running Windows, 98, ME, NT, XP and 2000
- Microprocessor Speed: Pentium 1 GHz
- Hard Drive: 20 GB
- RAM: 128 MB
- Sound Card: 16 bit
- Speakers
- CD-ROM Drive: 12x
- Monitor display resolution 1024 x 768
- Color Depth: 16 bit
- Fonts: Small

Gold Disk Contents

Current as of: 27 FEB 2004

Operating System	MS Windows 2000 SP4	Microsoft
Office Suite	Standard Office Automation Software	Microsoft
	Included on the Gold Disk:	
	* MS Word	
	* MS Excel	
	* MS PowerPoint	

* MS Access

Desktop Management	Diskeeper 7.0413	Executive Software
Email Client	MS Outlook 2000	Microsoft
Internet Browser	Internet Explorer MS 5.5 SP-2 128bit	Microsoft
Virus Protection	Norton A/V Corp Edition v7.5	Symantec
PDF Viewer	Acrobat Reader v5.05	Adobe
Terminal Emulator - Host (TN3270, VT100, X-Terminal)	Reflection 8.0.5 – Web Launch Utility	WRQ
Compression Tool	WinZip v8.1	WinZip
Collaboration Tool	Net Meeting v3.01 (4.4.3385)	Microsoft
Smart Card Middleware (unclassified only)	ActivCard Gold 2.2	ActivCard
Multimedia	RealPlayer One v2	RealNetworks
Multimedia	Windows Media Player v9	Microsoft
Internet Browser	Communicator 4.76	Netscape
Electronic Records Mgmt	Trim Context	Tower

Plug-ins

Web Controls	Macromedia Shockwave v8.5.1	Macromedia
Web Controls	Flash Player 7.014	Macromedia
Web Controls	Apple QuickTime Movie and Audio Viewer v 6.3	Apple
Web Controls	iPIX v6,2,0,5	Internet Pictures

Security Apps

Security	Intruder Alert v3.6	Symantec
Security	ESM v5.1	Symantec

Agents

Software Management	Radia Client Connect R20	Novadigm
Inventory, Remote control	Tivoli TMA v3.71	IBM/Tivoli

Remote Connectivity (Notebooks)

Dial-up connectivity	PAL v4.3	MCI/WorldCom
VPN	VPN Client v4.1	Alcatel

Blue Disk Contents

There is an initiative currently underway to supplement all NMCI seats with a standard complement of software components beyond those provided by the NMCI Gold Disk. Collectively, these components have become known as the NMCI Blue Disk. In general, the proposed contents of the Blue Disk consists of various drivers, CODECS, run-time engines, etc. that are likely to have broad applicability to Navy training. At the time of publication of this document, the layout of the Blue Disk and other contractual details have yet to be resolved. However, it is possible that resolution will occur in the relatively near future. Therefore, developers are encouraged to maintain active contact with their government sponsors so as to be aware of the current status of this initiative.

In addition to the Blue Disk that may become a Navy wide standard, there is another variant of the Blue Disk that applies to only NMCI seats within the NETC claimancy.

The below listed software components can be assumed to be present on all NETC NMCI seats.

- Authorware Web Player 6.5
- JAVA 2 runtime environment standard edition for Microsoft Internet Explorer 5.5 with SP2 - Sun JRE 1.3.1_02-1.3.1_04
- Visio Viewer 2002
- Citrix 6.30.1050

However, developers must understand that producing content that depends on the presence of these components may preclude the delivery of that content to non-NETC seats. Government sponsors and content developers are encouraged to carefully evaluate the merit of allowing or disallowing the use of these NETC specific components.

