Interim Army Business Rules and Best Practices for Distributed Learning Courseware Development

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Release Summary

Version	Release Date	Changes in Release
3.1	03 May 2024	- Updated BR numbers - Removed business rules that are common knowledge or irrelevant to the current learning management system - Removed Appendix D: Baseline Home Computer Configurations for Army Distributed Learning Products; moved it to the Acceptance Criteria in Appendix K - Removed Appendix A: Responsive Web Design in DL Courseware Development - Removed Appendix C: Instructional Strategy for Accommodating Special Scoring Requirements - Updated verbiage throughout for clarity, including replacing instances of "shall" with "must" as BRs are not suggestions - Updated references of ALMS to ATIS Learning - Removed the Testing and Delivery sections from the BRBP and moved to the Acceptance Criteria - Removed BRs: - BR 2.1.2 Allowable Folder Names and Characters - BR 2.1.3 External URL Encoding - BR 2.1.4 File Extension Separation - BR 2.1.8 Error Free Code - BR 2.2.7 SCORM Data Model - BR 2.2.10 SCORM Navigation Request - BR 3.1.1 Target Platform Testing - BR 3.1.2 Computer Configuration - BR 3.1.3 Conformance Testing Tools - BR 3.2.1 SCORM Strict Mode - BR 3.2.2 Army Conformance Testing - BR 4.1.1 Content Package Format - BR 4.1.2 Content Package Deliverables - BR 4.1.3 Source Materials Deliverables - BR 4.2.1 SCORM Content Package Deliverables - BR 4.2.2 SCORM Validation Deliverables

3.0	01 August 2022	- Added Business Rule 1.1.6 Responsive Web Design - Added Business Rule 1.1.7 Availability of Fonts Use - Added Business Rule 1.1.8 3D Models Specifications - Added Business Rule 1.1.9 No Embedded Certificates of Completion within Courseware - Combined Business Rule 2.1.1 and 2.1.2 into Business Rule 2.1.1 Allowable File and Folder Name Characters - Removed Business Rule 2.1.12 Consistent Exit Behavior - Removed Business Rule 2.1.13 Adobe Flash - Updated Business Rule 2.2.1 Window Closure and Exit Button - Moved Appendix E Use of Fonts into Business Rule 1.1.7 - Replaced Appendix E with 3D Models Specifications - Updated Appendix D BHCC
2.0	01 November 2021	- Removed reference to Learning Content Object (LCO) - Updated Business Rule 2.2.1 Window Closure and Exit Button - Updated Business Rule 2.1.9 Open Standards Requirement - Updated Business Rule 4.2.1 SCORM Content Package Deliverables - Added Business Rule 1.1.5 Revised Section 508 and WCAG Compliance - Removed BRBP Checklist - Added Responsive Web Design - Added Instructional Strategy for Accommodating Special Scoring Requirement

Table of Contents

Introduction

The Army Business Rules and Best Practices (BRBP) for Distributed Learning (DL) Development is a development and compliance resource for the creation of distributed learning products for Army DL Producing Activities (ADLPAs).

This document contains business rules and supporting best practices for application in development of DL products for delivery on Army Learning and Content Management Capability (ALCMC) information systems.

The intended audience is DL courseware programmers and instructional systems designers.

The business rules (BRs), best practices (BPs), and supporting information within this document provide DL developers with the baseline requirements for creating Army DL products that meet Army DL conformance requirements and provide certain functionality required by the Army.

Business rules and best practices are formatted to provide end-goals for developers that apply broadly to all types of Army DL products, avoiding narrow specificity where possible to give developers the freedom to create a variety of robust products to meet the needs of the Army.

Developers are responsible for determining how best to apply the language of the BRBP to Army DL products.

The office of the Vice Provost for Digital Education (VPDE), Courseware Standards and Specifications (CSS) Division maintains this document.

Key Concepts

- DL creation process: The development of Army DL courseware follows the ADDIE process consisting of five phases: Analysis, Design, Development, Implementation, and Evaluation. The Business Rules and Best Practices covers design and development for DL products. The Army Acceptance Criteria covers implementation, which includes testing and delivery.

- Content package: A content package is a file that contains content and accompanying metadata. It is a general concept that has been incorporated into standard formats such as the IMS Content Packaging specification used in SCORM.

- Interoperability: The concept of interoperability appears frequently in this document and refers to the ability of content packages to be transferred between

systems and function consistently. Interoperability also implies that content packages are fully self-contained, which is a key principle in specifications like SCORM.

- Learning experience: The learning experience simply refers to the learner's ability to experience learning content without confusion or difficulty. This concept is similar to "ease of use" or "user experience."

Required Knowledge

This document contains technical concepts related to instructional systems and web programming. The following technical specification knowledge is required:
- General usage of Learning Management Systems (LMS)
- Shareable Content Object Reference Model 2004 3rd Edition (SCORM) Technical Reference
- JavaScript and Extensible Markup Language (XML) programming
- Army DL Acceptance Criteria

> **IMPORTANT:** The Army only accepts web-based DL products conformant to SCORM 2004 3rd Edition.

Section Layout

The following sections include business rules, best practices, and appendices. The business rules and supporting information are presented within a life-cycle-style set of DL development phases, discussed in The Army Learning Environment, to provide clear context of requirements and why they exist, in the following order:

- **The Army Learning Environment**: An overview of the Army learning environment in which DL products reside, its major components, and the broad goals developers should keep in mind.

- **Section 1: Design**: The business rules and best practices that apply to designing a DL product before commencing development and programming work.

- **Section 2: Development**: The business rules and best practices that apply during the construction of a DL product and the implementation of its content and functionality.

- **Appendices**: This section contains information on 3D Model Specifications and Metadata.

The Army Learning Environment

"Army Learning Environment" describes the collection of technologies, platforms, and content that comprise Army DL. This section provides a brief overview of the relevant parts of the Army Learning Environment and a discussion of the expectations for developers creating a DL product.

SCORM 2004 3rd Edition Technical Specifications

Advanced Distributed Learning Initiative (ADL) provides three technical documents that make up the SCORM 2004 3rd Edition specification:

- <u>SCORM Content Aggregation Model (CAM)</u> specifies that content should be packaged in a ZIP file called a Package Interchange File (PIF).
  - The PIF must always contain an XML file named imsmanifest.xml.
  - The manifest file contains all the information the LMS needs to deliver the content. The manifest divides the course into one or more parts called Shareable Content Objects (SCOs).
  - The manifest contains an XML representation of the activity tree, information about how to launch each SCO, and metadata that describes the course and its parts.

- <u>SCORM Run-Time Environment (RTE)</u> specification states that the LMS should launch content in a web browser, either in a new window or in a frameset.
  - The LMS may only launch one SCO at a time. Once the content is launched, it uses a well-defined algorithm to locate an ECMAScript (JavaScript) API that is provided by the LMS.
  - This API has functions that facilitate the exchange of data with the LMS. The SCORM RTE data model provides a standard set of data model elements that can be written to and read from the LMS.
  - Some example data model elements include the status of the SCO (completed, passed, failed, etc.), the score the learner achieved, a bookmark to track the learner's location in the course, and the total amount of time the learner spent in the SCO.

- <u>SCORM Sequencing and Navigation (SN)</u> specification allows the content author to govern how the learner is allowed to navigate between SCOs, and how data progress is rolled up to the course level.
  - Sequencing rules are represented by XML within the course's manifest. Sequencing operates on a tracking model that closely parallels the data model elements reported by SCOs during run-time.

ADL's SCORM 2004 3rd Edition Overview and Impact Summary offers a high-level overview of the key differences between SCORM 2004 2nd Edition and SCORM 2004 3rd Edition. It also provides a high-level overview of the SCORM 2004 3rd Edition documentation suite, the SCORM 2004 3rd Edition Conformance Test Suite and SCORM 2004 3rd Edition Sample Run-Time Environment.

The SCORM 2004 3rd Edition technical specifications, content examples, and other SCORM related resources are located on the ADL website.

DL Delivery Platforms

This document pertains to developing courseware to be deployed on the Army Training Information System Learning (ATIS Learning).

ATIS Learning is based on the Moodle® Workplace in conjunction with Rustici Content Controller and fully supports SCORM 2004 3rd Edition content. ATIS Learning has a content testing environment (CTE) for testing content.

