

# **Reusable Design Guidelines**

**Version 2.9.3**

**Last Updated: May 15, 2004**

## 1.0 RIGHTS AND PERMISSIONS

**Description:** Provide a statement of rights and permissions associated with a resource. Grant appropriate rights.

**Explanation:** A resource cannot be reused if doing so would violate the terms and conditions imposed by copyrights, licenses or contracts. A statement of rights and permissions enables potential users to know what they can do in advance.

### 1.1 Statement of Copyright

**Description:** The copyright should be clearly stated, and include contact information for the copyright holder.

**Explanation:** All resources should be assumed to be copyrighted. A clear statement of copyright and information about how to contact the copyright holder enables the user to ask for any permissions not granted in the terms of use, such as modifying the resource.

**Priority:** [Priority 1: Must be satisfied to ensure reusability.]

#### Technique(s) and Method(s)

Collection	Store/catalog copyright information as metadata, preferably using a standards-based approach. Dublin Core (DC:Rights), IEEE LOM (LOM.Rights.CopyrightAndOtherRestrictions), and other standard metadata schema include places for copyright information.
Collection	Clearly present the user copyright information for the resource. Method: Display copyright information or a link to copyright information during search results listings or on resource description listings.
Developer	Develop a standard copyright statement and include it, or a link to it, in the resource. Method: Organizations may provide such statements. Copyright statements should include contact information for the copyright holder.

### 1.2 Terms of Use

**Description:** A license or explicit statement of rights and terms of use should be attached to or referenced in the resource.

**Explanation:** Without such a statement, permission must be asked every time a resource is used. Note that exemptions such as "fair use" have limited scope and applicability in the context of reusing online digital learning resources.

**Priority:** [Priority 1: Must be satisfied to ensure reusability.]

#### Technique(s) and Method(s)

Developer	Develop, copy or modify an applicable license or permission statement and include it, or a link to it, with the resource. Method: Organizations may provide such statements. A Terms of Use statement may also include a copyright statement.
Developer	Choose and link to a Creative Commons license.
Developer	Create a license using a standardized Rights Expression Language and associate to the resource (e.g., via a link or by referencing it in an associated metadata record).

Collection	Method: Two potential rights expression languages are: The MPEG REL and The Open Digital Rights Expression Language. Store/catalog metadata about Terms of Use, preferable using a standardized digital rights expression language.
Collection	Method: Two potential rights expression languages are: The MPEG REL and The Open Digital Rights Expression Language. Clearly present a standard set of brief Terms of Use to users. Method: Display Terms of Use to during search results listings or on resource description listings. Creative Commons provides an example of short, standardized descriptions of Terms of Use. These can be displayed in search results listings or on resource description listings.

### 1.3 Grant Modification Rights

Description:	Grant rights to modify the digital learning resource, or provide contact information for asking permission.
Explanation:	To enable others to adapt or customize the resource, the copyright holder should grant permission to modify a resource.
Priority:	[Priority 2: Should be satisfied to increase reusability.]

#### Technique(s) and Method(s)

Collection	Store statement of modifiability in Terms of Use. Statements of modifiability should be included in Terms of Use. Note that such statements should include information on where and how to submit requests for permissions, if applicable.
Developer	Provide statement of modifiability in Terms of Use. Statements of modifiability should be included in Terms of Use. Note that such statements should include information on where and how to submit requests for permissions, if applicable.

## 2.0 INTEROPERABILITY

Description:	Ensure that content can run properly in as many computing and learning environments as possible. Support authors and developers by providing versions of content that can be edited and modified.
Explanation:	Ensuring interoperability - primarily through the use of standards - will make it possible for the widest possible audience to adopt or adapt a resource.

### 2.1 Standardized and Portable Formats

Description:	Use standardized and portable formats for content.
Explanation:	Learning resources should be made available in formats that can be easily used by all members of the community for which they are intended, and that have the best chance of being used by an even wider audience.
Priority:	[Priority 1: Must be satisfied to ensure reusability.]