508 Accessibility

The Navy is committed to making all web-based learning content accessible to each person who uses the site. Section 508 of the Rehabilitation Act requires all Federal agency electronic and information technology is accessible to people with disabilities, including employees and members of the public. Content developers must ensure that content is Web-accessible to persons who may have disabilities. All ILE content should at a minimum meet all Priority 1 Checkpoints identified in W3C Web Accessibility Guidelines. In addition, developers must provide written documentation identifying which checkpoints were met. If, after best efforts, you cannot create an accessible page, provide a link to an alternative page that uses W3C technologies, is accessible, has equivalent information (or functionality), and is updated as often as the inaccessible (original) page. It is critical that the development team validate designs and page templates and the content of the web-based training throughout the development process to ensure that the web pages are accessible to all users. Web-based designs should be validated at every development milestone to avoid time consuming and potentially costly revamping efforts. Additionally, content can be made more accessible if developed with Cascading Style Sheets (CSS). ILE content developers are encouraged to read the W3C Web Accessibility Guidelines at the W3C Website, <http://www.w3c.org/WAI>.

Mobile Code

Mobile code is an executable software program or script that traverses a network and executes at the destination machine. The DoD Policy memo further describes mobile code as software obtained from systems outside the enclave boundary that is downloaded and executed on the local system without explicit installation or execution by the recipient. A simple click of the mouse on a Web link could expose the user to malicious mobile code. These programs and scripts are provided as content by Web Servers to the user's Web browser. In most cases, the user is probably not aware that the Web browser is requesting, downloading and executing mobile code on their computer. Content developers should be familiar with and follow the recommendations concerning mobile code issues.

The controlling mobile code policy memo and the following guides are recommended for building content destined to run in the ILE can be found at <https://iase.disa.mil/mcp/index.html>

- Mobile Code Policy Memo, 7 November 2000
- Mobile Code FAQ's, 3 May 2002
- Mobile Code Developer's Guide, 15 August 2002

Developers can set up a simulated workstation environment to test content for mobile code using the Configuration Guidance for Client Workstations and Applications To Implement the DoD Policy on the Use of Mobile Code Microsoft Windows 95/98/NT/2000-Based PCs Version 2, 07 April 2003. This document can be found at <https://iase.disa.mil/mcp/index.html>.

The document presents step-by-step configuration guidance on the use of Category 1 and 2 mobile code technologies, along with guidance to protect against malicious mobile code in email (e.g., viruses, worms), as defined in the referenced policy document. Developers can expect that end users will be configured in a similar way.

Bandwidth Constraints

Although it is the goal of ILE to provide a rich and engaging learning experience, it is nonetheless necessary to balance this goal against constraints that may be present in the ILE environment. Principle among these potential constraints is the finite bandwidth available between an end user and the server employed for delivery of that users ILE content. Therefore, it is necessary to insure that ILE content developers assess the performance of their deliverables in a representative environment. Accordingly, future content Delivery Orders, Statements of Work and Statement of Objectives will include requirements relative to the responsiveness of content as well as the methodology by which responsiveness will be measured. Although individual procurements may tailor this guidance, unless stated otherwise testing will be done in a network environment in which bandwidth between client and server is limited to 5.0 Mbps (megabits per second). Developers can choose to impose this 5.0 Mbps constraint using either hardware or software based mechanisms. With this bandwidth constraint in place, compliance with the following criteria shall be demonstrated:

- Maximum time for initial lesson loading – 10 seconds,
- Maximum time to proceed to successive screens/frames of the lesson – 5 seconds,
- Maximum time for initial response to a user interaction – 3 seconds.

The contractor shall be responsible for successfully conducting performance testing at their facility prior to submitting final deliverables to the government. Any deficiencies found during this testing will be corrected by the contractor prior to delivery

Delivery Format

All content developed for the ILE must conform to the Navy ILE Content Development Rules, Best Practices and Examples. Practically speaking, this equates to delivering ILE content in the form of a SCORM conformant SCO or SCOs. However, it is acknowledged that there are alternative forms of delivery that should be considered for ILE. One example would be content developed using the Evolution Learning Manager from OutStart Inc. It is possible to develop content using Evolution that is rendered on demand, directly from an internal Evolution database. In such a case, the instructional content is rendered into browser compatible HTML/DHTML, but never exists as a pure SCORM conformant SCO. Although this may be a reasonable approach, the Navy would likely have greater potential for re-use, re-purposing, etc. if the content in question could be published in the form of a SCO should circumstances so dictate.