DL Product Testing and Delivery

The following lists provide an overview of what goes into creating and delivering DL products within the Army learning environment. Detailed information about product delivery is available in the Army Acceptance Criteria.

DL developers are expected to complete the following prior to product submission:

- Follow the approved Instructional Multimedia Design Plan (IMDP)
- Implement instructional design requirements
- Implement functional requirements such as general content behavior and SCORM usage
- Validate full conformance to Army requirements using Army testing tools
- Conduct validation testing on the delivery platform's testing environment
- Ensure the final deliverable package includes all necessary items and documentation

The Army will perform the following after receipt of final deliverable package:

- Conduct a certification process on all submitted content in accordance with the Army Acceptance Criteria using tools such as Army Conformance Test Suite Online logs and Rustici Content Controller Debug Log Analyzer logs.
- Perform functional testing on the delivery platform to validate functional behavior and identify any issues that hinder the learning experience.
- Deploy content to learners on the delivery platform once DL product is deemed acceptable.

> **Note:** This document refers to this step as "platform delivery," which is different from delivery of a final product to the Government.

1 Design

This section covers the requirements for the Design phase of DL development. In this phase, it is assumed that no development or programming work has begun, and that developers are making design decisions that pertain to content structure and creating metadata to describe the content.

1.1 All Learning Content

The information in this section pertains to the design phase requirements for all IMI types.

BUSINESS RULE 1.1.1: DISCRETE INDEPENDENT CONTENT

Independent Learning Objects must be discrete blocks of learning content that do not refer to placement in a hierarchy or to other Learning Objects anywhere in the content.

Purpose

Business Rule 1.1.1 ensures that an independent content object is truly independent of other content objects and does not rely on or reference Learning Objects outside of itself. An independent Learning Object is designed for reuse in multiple locations within the Army learning environment and must not be associated with other Learning Objects or specific contexts.

Risk

Failure to follow Business Rule 1.1.1 causes an independent Learning Object to violate its purpose as an interoperable Learning Object and becomes dependent on use with the Learning Object(s)or context(s) it references.

Verification

Verify that the given Learning Object does not reference any other Learning Objects by name, number, or hierarchy placement anywhere in the content package titles, manifest, metadata, or content that is viewed as part of the learner experience.

Exception

Business Rule 1.1.1 is not applicable in scenarios where the Learning Object is explicitly designed as an introduction to a course.

BUSINESS RULE 1.1.2: CONSISTENT CONTENT TITLES

All Learning Objects must maintain uniformity in topic titles across content packaging resources and the instructional content presented to the learner.

Purpose

Business Rule 1.1.2 eliminates the risk of learner confusion regarding their position within the learning content. The rule pertains primarily to content packaging standards and how delivery platforms such as an LMS display the titles of items. For example, an organization of packaged content is allowed to have its own title that may differ from the title shown in content itself. Titling must be consistent throughout instructional content.

Risk

Failure to follow Business Rule 1.1.2 creates the risk of learners becoming confused as to their position within the lesson, negatively impacting their learning experience.

Verification

Ensure that the title in the instructional content matches the title exactly as it is formatted in the content package resources. If the title appears in multiple places within the packaging resources, ensure that each occurrence of the title matches every other occurrence. Test adherence to Business Rule 1.1.2 by confirming that the title as it appears in the LMS Table of Contents matches the title as it is displayed from within the content on the target delivery platform.

BUSINESS RULE 1.1.3: INTERNAL LEARNING CONTENT

Instructional content that is crucial for achieving mastery requirements of a Learning Object must be located within its content package and must not reference an external URL.

Purpose

Business Rule 1.1.3 ensures that critical learning content (i.e., text and media) which is essential to the learning objective is readily accessible from within a content package, as opposed to an unstable external location. The rule enforces the portability and availability of learning content.

Risk

Failure to follow Business Rule 1.1.3 creates the risk of critical learning content that is not within a content package (i.e., an external URL) uncontrollably changing or becoming unavailable. Learning content that is incomplete due to partial unavailability or incorrect alterations cannot fulfill its educational purpose for the learner.

Verification

Verify that all learning content is packaged locally within the content package and referenced using relative URLs. Test whether Business Rule 1.1.3 has been satisfied by running the Learning Object locally in an offline context and ensuring there are no broken links. The Army SCORM 2004 3rd Edition Conformance Test Suite (ACTS) may be used for this purpose when obtaining logs for SCORM 2004 3rd Edition Learning Objects.

Exception

The Army may allow exceptions for non-critical material, usually for large items such as Field Manuals and Soldier Training Publications. However, all files situated outside of the content package must be archived in an Army repository or within an Army LMS, ensuring protection against removal, replacement, or updates.

BUSINESS RULE 1.1.4: METADATA REQUIREMENT FOR ALL LEARNING CONTENT

Metadata is required for all Learning Objects and must conform to their corresponding specification and standards.

Purpose

Business Rule 1.1.4 ensures that all DL content has the metadata required for use within the ALCMC for content management purposes. The metadata provides an important data description of the content package including, but not limited to, doctrine, MOS, critical tasks list, courseware development history, tools used, and the version of regulatory and technical standards and specifications the courseware is developed against. It offers the ability to search, catalog, and reuse the courseware.

Risk

Failure to follow Business Rule 1.1.4 causes a significant reduction in the ability to reuse, maintain, or repurpose the courseware. It limits the possibility of using students' learning activity data for further analysis.

Verification

Verify that each content package contains valid metadata files that are well-formed and valid according to specified metadata standards.

BUSINESS RULE 1.1.5: REVISED 508 STANDARDS COMPLIANCE

All Army DL products must be compliant with the Revised 508 Standards.

Purpose

The Revised 508 Standards address access to information and communication technology (ICT) under Section 508 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794d), and Section 255 of the Communications Act. Compliance with these standards is mandatory for Federal agencies. The Revised 508 Standards, which are part of the Federal Acquisition Regulation, ensure access for people with physical, sensory, or cognitive disabilities.

Risk

Failure to follow Business Rule 1.1.5 means the DL courseware will not be 508 compliant in accordance with Section 508 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794d). Not meeting Revised 508 Standards may prevent people with or without disabilities from accessing some or all of the available content.

Verification

It is recommended that distributed learning product developers use the Voluntary Product Accessibility Template (VPAT™) for documenting and reporting 508 Compliance of the DL product.

BEST PRACTICE: USE THE VPAT TO DOCUMENT AND REPORT REVISED 508 STANDARDS COMPLIANCE

DL developers may use a Voluntary Product Accessibility Template (VPAT™) to document and report that a DL product meets Revised 508 Standards.

A VPAT is a self-reporting document for DL developers to detail each aspect of the Revised 508 Standards requirements and demonstrate how distributed learning products are compliant with Revised 508 Standards.

The current VPAT recommended by U.S. General Services Administration (GSA) may be found on the ITI Council website under "policy" and then "accessibility."

The above referenced VPAT document includes a brief description of the essential Revised 508 Standards requirements and Best Practices for Information and Communications Technology (ICT) for DL product developers. The accompanying Accessibility Conformance Report consists of tables that may be used to document and report each area of compliance with hyperlinks to sections in Revised 508 Standards requirements and available guidance.

For more references and information on 508 Compliances, see the additional official resources below:

- U.S. Access Board website
- WCAG website

- GSA 508 website
- Revised 508 Standards website

BUSINESS RULE 1.1.6: RESPONSIVE WEB DESIGN

All Army DL products must apply Responsive Web Design.

Purpose

Responsive Web Design (RWD) is an approach to web design that makes web pages display effectively on different devices and screen sizes. RWD responds to the needs of the users and the devices they use to access DL products by adapting web pages to varying screen sizes. Courseware developed with RWD applied can make the courseware readily available to the intended audience anywhere at any time on mobile devices.

Risk

Failure to follow Business Rule 1.1.6 means the DL courseware may not display properly on some devices, including mobile devices of various screen sizes. This can limit the learning opportunities of intended learners.

Verification

There are many high quality and effective web design testing tools that are available for the verification and assessment of the effectiveness of the RWD along with other aspects of the web design. Test the courseware on various devices and screen sizes using different browsers to ensure optimal responsiveness and a consistent user experience across different platforms.

BUSINESS RULE 1.1.7: AVAILABILITY OF FONTS USED

All Army DL products must be designed with fonts available on the target platforms.