#### Technique(s) and Method(s)

Developer	Learning content that is packaged using standards and specifications can be conformant most delivery environments and authoring tools. Common formats include IMS Content Packaging (also used by SCORM) and IMS Question & Test Interoperability format.
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	There are packaging standards such as MPEG-21 Part 2 and the Library of Congress Metadata Encoding and Transmission Standard (METS) that can be used to transport content. These are not readily understood by learning delivery platforms and authoring tools, but are easily transformed into formats that are understood.
Developer	Express content in XML. XML-based formats can often be transformed into one another and can later be converted to formats for the Web, for print or for handheld devices. XML-based formats can also be relatively easily transformed for ingestion into authoring tools and learning environments. Method: Many authoring environments can produce XML. It is helpful if you have a tool that can produce XHTML as well as HTML. Method: For mathematics, use MathML to describe mathematical notation.
Collection	Develop collection search tools and other services to use applications with default (common) installations. Method: Carefully consider use of browser-dependent features such as DHTML, ActiveX, etc.
Developer	Develop content to use applications with default (common) installations. The best general advice is to stick to commonly used formats that require only commonly installed plug-ins and commonly installed applications to run or display. Many Web content authoring environments can be configured to produce Web-based content that runs on different browsers and different platforms.
Developer	Use formats that are cross-platform or platform independent. Method: Cross-platform formats are ones that can be used on Macs, PC's and preferably UNIX machines, and that can be used with commonly installed versions and configurations of the Mac, Windows and UNIX operating systems. Method: Use formats such as PDF that can be used on most platforms.
Collection	Be prepared to store/link to multiple formats for each resource.

## 2.2 Use Interoperability Standards for Communication, Sequencing and Navigation

Description: Use industry interoperability standards for communication, sequencing and navigation.

Explanation: Using appropriate interoperability standards and specifications will allow digital learning resources to run on any conformant learning platform.

Priority: [Priority 3: More sophisticated technique that developers may address in order to enhance reusability.]

### Technique(s) and Method(s)

Developer	Use standards and specifications to sequence (order) content. AICC "CMI guidelines" and SCORM are two sets of standards and specifications that can be used to encode sequencing and navigation instructions and to enable content to communicate with a learning delivery platform in ways that are independent of the delivery platform.
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Method: Choose an authoring tool and/or learning content management system that can produce IMS/SCORM or AICC content. It is also possible to create reusable design templates that produce standards-based content.

### 2.3 Provide Editable Versions

Description: Provide an editable version, a link to an editable version or the source code, or a link to the content's assets to make modifications.

Explanation: The ease and ability of a resource to be adapted is increased if an editable version of the resource is provided.

Priority: [Priority 2: Should be satisfied to increase reusability.]

#### Technique(s) and Method(s)

Developer	Provide resource content in editable formats and make source code available. Method: When providing Flash content, give a link to the .fla file. When providing Java applets, link to the source. The same applies to other formats that have "source" and "compiled" versions. Method: Use Sourceforge or similar environment to make source code available.
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## 3.0 DESIGN

Description: Design and structure resources for use by as wide an audience as possible.

Explanation: Digital learning resources can be viewed as consisting of multiple layers: content, presentation, structure, pedagogy and context. Being aware of the effect of each layer on reusability will help guide design choices. Additionally, reducing interdependence among layers will enhance reusability.

### 3.1 Self-Contained Learning Experiences

Description: Structure content to consist of one or more self-contained learning experiences, each addressing a single topic or learning objective.

Explanation: The ease and ability of a resource to be adopted or adapted is increased if the reuser is able to select portions of content that have been designed as self-contained learning experience addressing a single topic or learning objective.

Priority: [Priority 1: Must be satisfied to ensure reusability.]

#### Technique(s) and Method(s)

Developer	Using learning objectives as the organizing structure makes it easier to know when a learning resource matches a learning need. It makes it easier to reuse single sections and is required when designing content that uses SCORM or IMS specifications. Method: At the start of the authoring or design process, identify what students are intended to learn, what ideas and techniques that must be acquired and synthesized along the way, and how understanding or mastery can be tested or verified. With this in mind, organize the content into sections that have clearly identified learning objectives and that include or suggest ways to check understanding or mastery of those objectives. There are numerous references that discuss and illustrate how to
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	determine and write objectives and how to design and structure content in this way.
Developer	<p>Eliminate interdependencies between content in different sections of a multi-section resource. When faced with two interdependent sections, analyze what is needed from one to understand the other. If the sections cannot be separated without reducing quality or without undo effort, recognize this and combine them.</p> <p>Method: If applets, images, exercises, notation or short explanations from one section are required background for another, include them in both sections. This can be done unobtrusively through pop-up windows or mouseovers.</p> <p>Method: If skills or knowledge from one section are needed to understand another, then consider referring to these abstractly or referencing multiple sources, making the original section one reference of many.</p>
Developer	Structure content the smallest possible granularity, each with a well defined learning objective(s).