Consequently, any content developer proposing a delivery format other than that defined in the Navy ILE Content Development Rules, Best Practices and Examples will be required to provide a mechanism by which the Navy, at a later date, could transform the content to follow the Navy Reusable Object Model, independently and without further assistance from the development contractor. To the extent possible, the contractor should design the content such that there is no difference in the performance and features of the content or the underlying performance tracking capabilities, regardless of the delivery format (SCORM vs. non-SCORM). In the event there are unavoidable differences in how the content will perform in the different delivery formats, the government will be so apprised as part of the contractor's proposal and the government will retain the right to make a final decision as to whether these inconsistencies are acceptable.

User Control of Lengthy Operations

There may be instances in which there are legitimate reasons for ILE content to run for relatively long periods without any direct user interaction. For example, there might be instructional value in an extended video segment. However, even in such circumstances, ILE content should include provisions that allow the learner to terminate any such sequence prematurely. Accordingly, any ILE content in which there are autonomous sequences (video, downloads, animations, etc.) of greater than 15 seconds shall have provisions that allow early, user controlled, termination of that sequence. Additionally, should the learner exercise the early termination option, termination must be performed in a controlled and graceful manner with the learners system left in a stable state and without any consequential loss of data or functionality.

Content to LMS Communication

The Navy's LMS implemented all of the mandatory SCORM API functions required for execution, state management, and data transfer. It is assumed that once the SCO is launched it can then "get" and "set" information with an LMS. All communication between the API Adapter and the SCO is initiated by the SCO. There is currently no supported mechanism for LMSs to initiate calls to functions implemented by a SCO. The functions of the API Adapter object are threefold:

- *Execution State*
Two of the API functions, *LMSInitialize(“”)* and *LMSFinish(“”)*, handle execution state.
- *State Management*
The API has three functions that are used to handle errors. These three API functions are: *LMSGetLastError()*, *LMSGetErrorString(errornumber)* and *LMSGetDiagnostic(parameter)*.
- *Data Transfer*

The remaining three API functions are used to transfer data to and from an LMS: *LMSGetValue(data model element)*, *LMSSetValue(data model element, value)* and *LMSCommit(“”)*. Note that the API is designed to get and set data values that are separately defined by an external data model.

- Initialize – This indicates to the API Adapter that the SCO is going to communicate with the LMS. It allows the LMS to handle LMS specific initialization issues. It is a requirement of the SCO that it call this function before calling any other API functions.
- Bookmarks – Check for content’s method to update the student's bookmark when the student changes pages
- Credit – Used by the LMS system to indicate whether or not the student is taking the SCO for credit. All content is taken for credit on the Navy’s LMS.
- Scoring - The raw score for a SCO may be internally calculated in any manner that makes sense to the developer, and represents a final, normalized score for the SCO. For instance, it could reflect the percentage of objectives complete, it could be the raw score on a multiple-choice test, or it could indicate the number of correct first responses to embedded questions in a SCO. The LMS initializes the raw score to “ ” or “NULL”. If the content developer does not want a SCO included in the final calculation of the final score for the course then the raw score for a SCO should not be set. The *cmi.core.score.raw* can be a normalized value between 0 and 100. However, the content developer should not set “0” as a score unless it is to be averaged in with other SCOs for a final grade in the course.
- Lesson Status – This is the current student status as determined by the LMS. Six status values are possible
 - Completed: All of the elements in the SCO were experienced by the student. No associated raw score should be sent.
 - Incomplete: The SCO was begun but not finished.
 - Passed: Necessary score was achieved. Student is considered to have completed the SCO and passed. This should only be set for those SCOs associated with sending a passing raw score.