Purpose

Proper display of text, characters, symbols, bullets, and icons is an important aspect of quality DL courseware. DL content developers must ensure that fonts used in courseware are readily available on the target platforms the DL courseware is designed for.

Risk

Failure to follow Business Rule 1.1.7 means text, numbers, bullets, symbols, or icons in certain fonts may not display properly, making the courseware unusable.

Verification

Ensure that all text, symbols, and characters are displayed as designed on target delivery platforms. If a custom font is necessary, the font file must be included in the courseware package.

Application

All Army DL products should use web-safe fonts and must define fallback fonts in the course content. When not using web-safe fonts, custom fonts must be included in the content package.

Web-Safe Fonts

DL Developers should maximize the use of web-safe fonts. Web-safe fonts are readable and look the same for all browsers and devices, pre-installed on most devices (e.g., computers, mobile phones, and tablets). Below is a list of popular web-safe fonts:

- Arial (sans-serif)
- Courier New (monospace)
- Garamond (serif)
- Georgia (serif)
- Helvetica (sans-serif)
- Times New Roman (serif)
- Verdana (sans-serif)

Fallback Font Stack and Font Family

A fallback font stack is the CSS code that instructs a browser on which fonts to display, and what to do should the first-choice font be unavailable or not working. A font family is a grouping of fonts defined by commonly shared design styles. For example, the Times family includes different font sizes, styles (like roman and italic), and weight (like regular and bold).

Examples of fallback font stacks composed of fonts in the same family:

- `Arial, Helvetica, sans-serif`
- `"Arial Black", Gadget, sans-serif`
- `"Bookman Old Style", serif`
- `"Comic Sans MS", cursive, sans-serif`
- `"Courier New", Courier, monospace`
- `Garamond, serif`
- `Georgia, serif`
- `Impact, Charcoal, sans-serif`
- `"Palatino Linotype", "Book Antiqua", Palatino, serif`
- `"Times New Roman", Times, serif`
- `Verdana, Geneva, sans-serif`

BEST PRACTICE: FALLBACK FONTS

Use fallback font stacks to avoid distortion of text and/or layout when specified fonts are not available or not working. This is especially important when custom fonts are embedded in the courseware.

Below is an example of implementing the fallback mechanism for unavailable or missing fonts:

FALLBACK MECHANISM FOR UNAVAILABLE OR MISSING FONTS
| ```
p {
    font-family: "Comic Sans MS", cursive, sans-serif;
}
``` |

Embedding Custom Fonts

In cases where certain custom fonts rather than web-safe fonts are chosen and embedded in courseware for special effects to enhance instructional presentation, the custom fonts may be added by using the @font-face CSS rule. The pertinent font files shall be included in the content package as mentioned in accordance with Business Rule 2.2.3. There are several web-font formats available with varying browser support. Custom fonts may potentially be blocked by software installed on certain DL delivery platforms. Therefore, the use and display of custom fonts embedded in the courseware must be fully tested on all target platforms for DL delivery.

Below is an example of embedding custom fonts:

EMBEDDING CUSTOM FONTS

```
@font-face {
  font-family: 'FontName';
  src: url('webfont.eot'); /* IE9+ Compat Modes */
  src: url('webfont.woff2') format('woff2'), /* Super modern browsers */
       url('webfont.woff') format('woff'), /* Modern browsers */
       url('webfont.ttf') format('truetype'), /* Safari, Android, iOS */
       url('webfont.svg#FontName') format('svg'); /* Legacy iOS */
}
```

> **WARNING**: Custom fonts may potentially be blocked by software installed on certain DL delivery platforms. DISA STIG Rule SV-78131r1_rule stipulates that the system shall be configured to block untrusted fonts from loading. Rule SV-59369r1_rule describes a policy setting that allows the user to manage whether pages of the zone may download HTML fonts. For this reason, always specify fallback fonts as explained in the "Fallback Font Stack and Font Family" section.

Use of Unicode

Unicode is the universal character encoding maintained by the Unicode Consortium. This encoding standard provides the basis for processing, storage, and interchange of text data in any language in all modern software and information technology protocols. Unicode provides a unique number for every character, no matter what the platform, program, or language is. These characters include symbols, icons and emojis that may be incorporated into the user interface.

However, different computer systems may display the Unicode characters differently, and some Unicode characters may not be available in certain computer systems. Therefore, if the developer decides to incorporate Unicode characters in the courseware, a thorough test must be conducted on all target delivery platforms to verify that the characters render and display properly as designed.

BUSINESS RULE 1.1.8: 3D MODEL SPECIFICATIONS

ALL 3D models developed for Army DL Products must meet the requirements of the Army 3D Model Specifications.

Purpose

Specifications for 3D models ensure all models meet certain quality standards so they may be used, revised, and reused as intended. 3D models must adhere to the specifications outlined in Appendix A.

Risk

Failure to follow Business Rule 1.1.8 means the 3D model will not meet the specifications for Army 3D models and runs the risk of inferior model quality and functionality, resulting in rejection by the Army.

Verification

Refer to Appendix A: Army 3D Model Specifications for detailed information on 3D model specifications.

BUSINESS RULE 1.1.9: NO EMBEDDED CERTIFICATES OF COMPLETION WITHIN COURSEWARE

Certificates of Completion must not be embedded within courseware intended for deployment on ATIS Learning.

Purpose

ATIS Learning automatically generates a DA87 compliant Certificate of Completion when the learner successfully completes a topic or course. It is not only redundant but also potentially harmful to embed certificates in the courseware.

Risk

Embedding and displaying a Certificate of Completion within the courseware may cause the learner to exit the topic or course improperly. As a result, learning-outcome information such as completion status and scores may not be recorded correctly in the ATIS Learning. When learners complete the course and arrive at the certificate, they often believe they have officially completed the course and exit out or close the window before the course signals to the LMS that the learner has completed the course. This causes the ATIS Learning to suspend the course and record it as not complete. This often results in calls to the Army Training Help Desk (ATHD) to have a learner's completion status corrected.

Application

Instructions for obtaining ATIS Learning generated course or topic Certificate of Completion are found in the ATIS Learning Help by searching for the term "certificate," then searching for either Learner Print Course Certificate or Learner Print Topic Certificate. Include Instructions for Obtaining ATIS Learning Generated Certificate of Completion in the Letter of Instruction for proponent organizations that emphasize the need for the student to obtain a Certificate of Completion. Training developers may incorporate guidance into the Letter of Instruction for students to obtain a Certificate of Completion.

1.2   SCORM Content

The information in this section pertains to the design phase requirements for SCORM 2004 3rd Edition DL products. This document considers the design phase for SCORM 2004 3rd Edition to cover manifest creation and configuration, and the creation of accompanying metadata.

BUSINESS RULE 1.2.1: SINGLE-SCO CONTENT PACKAGES

SCORM 2004 3rd Edition content packages must be limited to a single SCO for the purposes of modularity and interoperability.

Purpose

Business Rule 1.2.1 ensures that SCOs maximize interoperability and portability by keeping content packages single-SCO packages and at a manageable size.

Risk

Failure to follow Business Rule 1.2.1 may cause large and difficult-to-manage content packages. Having multiple SCOs will create multiple levels of sequencing and navigation mechanisms and course structures which are prone to courseware errors. Multi-SCO packages lose portability, and the difficulty in diagnosing and repairing issues is increased in content packages with many components, especially where SCORM sequencing logic is concerned.

Verification

Verify that the manifest file contains a single `organization` element with a single `item` element. Figure 1 provides an example of how to define a single SCO package in a manifest file. Note that there is only one `organization` element under the `organizations` element and only one `item` element under the `organization` element.

REFERENCE TO AN EXTERNAL METADATA FILE FROM WITHIN THE PACKAGE MANIFEST