### 3.2 Separation of Content and Presentation

Description: Separate content from presentation.

Explanation: The ease and ability of a resource to be adapted is increased by separating content from presentation, enabling the adapter to customize the resource for his/her needs (e.g., for Web sites this can involve using styles, styles sheets and XML-based content formats).

Priority: [Priority 1: Must be satisfied to ensure reusability.]

#### Technique(s) and Method(s)

Developer	<p>For Web-based resources, use styles, style sheets, and XML-based formats.</p> <p>Method: For Web sites use Cascading Style Sheets to format HTML documents. For improved reusability use Cascading Style Sheets, XML-based content and XSLT to display content in HTML/XHTML.</p>
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### 3.3 Separation of Content and Navigation

Description: Separate content from navigation.

Explanation: The ease and ability of a resource to be adapted is increased by separating content from navigation, enabling the adaptor to customize the resource for his/her needs. This includes removing intra-section and inter-section navigation elements (e.g., "Previous"/"Next" buttons and links to other sections).

Priority: [Priority 2: Should be satisfied to increase reusability.]

#### Technique(s) and Method(s)

Developer	<p>Eliminate "Previous" and "Next" Buttons/Links by providing a separate section or frame that controls the navigation. Note: Hard-coded navigational links may be used within a section that can only be used as a self-contained unit.</p>
Developer	<p>Eliminate intra-section navigation by providing a separate section or frame that controls the navigation. Note: Hard-coded</p>

	navigational links may be used within a section that can only be used as a self-contained unit.
Developer	Separate repeatedly used components. It will be easier to reuse sections independently and to make significant changes to the look and feel of a resource if repeatedly used images, movies, applets, examples, explanations, exercises or formulae are stored separately and incorporated into content by links rather than included directly.
	Method: For Web sites, store text, raw media and similar objects separately from its presentation in a Web page.
Developer	Use standards and specifications to sequence (order) content. AICC "CMI guidelines" and SCORM are two sets of standards and specifications that can be used to encode sequencing and navigation instructions and to enable content to communicate with a learning delivery platform in ways that are independent of the delivery platform.

### 3.4 Accessible Design

Description: Adhere to accessible design guidelines.

Explanation: Accessible design guidelines enable a wider possible use of the resource, in addition to providing support for users with disabilities. In some cases this is a legal requirement (e.g., Section 508 for U.S. Federal Web sites).

Priority: [Priority 2: Should be satisfied to increase reusability.]

#### Technique(s) and Method(s)

Developer	Follow specifications and guidelines for accessible design such as those supported by World Wide Web Consortium Web Accessibility Initiative or the CPB/WBGH National Center for Accessible Media. Method: Provide textual transcript for audio and/or video. Method: Provide "alt" tags for images in Web pages.
Developer	Use authoring tools that include support for accessible design. Method: Macromedia Flash is one such authoring tool. Method: Current versions of Adobe Acrobat support accessible design, although care must be taken not to lock PDF files.

### 3.5 Multiple Educational Settings

Description: Design for multiple educational settings.

Explanation: The potential audience for a resource is increased by providing support for use of the resource in multiple educational settings (e.g., in-class lecture and self-paced study).

Priority: [Priority 2: Should be satisfied to increase reusability.]

#### Technique(s) and Method(s)

Developer	Design the resource to be used in multiple educational settings. Method: If a resource is conceived for classroom use, determine whether activities that require physical materials or the physical presence of other people (e.g., an instructor or other students) can be isolated in a separate section or re-cast in a way that can be done remotely without negatively impacting the quality of the learning experience. Determine if
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an instructor or mentor is really required and whether the resource can effectively be broken up into a mentored section and self-paced section. If the role of a mentor is primarily to convey instructions, set context or check progress, consider providing alternatives that do not require a mentor. For example, a recorded video session and demo might serve to convey instructions and set context, and online quizzes could be used to check progress.