- Failed: The SCO was not passed. Student is considered to have completed the SCO and failed. This should only be set for those SCOs associated with sending a failing raw score.
- Not Attempted: The SCO was not initialized.
- Finish – The SCO must call this when it has determined that it no longer needs to communicate with the LMS, if it successfully called LMSInitialize at any previous point. This call signifies two things: 1)The SCO can be assured that any data set using LMSSetValue() calls has been persisted by the LMS. 2)The SCO has finished communicating with the LMS.

File Structure, Naming and Storage

During the design and development process, the designers, developers, technical writers, programmers, subject matter experts, and quality assurance personnel handle numerous files of varying types. Creating a standard format for all folders and file names will make it faster and easier for all parties to identify and located the files they need. At a minimum, a file should include the name, and/or number of the course for which it was created, the module or lesson number, a description of the item, and a version/revision number. The names should be as intuitive as possible, so that developers and programmers can quickly and easily identify files without having to view the contents of each file to ensure they are using the correct file. In addition to standard file names and conventions, ensure that, during the development process, files are stored in a central location and accessible to the entire production team. Filenames should not have spaces or special characters and should not be longer than 20 characters.

Databases/Data Sources

The ILE can provide support for databases such as Microsoft Access that don't require a special ODBC connection. For content delivered in an external database, it is recommended that content developers provide a DSN-less connection to the database. A DSN-less connection is much faster than using a system DSN and doesn't require a ODBC registry entry. Dynamically delivered content running from a separate database will not be given any ODBC read write permissions/capability that is not defined in the SCORM API Adapter functions for SCORM Runtime Data elements. Using XML technologies and HTML as data sources are highly recommended and supported by most W3C standards-based browsers.

Server Side Scripting

Server-side scripting technologies such as Active Server Pages (ASP), PHP Hypertext Preprocessor (PHP), and Cold Fusion often change and are sometimes not backward compatible. In addition, server-side technologies are platform-dependent and don't promote portability. ASP is currently the only supported server-side scripting technology in the ILE. However, the Navy ILE strongly discourages against developing courseware that is strictly dependent upon any server-side scripting technology.

Client Side Scripting

Content developers are encouraged to create content according to the W3C Document Object Model (DOM). The DOM is a platform- and language-neutral interface that will allow programs and scripts to dynamically access and update the content, structure and style of documents. The document can be further processed and the results of that processing can be incorporated back into the presented page. The DOM provides a standard set of objects for representing HTML and XML documents, a standard model of how these objects can be combined, and a standard interface for accessing and manipulating them. Content developers can support the DOM as an interface to their data structures and APIs, and write to the standard DOM interfaces rather than browser-specific APIs, thus increasing interoperability. Dynamic HTML (DHTML) is a term used to describe the combination of HTML, style sheets and JavaScript that allows documents to be animated. DHTML can be used by content developers as long as the syntax utilizes the standards such as the DOM and semantics of the general purpose, cross platform, vendor-neutral scripting language ECMAScript.

Cascading Style Sheets

Before version releases, 6.2 of Netscape and version 6 of Internet Explorer, web developers faced difficulties in implementing many of the W3C standards because the browsers previously did not implement accessible technologies like Cascading Style Sheets or implemented them inconsistently. Now content can be made more accessible if developers use Cascading Style Sheets (CSS). With CSS-styled pages, users can easily apply personalized formatting to web documents. A page design using specific font colors and backgrounds, for example, presents a problem for users with color blindness: the contrast between the text and background may not be enough for the text to be distinguishable. If the colors are set via a style sheet, users can set their browser preferences to override your settings and can apply their own style sheet to the page instead. With CSS-styled pages, the user can transform web content into a format that addresses their requirements for accessibility.