```
<organizations default="CCC">
 <organization identifier="CCC" adlseq:objectivesGlobalToSystem="false">
  <title>Captains Career Course</title>
  <item identifier="CCCM01" identifierref="CCCM01_resources">
 <title>Captains Career Course Module 01</title>
  </item>
 </organization>
</organizations>
```

Figure 1: Code sample for a single SCO package defined in a manifest

BUSINESS RULE 1.2.2: SCORM METADATA FILES

Content packages must contain discrete metadata files that conform to the IEEE LOM schema, and each file must be properly referenced within the content package manifest file.

Purpose

Business Rule 1.2.2 ensures that metadata files are both discrete from the content they support and valid to the Institute of Electrical and Electronics Engineers (IEEE) standard for learning object metadata (LOM) to support interoperability.

Risk

Failure to follow Business Rule 1.2.2 means that the content package is missing metadata or contains invalid metadata. Information required in the metadata will not be available to the learning management system. The courseware will fail Army SCORM testing for DL products.

Verification

Use the Web-based Army Conformance Test Suite (ACTS) to verify the conformance to Business Rule 1.2.2. The content package is considered meeting BR 1.2.2 requirements if the test result reports no conformance errors.

Verify that each content package contains discrete metadata files that conform to the IEEE LOM schema, and that each file is properly referenced within the content package manifest file. Figure 2 shows an example of a reference to a separate metadata file within a SCORM 2004 3rd Edition SCO manifest file. The `adlcp:location` element contains the reference to the `metadata_course.xml` file.

REFERENCE TO A METADATA FILE FROM WITHIN THE PACKAGE MANIFEST

```
<metadata>
  <schema>ADL SCORM</schema>
  <schemaversion>2004 3rd Edition</schemaversion>
  <adlcp:location>metadata_course.xml</adlcp:location>
</metadata>
<organizations default="CCC">
```

Figure 2: Code sample for a reference to an external metadata file from within the package manifest

BUSINESS RULE 1.2.3: ARMY METADATA FIELDS

All SCORM 2004 3rd Edition metadata files must be formatted to include the following fields to meet Army requirements:

- General Identifier Fields
  - Catalog; Entry
- General Fields
  - Title; Language; Description; Keywords; Type of Metadata
- Life Cycle Fields
  - Version; Status of Package Submittal; Proponent's Role; Proponent's Name, Address and Email; Date of Submittal
- Metadata Fields
  - Catalog Identifier; Entry Identifier; Schema; Language
- Technical Fields
  - Format
- Rights Fields
  - Cost; Copyright and Other Restrictions
- Classification Fields
  - MOS and Skill Level; SQI; ASI; Task Numbers and Task Descriptions; Learning Objectives; 508 Compliant; Security Level (Foreign Disclosure)

Purpose

Business Rule 1.2.3 ensures that metadata files contain all the information the Army needs to support learning content tracking and interoperability.

IMPORTANT: Refer to the Appendix B: Metadata section for details on implementing required Army metadata fields, such as default field value requirements.

Risk

Failure to follow Business Rule 1.2.3 causes metadata to be invalid according to formatting requirements. The result is a DL product that is incomplete, which means the Army will not accept the product when it is delivered.

Verification

Verify that all metadata files contained within the content package adhere to the guidelines presented in Appendix B: Metadata, and that all elements are present within each metadata file. The Army SCORM 2004 3rd Edition Conformance Test Suite (ACTS) checks the presence and valid values of Army required metadata in SCORM packages.

BEST PRACTICE: ASSIGN ORGANIZATION AND SCO TITLES IN THE MANIFEST

Give the organization and each SCO correct titles in the manifest for a SCORM package. Avoid using default values such as "A001" which may confuse the learner.

This best practice relates directly to Business Rule 1.1.2 for ensuring consistency in titles. A SCORM content package manifest has a title element for the organization element, and a title for each SCO within as well – the LMS will display all titles in a table of contents. When assigning organization titles in the manifest is overlooked, especially when using authoring tools that assign default values, it can cause confusion to the learner. Figure 3 provides an example of setting consistent organization and SCO titles in a manifest.

MATCHING ORGANIZATION AND SCO TITLES IN A CONTENT PACKAGE MANIFEST