Method: If a resource is designed for online use, consider how it might be used in a classroom. Interactive exercises and simulations are especially valuable for classroom use.

### 3.6 Multiple Educational Levels

Description: Design for multiple educational and age levels.

Explanation: The potential audience for a resource is increased by providing support for users of multiple educational and/or age levels (e.g., university and high-school use or 7-8 year olds and 12-13 year olds).

Priority: [Priority 2: Should be satisfied to increase reusability.]

#### Technique(s) and Method(s)

Developer	Design the resource to be used by multiple educational or age levels. Be aware of how writing style, graphical style and structure affect the appropriateness of a resource for various educational and age levels.
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### 3.7 Multilingual Support

Description: Design for multilingual support.

Explanation: The potential audience for a resource is increased by providing versions in multiple languages or enabling easy translation of content into another language. In some cases this is standard practice or a legal requirement. Care should also be taken to be sensitive to cultural aspects of potential users.

Priority: [Priority 2: Should be satisfied to increase reusability.]

#### Technique(s) and Method(s)

Developer	Provide multilingual support. Consider selecting and using tools that are designed to support multi-language versions of content and software.
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Method: Include transcripts for audio and/or video in multiple languages. Translation is still facilitated even if a transcript is only provided in a single language.

Method: Separate visual labels from the visual image to facilitate translation.

Developer	Design for use by diverse users (e.g., background, ethnicity, education level, etc.). Use language, images, scenarios and examples that make sense in as many cultural contexts as possible. If a cultural context is set as part of the background, make sure that it is appropriate and contributes to the effectiveness of the resource.
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## 4.0 METADATA



Description: Provide rich metadata about the resource.

Explanation: Providing adequate and accurate metadata will greatly enhance reusability because it helps the resource be found and used.

#### 4.1 "Basic" Descriptive Information

Description: Provide information (metadata) giving a basic description of the resource including a title, author, description, identifier and key words.

Explanation: Basic descriptive information enables the resource to be found and used.

Priority: [Priority 1: Must be satisfied to ensure reusability.]

##### Technique(s) and Method(s)

Developer	Basic descriptive metadata is usually provided by the author, generated automatically or added by a cataloger. Many authoring tools provide the means to add this basic metadata, especially if they can create SCORM or IMS content.
Collection	Store/catalog basic metadata and use basic metadata during search and browse.

#### 4.2 Contextual Information

Description: Provide information (metadata) addressing the context of use of the resource.

Explanation: Contextual information is used to find resources for a specific context. For educational applications, this includes information about the grade level and intended audience of the resource.

Priority: [Priority 1: Must be satisfied to ensure reusability.]

##### Technique(s) and Method(s)

Developer	Contextual metadata is usually determined by an author, authoring team or design team. Some authoring environments provide the means to add this metadata.
Collection	Store/catalog contextual information metadata.

#### 4.3 Technical Information

Description: Provide information (metadata) addressing technical requirements.

Explanation: Technical information includes the format of a resource and what software or systems are required to use or modify the resource.

Priority: [Priority 2: Should be satisfied to increase reusability.]

##### Technique(s) and Method(s)

Developer	Technical Information metadata may be provided by an author or authoring team, may be automatically generated or may be added by a cataloger. Some authoring environments provide the means to add this metadata.
Collection	Store/catalog technical information metadata.

#### 4.4 Usage Information

Description: Provide information on how to use the digital learning resource.

Explanation: User information includes software documentation (online, printed or in the form of help screens), instructor guides, and other information that helps a resource be properly and effectively used.

Priority: [Priority 3: More sophisticated technique that developers may address in order to enhance reusability.]

Technique(s) and Method(s)

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Collection	Store/catalog usage information, provide ability to link to usage information. Method: Amazon.com allows users to post reviews of items in its catalog often describing how the user like the item or uses the item. Method: Resources cataloged in MERLOT can have both "Assignments" and "Member Comments" describing how to use the resource.
Developer	A link or reference should be provided to any documentation that is necessary or will make it easier to use, reuse or, if appropriate, modify a resource.