Streaming Media

Most Real Network Media and Windows Media files will be placed on a dedicated ILE streaming media sever. The current ILE architecture utilizes the Windows Media Services Version 9.0 and Real Systems Version 8.0. The ILE architecture currently does not offer the capability to support Flash Remoting. During the content development process and prior to final content submission it is imperative that the content developer engages the ILE NEL content team for recommendations, ILE supported streaming media types and up-to-date instructions for coding media file URLs within their content.

Due to current media vendor technical limitations “streaming media” will not run in an https/SSL environment. Therefore the streaming media files will be located on a server different then where the actual course content files reside, “content server”. In some cases, relatively few and small media files can be located and served up from the “content server”. Using the HTML “embed” tag or similar tags for Windows Media,

Quick Time, and Flash files have been tested in the current ILE ([https/SSL](https://ssl)) environment and will work. NOTE that these files are NOT being streamed. Real Network Media files WILL NOT work in this scenario. Media files not using an HTML "embed" type tag may work if the media file can be downloaded to the client machine and then ran from the applicable media player. This is not the preferred way due to bandwidth considerations and client side computer settings.

Java Virtual Machine

Java Virtual Machines (VM)- Due to NMCI restrictions, users can't download the Sun Micro Systems VM to the client computer. NETC has requested the Sun VM be added to all NMCI computers (Gold Disk) or pushed out to users within the enclave. ILE testing has determined that some content will function properly, communicating with the LMS, with either VM installed, however some content only functions properly dependent on the specific VM installed. It is incumbent on the content developer to insure content will work with either VM installed because Microsoft will no longer be authorized by Sun to have the ability to support the Microsoft VM after the summer, 2004. See <http://www.microsoft.com/java> for more information.

Testing

All content should be tested for interoperability prior to submission for hosting on Navy E-Learning. Unless stated otherwise in individual orders, a representative sample of all content should be tested using Content Compatibility Center (C3) before submitting final deliverables for hosting. The C3 is a web-based tool that content developers can use to test their SCORM or AICC content for interoperability with the Navy LMS. Access to C3 can only be provided to government sponsors, SYSCOMS, and naval learning centers. Any government contractor in need of access to the C3 must obtain approval through the government sponsor. Government sponsors can request a C3 account by visiting the ILE content support center. The C3 provides a detailed logging report system allows users to access log files so users can troubleshoot and review invalid URL errors, invalid manifests, etc. The log files not only identify errors encountered through the course, but suggest modifications that can be made to solve or work/around the error. In addition to accessing the log files, customers and developers can use the browser's java console feature to monitor the output of the API SCORM data model calls executed by the courseware. Because the output is similar to the course program code, a SCORM content developer will be able to review and understand identified problems in less time than a non-technical user.

Developers are also required to test a representative sample of their content using the ADL Test Suite (available at <http://www.adlnet.org>). All content submitted for hosting within the Navy ILE must be accompanied by an electronic version of the ADL Test Suite Log files. These three log files should provide the results for the Sharable Content Object (SCO) Run-Time Environment Conformance Test, the Meta-data Conformance Test, and the Content Package Conformance Test.

In special circumstances, developers can also request assistance relative to prototype testing from the Navy E-Learning content manager. However, it is important to note that this support will be provided only as a means of validating the technical compatibility of content and should not be viewed as a means of exercising a quality control process that would normally be the responsibility of content developers.

Subject matter and functional testing should be additionally performed by readers outside of the development team who are willing to supply informed criticism and report programming bugs, typographic errors, and critique the overall design and effectiveness of the courseware.

Content Submission Method

Content is provided via FTP (File Transfer Protocol), CD-R or DVD as specified in individual delivery orders. In either case, SCORM content should be delivered as a conformant content package. For more information on the Content Packaging Conformance Requirements, refer to <http://www.adlnet.org/>

Deliverables

Content submitted for hosting on ILE should contain the following:

- Content package
- Verification of a Virus Scan on the extracted contents
- Content submission form and checklist
- Life Cycle Maintenance Guide
- Installation instructions for staging the content on a web server
- Assessment answer keys (only for content with assessments, tests, quizzes, etc.)
- Course instructions describing navigation and completion requirements.