```
 <organizations default="CCC">
  <organization identifier="CCC" adlseq:objectivesGlobalToSystem="false">
   <title>Captains Career Course</title>
   <item identifier="CCCM01" identifierref="CCCM01_resources">
       <title>Captains Career Course Module 01</title>
   </item>
  </organization>
</organizations>
```

Figure 3: Code sample for matching organization and SCO titles in a content package manifest

2 Development

This section covers the requirements for the Development phase of DL development. In this phase, it is assumed that the design decisions have been made and it is time to begin programming work.

2.1 All Learning Content

The information in this section pertains to the development of learning content for all IMI types.

BUSINESS RULE 2.1.1: ALLOWABLE FILE AND FOLDER NAME CHARACTERS

Files and folders in Army learning content packages must contain only the following allowable characters from the RFC 3986 unreserved character set:

- _ . A B C D E F G H I J K L M N O P Q R S T U V W X Y Z a b c d e f g h i

j k l m n o p q r s t u v w x y z 0 1 2 3 4 5 6 7 8 9

Purpose

Business Rule 2.1.1 ensures that a standard file and folder naming convention exists to enforce content interoperability, and that file and folder names do not contain any characters (such as special characters) that could cause problems related to the syntax for file paths on delivery platforms.

Risk

Failure to follow Business Rule 2.1.1 creates a risk of content failing to operate correctly on its delivery platform due to unsupported syntax in file or folder names.

Verification

Verify that each file and folder name you create and/or that is created by your DL authoring tool of choice contains only characters from the list presented in Business Rule 2.1.1.

BUSINESS RULE 2.1.2: MAXIMUM FILE PATH LENGTH

File paths in Army learning content packages must not exceed 256 characters in length.

Purpose

Business Rule 2.1.2 ensures that a standard file naming convention exists for interoperability of Army DL content and minimizes the risk of problems on delivery platforms regarding the allowable length of file paths.

Risk

Failure to follow Business Rule 2.1.2 creates a risk of content failing to operate correctly on its delivery platform because of file paths that exceed the length limit. A file path that exceeds the allowable length limit may result in the delivery platform not storing or serving the file.

Verification

Verify that each file and folder use concise names that are no longer than needed to convey relevant information. For example, consider using a shorthand identifier for a lesson name instead of the full name when creating files and folders within the content package (e.g., a folder named "CCCM01" instead of "Captains_Career_Course_Module_01").

BUSINESS RULE 2.1.3: BROWSER DATA STORAGE

Learning content must not store data using the web browser's built-in methods such as cookies or Web Storage.

Purpose

Business Rule 2.1.3 exists because many learners in the Army learning environment use machines that have heightened security configurations that often include disabling built-in web browser data storage mechanisms such as cookies or Web Storage. Developers should make use of data storage capabilities in an approved technology like SCORM, depending on the IMI type for the content.

Risk

Failure to follow Business Rule 2.1.3 creates a risk of content failing to operate correctly due to unsupported functionality, causing a detriment to the learner's experience.

Verification

Verify that the implementation of a Learning Object does not include the use of any local storage technologies. Ensure that Business Rule 2.1.3 has been satisfied by testing the Learning Object in a browser with caching, cookies, and other local storage options disabled and confirming proper operation.

BUSINESS RULE 2.1.4: SERVER-SIDE TECHNOLOGY

Learning content shall not make use of any server-side technologies such as scripting or database implementations.

Purpose

Business Rule 2.1.4 ensures that learning content does not make use of server-side technologies not endorsed for use on ALCMC delivery platforms for security reasons. Server-side technologies include use of languages such as Hypertext Preprocessor (PHP), relational database implementations, or servlets.

Risk

Failure to follow Business Rule 2.1.4 means the Army will not accept a DL product due to security concerns.

Verification

Verify that the implementation of the Learning Object does not include the use of any server-side technologies by methods such as code analysis and design document review.

BUSINESS RULE 2.1.5: OPEN STANDARDS REQUIREMENTS

All source code created and delivered for IMI must be designed and programmed using "open standards" as presented in the Open-Source Initiative website.

Purpose

IMI products often need maintenance after deployment due to changes in requirements, running environment, etc. For government approved and technically qualified developers to make modifications, the source code must follow open standards requirements and not rely on hidden or proprietary technical information that is not publicly available.

Risk

Failure to follow Business Rule 2.1.5 means the source code may not be accessible by the Government for editing, content updating, and enhancements.

Verification

Verify that the source materials adhere to the following:

- **Availability:** The complete set of content source files must be delivered to the government under royalty-free terms with no distribution restrictions.
- **Patents:** All patents involving any source objects, scripts, tagging or code in this learning content must be licensed under royalty-free terms for unrestricted use, or be covered by a promise of non-assertion when practiced by open-source software
- **No Intentional Secrets:** Any detail necessary for interoperable implementation shall not be withheld.
- **No Agreements:** There shall not be any requirement for execution of a license agreement, non-disclosure agreement, grant, click-through, or any other form of paperwork to deploy any code in the learning content.

BUSINESS RULE 2.1.6: BOOKMARKING REQUIREMENT FOR NON-ASSESSMENTS

Non-assessment Learning Objects must contain functionality to bookmark the learner's progress whenever the learner exits the content.

Purpose

Business Rule 2.1.6 ensures that the learner may experience content at their own pace with the ability to exit and return without loss of progress. Bookmarking is a necessity for long learning objects and sequences of learning objects where full completion may require multiple visits to the content by the learner.

Risk

Failure to follow Business Rule 2.1.6 causes a DL product to be incomplete due to a missing critical item of functionality. If a learner is interrupted and must exit the courseware in the middle of a lesson and the bookmarking function does not work as intended or is not included, learners must redo parts of the lesson they have already taken, hindering a smooth learning experience.

Verification

Verify that the Learning Object supports bookmarking. Test this by running the Learning Object on the target delivery platform testing environment, exiting after making some progress, then reentering and verifying that your bookmarking functionality works as intended.

NOTE: Business Rule 2.1.6 is NOT applicable in cases of credit-producing assessment content.

BUSINESS RULE 2.1.7: ASSESSMENT DATA OBFUSCATION

Credit-producing assessment learning content must obfuscate question-and-answer data so that the data is not in a plaintext format easily recognizable by the learner.

Purpose

Business Rule 2.1.7 exists to mitigate the risk of assessment data being compromised and ensure that assessment data is not plainly visible to the most common methods of cheating in DL.

Risk

Failure to follow Business Rule 2.1.7 increases the risk of assessment data compromise using well-known methods such as the web browser's developer tools. Assessment data compromise reduces the effectiveness of the DL product.

Verification

Verify that question and answer data is not present in an easily readable format; ideally, this data would not be in plaintext. If the framework requires plaintext question and answer data, then the data must be minified.

2.2 SCORM Content

The information in this section pertains to the development of SCORM content.

BUSINESS RULE 2.2.1: WINDOW CLOSURE AND EXIT BUTTON

Unless required by the LMS, SCORM 2004 3rd Edition learning content must not forcefully close the LMS SCORM player nor instruct the learner to close the LMS SCORM player using the browser close button.

Each content page must include a blatantly prominent, unobscured "EXIT" button in a consistent location as the standard method for learners to exit the course and close the content window. The "EXIT" button shall be designed to include the actual word for uniformity across all Army DL products.

Purpose

Business Rule 2.2.1 exists to prevent SCORM content from interrupting the active connection between itself and the LMS. The LMS loads SCORM content in its own player window, and if the window closes for any reason other than the automatic LMS actions that occur after attempt termination, both the storage and evaluation of data from the content may be negatively affected.

The "EXIT" button triggers the SCO's proper exit procedure to save the learning progress data and terminate the SCORM session. By requiring the learner to click the "EXIT" button instead of the browser close button, the SCO is given ample time to send learning progress data to the LMS without the risk of losing data during page dismissal.

Risk

Failure to follow Business Rule 2.2.1 creates the risk of either the courseware or the learner closing the LMS SCORM player window forcefully and interrupting the sequence of behavior the LMS needs to perform while the window is active. This may cause issues with tracking and completion credit resulting from learning progress data loss.

Verification

Verify all the implementation details outlined in this section are met when developing the SCO, then ensure during testing that exiting the content does not force the LMS player window to close. If using an authoring tool during development, the content package files may require manually editing to ensure proper window closure if no appropriate configuration options are available in the tool.

Content must include an "EXIT" button on all pages. The courseware is required to instruct the learner, by way of a mandatory tutorial, letter of instruction message, or other noticeable and mandatory medium, to use only the "EXIT" button inside of the courseware to close the content window rather than the "x" button of the browser.

Application

By implementing the following four practices in courseware development, the risk of the

learner forcibly closing the content window and risking the loss of learner data is reduced:

1. Separate LMS SCORM Player Window and Content Presentation Window:

Launch learning content in its own window separate from the LMS SCORM player window to minimize the unintended forceful LMS SCORM player window closure.

The LMS SCORM player window is a frameset that contains pages responsible for LMS tracking and other functionality. Issues caused by closing the LMS player window forcefully may be avoided by programming content to launch in a separate window from the LMS SCORM player window. It is common practice to have the entry point for content be a "launcher" page that will load in the LMS SCORM player window and then open a separate window containing the learning content.

2. Avoid Top-Level Window Closure:

Avoid using methods that will result in a window being closed from the top level, such as `top.close()`.

It is common for the LMS SCORM player window to contain framesets with pages that are not visible to the learner but perform critical LMS functions. The `top.close()` method will close the LMS SCORM player window and may cause issues. On the other hand, the `window.close()` method is acceptable since it will not affect framesets and works without issue for separate content windows.

3. Placement of Exit Button:

Business Rule 2.2.1 mandates all Army IMI courseware to have the "EXIT" button on all content pages in a consistent, unobscured location so that the learner may find it intuitively when trying to exit. The button shall be blatantly prominent to guide the learner to use it rather than the browser's window or tab close button.

4. Reiteration in Letter of Instruction (LOI):

Include a statement in the Letter of Instruction (LOI) directing learners to use the "EXIT" button within the content window to close out of the courseware instead of using the "x" button of the browser window. This will further reduce the risk of the learner closing the content window without clicking the "EXIT" button.

BUSINESS RULE 2.2.2: SCORM MANIFEST AND SCHEMAS

SCORM 2004 3rd Edition content packages must contain a manifest file (imsmanifest.xml) and all SCORM 2004 3rd Edition base and extension schemas in the root level of the package. Additionally, all local schema files shall be referenced in the schemaLocation attributes.

Purpose

Business Rule 2.2.2 ensures that SCORM content packages are built to the SCORM 2004 3rd Edition specification. The inclusion of all schemas in the content package promotes interoperability by having all the reference documents contained within the package rather than requiring external lookup, which may fail.

Risk

Failure to follow Business Rule 2.2.2 creates two risks. First, a SCORM content package may not be valid to the SCORM 2004 3rd Edition specification. Second, the SCORM content package may not be capable of being validated using the Army test tools due to a schema not being present in the package. Either case means that the Army will not accept the content package when it is delivered.

Verification

Verify that imsmanifest.xml as well as all SCORM 2004 3rd Edition base and extension schemas are present in the root level of the content package. Run the Army SCORM 2004 3rd Edition Conformance Test Suite (ACTS) on the courseware to verify the presence of the proper schema files.

BUSINESS RULE 2.2.3: SCORM CONTENT PACKAGES

All files that make up the content for a SCORM 2004 3rd Edition SCO must be contained within its content package and referenced in the imsmanifest.xml file.

Purpose

Business Rule 2.2.3 ensures that SCORM content packages are built to the SCORM 2004 3rd Edition specification. The inclusion and reference to each file in the content package promotes interoperability. Additionally, the Army test tools specifically test for the presence of files in the packages and for references to all packaged files in the manifest.

Risk

Failure to follow Business Rule 2.2.3 creates the risk of some content being unavailable. In addition, SCORM content may fail validation testing using the Army testing tools. Failure to pass the testing tools means the Army will not accept the content package.

Verification

Verify that all files within the content package are referenced within the manifest, including all manifest, metadata, and schema files as outlined in Business Rule 2.2.3. Run the Army SCORM 2004 3rd Edition Conformance Test Suite (ACTS) on the courseware to verify the presence of the imsmanifest.xml file and all references.

BUSINESS RULE 2.2.4: SCORM OBJECTIVES GLOBAL TO SYSTEM

The adlseq:objectivesGlobalToSystem attribute of the organization element must be set to "false" in all Army SCORM 2004 3rd Edition content packages.

Purpose

Business Rule 2.2.4 ensures that SCOs do not make their objective data available to the entire LMS. The default value for the organization `adlseq:objectivesGlobalToSystem` attribute is "true" and this rule requires that the value must be explicitly set to false. See Figure 4 for an example of setting the `adlseq:objectivesGlobalToSystem` attribute to "false" in a content package's manifest.

SETTING ADLSEQ:OBJECTIVESGLOBALTOSYSTEM TO "FALSE" FOR THE ORGANIZATION

```
<organizations default="CCC">
 <organization identifier="CCC" adlseq:objectivesGlobalToSystem="false">
…
 </organization>
</organizations>
```

Figure 4: Code sample for setting the adlseq:objectivesGlobalToSystem attribute to false

Risk

Failure to follow Business Rule 2.2.4 creates the risk of objective data from a particular SCO overwriting or conflicting with objective data from another SCO. Giving robust unique identifiers to objectives is an often-overlooked practice, meaning many SCOs have the same default objective names. Keeping objectives out of the global system scope reduces the risk of conflicts.

Verification

Verify that the `adlseq:objectivesGlobalToSystem` attribute is present within the organization element and set to "false" in any content package created.

BUSINESS RULE 2.2.5: SCO'S PRIMARY OBJECTIVE

SCORM 2004 3rd Edition SCOs must explicitly declare their objectives in the manifest.

Assessment SCOs must include an `imsss:primaryObjective` element in the manifest with the `satisfiedByMeasure` attribute being "true" and declare a mastery score using the imsss:minNormalizedMeasure element.

Non-assessment SCOs must include an `imsss:primaryObjective` element in the manifest with the `satisfiedByMeasure` attribute being "false".

All SCOs must set the `imsss:deliveryControls` element's `completionSetByContent` and `objectiveSetByContent` attributes' value to "true".

Purpose

Business Rule 2.2.5 ensures content functionality by requiring SCORM 2004 3rd Edition SCOs to explicitly identify the objective that contributes to the rollup associated with the activity.

```
<organizations default="CCC">
 <organization identifier="CCC" adlseq:objectivesGlobalToSystem="false">
  <title>Captains Career Course</title>
  <item identifier="CCCM01" identifierref="CCCM01_resources">
   <title>Captains Career Course Module 01 Exam</title>
   <imsss:sequencing>
    <imsss:controlMode choice="false" choiceExit="false" flow="true"/>
    <imsss:objectives>
     <imsss:primaryObjective satisfiedByMeasure="true" objectiveID="CCC_M01_EXAM">
      <imsss:minNormalizedMeasure>0.8</imsss:minNormalizedMeasure>
     </imsss:primaryObjective>
    </imsss:objectives>
    <imsss:deliveryControls completionSetByContent="true"
    objectiveSetByContent="true"/>
   </imsss:sequencing>
  </item>
 </organization>
</organizations>
```

Figure 5. Code example of assessment SCO's manifest

```
<organizations default="CCC">
 <organization identifier="CCC" adlseq:objectivesGlobalToSystem="false">
  <title>Captains Career Course</title>
  <item identifier="CCCM01" identifierref="CCCM01_resources">
   <title>Captains Career Course Module 01 Lesson</title>
   <imsss:sequencing>
    <imsss:controlMode choice="false" choiceExit="false" flow="true"/>
    <imsss:objectives>
     <imsss:primaryObjective satisfiedByMeasure="false" objectiveID="CCC_M01_LESSON"/>
    </imsss:objectives>
    <imsss:deliveryControls completionSetByContent="true"
    objectiveSetByContent="true"/>
   </imsss:sequencing>
  </item>
 </organization>
</organizations>
```

Figure 6. Code example of non-assessment SCO's manifest

Risk

Failure to follow Business Rule 2.2.5 may prevent SCORM 2004 3rd Edition SCOs from functioning as intended and creates the risk of the learner not receiving credit when they have successfully completed the learning activity or the learner receiving credit when they have not successfully completed the learning activity. Unexpected results may arise if relying on the LMS to automatically apply a default objective that the content has no control over.

Verification

Verify the related elements and attributes in the manifest match the examples given above.

BUSINESS RULE 2.2.6: ROLLUP RULES

SCORM 2004 3rd Edition SCORM packages must explicitly declare rollup rules in the manifest according to their instructional strategy.

Purpose

Business Rule 2.2.6 ensures the SCO activity is correctly rolled up. The following code example contains three rollup rules:

1. **If all children are satisfied, roll up "completed" for completion status**

   When the learner exits the SCO after a successful attempt, tell the LMS that the learning content overall has a completion status of "completed" so the system can evaluate the learning assignment.

2. **If all children are satisfied, roll up "satisfied" for satisfaction status**

   Additionally, when the learner exits the SCO after a successful attempt, tell the LMS that the learning content overall has a satisfaction status (analogous with success status) of "satisfied" so the learner can receive credit for the learning assignment upon evaluation.

3. **If any children are not satisfied, roll up "incomplete" for completion status**

   When the learner exits the SCO after a failing attempt, tell the LMS that the learning content has an overall completion status of "incomplete" so the system will not evaluate the learning assignment. This rollup rule is critical to enabling the unlimited attempts instructional strategy.

Note that the third rollup rule is used only if the learners are allowed to re-enter the same attempt (with all the learning activity data retained) after having failed it. Usually, courses are configured to let the learners start a new attempt if they failed that learning activity.

```
<organizations default="CCC">
 <organization identifier="CCC" adlseq:objectivesGlobalToSystem="false">
  <title>Captains Career Course</title>
  <item identifier="CCCM01" identifierref="CCCM01_resources">
  ...
  </item>
  <imsss:sequencing>
   <imsss:rollupRules>
    <imsss:rollupRule childActivitySet="all">
     <imsss:rollupConditions conditionCombination="all">
      <imsss:rollupCondition condition="satisfied"/>
     </imsss:rollupConditions>
     <imsss:rollupAction action="completed"/>
    </imsss:rollupRule>
    <imsss:rollupRule childActivitySet="all">
     <imsss:rollupConditions conditionCombination="all">
      <imsss:rollupCondition condition="satisfied"/>
     </imsss:rollupConditions>
```