Manifest Properties

A well-formed and valid manifest should be verified before a content package is submitted for hosting. IMS has updated the Content Packaging Schema to support the Final Recommendation of the W3C XML Schema specification. Currently, several commercial tools support Schema validation including: Xerces, XML Authority, XML Spy, and Oracle parsers.

A visible course title element must exist within the manifest. Tools such as the Microsoft LRN Toolkit do not create a visible course title. If content developers use such a tool, the title element must be manually entered into the manifest. At least one content object or 'SCO' is required for a content package. All SCOs should be listed under the organization element.

The resources described in the manifest are physical assets such as web pages, media files, text files, assessment objects, or other pieces of data in file form. Resources may also include assets that are outside the Package but available through a URL, or collections of resources described by (sub) Manifests. The combination of resources is

generally categorized as "content". Each resource may be described in a <resource> element within a manifest's XML. This element includes a list of all the assets required to use the resource, and listing of resources is necessary to ensure content interoperability. The files included in the Package are listed as <file> elements within such <resource> elements. For more information, refer to the IMS Content Packaging Best Practice Guide <http://www.msglobal.org>

Content Packaging

Once you have developed all of your physical RIO files, identified the metadata for each RIO and the metadata for the entire content package, and defined your base RLO, you can prepare to package your content for SCORM™. The SCORM™ content package is a standardized way to exchange digital resources between different learning management systems (LMSs), authoring tools, content repositories, and operating systems.

In traditional instructional design terms, the content package would be everything needed to deliver the course, module, lesson, etc. to the learner. The size of your content package will depend on the structures you've created for your particular content and the manner in which you want them to be delivered to your learners. In SCORM™, the content package contains two principal sections:

- 1) A manifest that lists all of the resources or assets you want to include in the package, the content structure diagram you created (called the organization), the sequencing rules, and all of the metadata for the RIOs, the RLOs, and the package itself
- 2) All of the actual RIO and asset files for the content package

Preparing your content package is an excellent time to organize all the files you've used during the development process, including your RIO and RLO design specifications. Delete or move any incomplete or unused materials, confirm all file names adhere to your naming conventions, and verify that all required metadata fields are complete. Individual delivery orders will specify submission of the content package in a CD-R or DVD format.

Copyright

Authors of web content are viewed as having the same rights as those of other materials, and anyone who violates those rights could be subjected to penalty. Copyright is granted to the creator of a work the moment it is fixed in a tangible medium. Though a Web page rendered on a computer screen doesn't appear to be tangible, copyright is granted to Web authors upon creation of any single page. A page doesn't need to have a copyright notice in order to be protected by copyright law. As technology continues to evolve, the need for an appreciation of both information proprietors' rights and user privileges like "fair use" is expected to intensify.

"Fair use" is the most well-known and most important exception to the copyright owner's rights. The concept of "fair use" was established in the Copyright Law of 1976. It specifies situations in which copyrighted materials may be used without express permission of the copyright holder. The four factors that define "fair use" interpretation include: purpose, nature of work, amount and market effect. The definition and accompanying factors protects the creator by ensuring that the quantity of the work used is negligible, and of little adverse effect to the market for the work, and that, whenever possible, permission of the creator is sought.

Unfortunately, the lack of intellectual property rights for the web and distance education has forced developers to produce course applications that hinge upon incorporating a distorted balance between copyright law and "fair use". Web applications and web pages should be considered as publications and intellectual property rights will be applied as it would in any other publishing medium. Since copyright law is a bit murky when it comes to issues involving teaching, distance education and the like, obtaining permission is the only solution presently given.

Content developed specifically for the Department of the Navy shall become the property of the US Government and be available to all Government entities without restrictions.