```
      <imsss:rollupAction action="satisfied"/>
     </imsss:rollupRule>
    </imsss:rollupRules>
    <!-- include the following rule
         ONLY IF re-opening a failed SCO does not count as a new attempt ->
    <imsss:rollupRule childActivitySet="any">
     <imsss:rollupConditions conditionCombination="any">
      <imsss:rollupCondition operator="not" condition="satisfied"/>
     </imsss:rollupConditions>
     <imsss:rollupAction action="incomplete"/>
    </imsss:rollupRule>
   </imsss:sequencing>
  </organization>
</organizations>
```

Figure 7. Code example of rollup rules

Risk

Failure to follow Business Rule 2.2.6 may prevent SCORM 2004 3rd Edition SCOs from rolling up learners' status correctly and create a risk of the LMS not recording the correct outcome. Unexpected results may arise if relying on the LMS to automatically apply default rollup rules that the content has no control over.

Verification

Verify the related elements and attributes in the manifest match the examples given above.

BUSINESS RULE 2.2.7: SCORM REQUIRED API CALLS FOR ASSESSMENTS

Credit-producing assessment SCORM 2004 3rd Edition SCOs must at a minimum use the SCORM API as follows:

Method Calls	Data Model Value Elements
Call at least once:	Set a valid value at least once:

`Initialize`
`GetLastError`
`Commit`
`Terminate`
	`cmi.exit`
	`cmi.completion_status`
	`cmi.success_status`
	`cmi.score.scaled`
	`cmi.session_time`
	`cmi.interactions.n.correct.response.n.pattern`
	`cmi.interactions.n.learner_response`
	`cmi.interactions.n.latency`
	`cmi.interactions.n.timestamp`
	`cmi.interactions.n.type`
	`cmi.interactions.n.result`
	`adl.nav.request`

Purpose

Business Rule 2.2.7 ensures that the minimum required run-time behavior for SCORM 2004 3rd Edition assessment SCOs is present when the learner attempts the content. The Army specifically tests for the method calls and data model elements outlined in this rule during validation and certification.

> **IMPORTANT:** All items listed in Business Rule 2.2.7 must be present during run-time to prevent failure during Army validation and certification.

Risk

Failure to follow Business Rule 2.2.7 causes content to fail to record and/or report learner responses, answers, interactions, and progress accurately, and subsequently causes the content to not function as intended.

Verification

Verify that the courseware calls the required SCORM methods and sets the required data elements at runtime by running the SCO Runtime Environment (RTE) testing in ACTS.

BUSINESS RULE 2.2.8: SCORM REQUIRED API CALLS FOR NON-ASSESSMENTS

Credit-producing, non-assessment SCORM 2004 3rd Edition SCOs must at a minimum use the SCORM API as follows:

Method Calls	Data Model Elements
Call at least once:	Set a valid value at least once:

`Initialize`
`Commit`
`Terminate`
	`cmi.exit`
	`cmi.completion_status`
	`cmi.success_status`
	`cmi.location` or `cmi.suspend_data`
	`cmi.session_time`
	`adl.nav.request`

Purpose

Business Rule 2.2.8 ensures that the minimum required run-time behavior for SCORM 2004 3rd Edition non-assessment SCOs is present when the learner attempts the content. During certification, the Army specifically observes the method calls and data model elements outlined in this rule.

> **IMPORTANT:** All items listed in Business Rule 2.2.8 must be present during run-time to prevent failure during Army certification.

Risk

Failure to follow Business Rule 2.2.8 will cause content to fail to record and/or report learner responses, answers, interactions, bookmarks, and progress accurately. This will adversely impact the functionality of the content, leading to failure of Army validation and certification.

Verification

Verify that the courseware calls the required SCORM methods and sets the required data elements at runtime by running the SCO Runtime Environment (RTE) testing in ACTS.

Conclusion

The business rules and best practices in this document pertain to the design and development of Army distributed learning products. Instructions for testing and delivery of Army DL courseware can be found in the Army Acceptance Criteria for Distributed Learning Products.

It is imperative that developers of Army DL products follow these business rules and best practices to ensure that courseware is conformant to Army specifications and will successfully deploy on Army learning management systems.

Appendix A: 3D Model Specifications

Introduction

With the use of 3D models becoming more prevalent in education and training environments, the need has arisen for a set of specifications for model creation. A set of accepted standards not only ensures that the Government is supplied with quality, fully functional models, but it also allows for the sharing and re-use of models, thus reducing the amount of redundant work and resources used.

Overview and Description

This appendix establishes specifications for the creation and use of 3D models developed for Army DL products to ensure the highest quality and functionality. The following specifications for topology, texturing, and organization provides assurance that 3D models will function properly for intended use and re-use.

Specification sections include realism, files & format, organization, geometry, materials & textures, and animations & transforms.

3D models MUST have no licensing restrictions that prevent the native source files from being used and distributed in an unlimited fashion and for all Government purposes.

Artifacts may be produced with any software in accordance with the business rules, best practices and the following specifications.

Specifications

ID (3DS-)	Title	Description
		Realism
1.01	Real-World Representation	The 3D model must accurately depict the real-world object it represents in proportion and scale using centimeters, and in texture and material regardless of viewing angle. The model's appearance must be indistinguishable from a photograph of the real-world object when rendered full frame at 2048 x 2048.

1.01e1	Real-World Representation Exception for Models of Exceeding Size Variance	Models of objects that have a real-world scale that require magnification or distance to see, such as amoebas and solar systems, are exempt from the real-world scale requirement.
	Files & Format	
2.01	Source File Format	3D models must be delivered in .fbx file format along with all source files from the native software used to create the models, including all native texture files used for texture creation with the texture maps, such as non-destructive Photoshop files or Substance files.
2.02	License and Copyright Restrictions	3D models must have no licensing restrictions that prevent the native source files from being used and distributed in an unlimited fashion and for all Government purposes.
2.03	Third-Party Tools and Plug-ins	3D models must have no external references nor require third-party tools or plug-ins unless otherwise indicated in this specification or specifically authorized by the Government.
2.04	No Extraneous Objects	The model file must include only the 3D model specified. No extraneous helpers, shapes, splines, or other unexpected objects not specifically needed for model functionality shall be present.
	Organization	
3.01	Model Naming	3D models must have uniquely and appropriately named hierarchy objects. Model name must be descriptive of the file content and not contain file extensions. All words used for the product name except for articles, conjunctions, and prepositions must have an initial capital letter.

3.02	Empty Objects	No empty objects are permitted. 3D models must have no empty objects that have names but nothing else.
3.03	Multiple Objects	Models with multiple objects must include a grouping or hierarchy for moving all objects in the model together. The model must consist of objects logically separated into individual pieces and individual materials.

3.04	Single Layer	The entire model must be contained within a single, non-default layer named the same as the model file.
3.05	Subdividable Topology	Models must be cleanly subdividable for higher detail and still retain the shape of the model.
	Geometry	
4.01	Quadrangles and Triangles	3D models must use quadrangles and triangles only.
4.02	Isolated Vertices	3D models must have no isolated vertices. Each vertex must be attached to a face.
4.03	Coincident or Coplanar Faces	3D models must have no coincident or coplanar faces (no faces or polygons that are redundant or overlapping or denote the same surface).
4.04	Backfacing or Inverted Face Normals	No backfacing or inverted face normals are permitted. All normals must be pointing out toward the correct direction for rendering without errors.
4.05	Coincident Edges	No coincident edges (Unwelded Seams) are permitted. Any two edges on an object that meet or overlap in the same position must be welded.
4.06	Clean Edge Flow	Models must have the best possible edge flow, with sufficient geometry to meet these requirements without superfluous geometry.

4.06e	Clean Edge Flow Exception for Models of Exceeding Size Variance	Objects such as screws, bolts, rivets, wires, and other objects which are small in comparison to the overall model size do not have to follow the Clean Edge Flow rules. This includes objects that represent a thin real-life object as a one-sided object, where the shape of the object is depicted via an opacity map.
4.07	Hidden Seams	3D models must have UV texture seams hidden in less visible areas.

4.08	Archives	Archives must not contain multiple renderer versions; separate download archives should be provided for different renderers, even from the same 3D application. All bitmap textures are archived with each required model file in a flat file structure, or in a single subfolder beneath the main product file, or in a single named ZIP file where model files are each placed into their own named ZIP files.
4.09	Sealed Geometry	3D model geometry must be completely sealed so that there are no openings where backfaces would be visible. This includes geometry visible through transparent objects or materials.
4.10	Poles with More Than 5 Edges	Avoid poles with more than five edges whenever possible.
	Materials & Textures	
5.01	Materials	All objects must have at least one material applied. Multiple materials must be separated with consideration of the different surface types or intended material properties.
5.02	Texture File Names	Materials and Bitmap texture files must be named descriptively. Generic or default names are not acceptable.
5.03	Texture Maps Resolution	Texture maps must be a square resolution at a minimum of 1024 x 1024.
5.04	PBR Texture Maps	3D models must include all PBR texture maps.
5.05	Texture Paths	All texture paths must be relative for submission.
5.06	Texture Files	Texture maps must be named with the same name as the material they are applied to followed by the correct file extension. All texture maps must be saved as BMP, JPG, PNG or TGA, PSD, or TIF format. All texture files must have a correct file extension. There must be no text after the file extension.
5.07	Texture Stretching	3D models must have no obvious texture stretching.

5.08	Unwrapped UVs	All 3D models must include unwrapped UVs.
	Animation & Transforms	
6.01	Rigging for Animation	3D models intended for animation must include all necessary rigging and function as expected.
6.02	Animation Play	Animation must play smoothly. There must be no spikes in an animation graph that would cause obvious glitches, hitches, or unnatural movement.
6.03	Animation Looping	Animation designated as looping must be seamless and loop smoothly.
6.04	Model Transforms	3D models must have frozen/reset transforms unless the model is animated.

Appendix B: Metadata

This section is to assist with implementation details for metadata that describes Army SCORM 2004 3rd Edition DL content. Where Business Rule 1.2.3 lists the required fields for metadata, the discussion here is about how the fields appear in an XML document, and the required values for specific fields.

Each resource (e.g., an organization or SCO) must be accompanied by metadata that describes the resource itself. There are six primary elements in which metadata fields and values exist: `general`, `lifeCycle`, `metaMetadata`, `technical`, `rights`, and `classification`. Figure 1 provides a condensed example of how each element appears in a metadata file. Note that there are multiple `classification` elements, and each element contains multiple fields.

PRIMARY ELEMENTS IN A SCORM 2004 3RD EDITION METADATA FILE

```xml
<?xml version="1.0"?>
<lom xmlns="http://ltsc.ieee.org/xsd/LOM"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://ltsc.ieee.org/xsd/LOM lomStrict.xsd">
 <general>…</general>
<lifeCycle>…</lifeCycle>
<metaMetadata>…</metaMetadata>
<technical>…</technical>
<rights>…</rights>
<classification>…</classification>
<classification>…</classification>
<classification>…</classification>
<classification>…</classification>
<classification>…</classification>
</lom>
```

Figure 1: Code sample for primary elements in a SCORM 2004 3rd Edition metadata file

Table 1 lists all the fields in an Army SCORM 2004 3rd Edition metadata file, the path for each in the XML document, and the required value(s) where applicable. Use the table as a quick reference when creating metadata files for SCORM 2004 3rd Edition content. The subsections following this table provide a detailed discussion of each of the metadata fields.

Table 1

Army SCORM 2004 3rd Edition Metadata Fields

Field	XML Paths	Required Value(s)
Catalog	general.identifier.catalog	ATIA
Entry	general.identifier.entry	TBD
Title	general.title	
Language	general.language	
Description	general.description	
Keywords	general.keyword	
Aggregation Level	general.aggregationLevel	
Version	lifeCycle.version	1.0
Status	lifeCycle.status	final
ADLPA Role	lifeCycle.contribute.role	publisher
ADLPA Name, Address, Email	lifeCycle.contribute.entity	
Date of Submission	lifeCycle.contribute.date	
Metadata Catalog Identifier	metaMetadata.identifier.catalog	TBD
Metadata Entry Identifier	metaMetadata.identifier.entry	TBD
Metadata Specifications	metaMetadata.metadataSchema	LOMv1.0 SCORM_CAM_v1.3 ADLv1.0

Metadata Language	metaMetadata.language	
File Formats	technical.format	
Cost	rights.cost	no
Copyright and Other Restrictions	rights.copyrightAndOtherRestrictions	no
MOS and Skill Level Classification		
Purpose	classification.purpose	discipline
Description	classification.description	
Keyword	classification.keyword	
SQI Classification		
Purpose	classification.purpose	discipline
Description	classification.description	
Keyword	classification.keyword	
ASI Classification		
Purpose	classification.purpose	discipline
Description	classification.description	
Keyword	classification.keyword	
Task Numbers and Descriptions Classification		
Purpose	classification.purpose	educational objective
Description	classification.description	
Keyword	classification.keyword	
Learning Objectives (Action, Condition, Standard) Classification		
Purpose	classification.purpose	educational objective
Description	classification.description	

Keyword	classification.keyword	

508 Compliant Classification		
Purpose	classification.purpose	accessibility restrictions
Description	classification.description	
Keyword	classification.keyword	
Security Level (Foreign disclosure) Classification		
Purpose	classification.purpose	security level
Description	classification.description	
Keyword	classification.keyword	
ADL-R Requirement Classification		
Purpose	classification.purpose	collection
Description	classification.description	
Keyword	classification.keyword	

General Identifier Fields

This section discusses the identifier fields within the `general` element of the metadata document.

Catalog and Entry

The two general identifier fields `catalog` and `entry` are used by the Army for management purposes. Both fields together represent a mechanism for assigning a unique identifier to the item that the metadata file describes. The required value for the `catalog` element is "ATIA" and the required value for the `entry` element is "TBD".
Figure 2 contains sample code showing how the two fields appear.

THE CATALOG AND ENTRY FIELDS IN SCORM 2004 3RD EDITION METADATA

```
<general>
 <identifier>
  <catalog>ATIA</catalog>
<entry>TBD</entry>
 </identifier>
 …
</general>
```

Figure 2: Code sample for catalog and entry fields in SCORM 2004 3rd Edition metadata

General Fields

This section discusses the non-identifier fields within the `general` element of the metadata document.

Title

The `title` field describes the name of the resource that the metadata is for. Note that the string sub-element contains the text value for the `title` field, and that the title value shall match the one in the manifest. Figure 3 contains sample code showing how the `title` field appears.

THE TITLE FIELD IN SCORM 2004 3RD EDITION METADATA

```
<general>
 …
 <title>
 <string>Captains Career Course</string>
 </title>
 …
</general>
```

Figure 3: Code sample for title field in SCORM 2004 3rd Edition metadata

Language

The `language` field describes the language for the content of the resource using two- letter language codes specified in ISO 639-2. Figure 4 contains sample code showing how the `language` field appears.

THE TITLE FIELD IN SCORM 2004 3RD EDITION METADATA

```
<general>
 …
 <language>en</language>
 …
</general>
```

Figure 4: Code sample for language field in SCORM 2004 3rd Edition metadata

The two-letter language codes in ISO 639-2 are referenced on the Library of Congress website. Look under "more" then "Library Standards" and see ISO 639-2 under "Information Resources Retrieval."

Description

The `description` field contains a general description of the resource. Note that the `string` sub-element contains the text value for the `description` field. Figure 5 contains sample code showing how the `description` field appears.

THE DESCRIPTION FIELD IN SCORM 2004 3RD EDITION METADATA

```
<general>
 …
 <description>
 <string>Basic description of the Captains Career Course</string>
 </description>
 …
</general>
```

Figure 5: Code sample for description field in SCORM 2004 3rd Edition metadata

Keyword

The `keyword` field contains a keyword or phrase that describes the resource. There can be multiple keywords for any given resource. Note that the `string` sub-element contains the text value for the `keyword` field. Figure 6 contains sample code showing how the `keyword` field appears.

THE KEYWORD FIELD IN SCORM 2004 3RD EDITION METADATA

```
<general>
…
 <keyword><string>Captain</string></keyword>
 <keyword><string>Leadership skills</string></keyword>

 …
</general>
```

Figure 6: Code sample for keyword field in SCORM 2004 3rd Edition metadata

Aggregation Level

The `aggregation level` field identifies the type of resource the metadata describes in the context of its granularity, such as whether the resource is a SCO or an organization. The aggregation level for Army SCORM 2004 3rd Edition content shall be one of the two following levels:

> "2" indicating a SCO

> "3" indicating an organization

Note the `source` sub-element value is always "LOMv1.0", and the `value` sub-element that contains the numeric value for the aggregation level. Figure 7 contains sample code showing how the `aggregation level` field appears.

THE AGGREGATION LEVEL FIELD IN SCORM 2004 3RD EDITION METADATA

```
<general>
 …
 <aggregationLevel>
 <source>LOMv1.0</source>
 <value>2</value>
 </aggregationLevel>

 …
</general>
```

Figure 7: Code sample for aggregation level field in SCORM 2004 3rd Edition metadata

Lifecycle Fields

This section discusses the fields within the `lifeCycle` element of the metadata document.

Version

The `version` field contains the version or edition of the resource. The `version` field must always be "1.0" for the initial delivery. Note that the `string` sub-element contains the text value for the `version` field. Figure 8 contains sample code showing how the `version` field appears.

THE VERSION FIELD IN SCORM 2004 3RD EDITION METADATA

```
<lifeCycle>
 …
 <version>
 <string>1.0</string>
 </version>
 …
</lifeCycle>
```

Figure 8: Code sample for version field in SCORM 2004 3rd Edition metadata

---

Status

The `status` field contains the submittal status for the resource. Note the `source` sub-element value is always "LOMv1.0", and the `value` sub-element that contains the status value. The status value must always be "final" for delivery. Figure 9 contains sample code showing how the `status` field appears.

THE STATUSLEVEL FIELD IN SCORM 2004 3RD EDITION METADATA

```
<lifeCycle>
 …
 <status>
 <source>LOMv1.0</source>
 <value>final</value>
 </status>
 …
</lifeCycle>
```

Figure 9: Code sample for status field in SCORM 2004 3rd Edition metadata

Lifecycle Contributor Fields

This section discusses the contributor fields within the `lifeCycle` element of the metadata document.

Contributor fields are contained within a `contribute` sub-element.

ADLPA Role

The `role` field describes the role of the ADLPA; the field has a required value of "publisher". Note that the `source` sub-element value is always "LOMv1.0", and the `value` sub-element contains the role value.

Figure 10 contains sample code showing how the `role` field appears.

THE ROLE FIELD IN SCORM 2004 3RD EDITION METADATA

```
<lifeCycle>
 <contribute>
  <role>
   <source>LOMv1.0</source>
   <value>publisher</source>
  </role>
 </contribute>
</lifeCycle>
```

Figure 10: Code sample for role field in SCORM 2004 3rd Edition metadata

ADLPA Name, Address, and Email

The `entity` field contains the name, address, and contact information of the ADLPA in vCard format per RFC 6350. The field value must contain the full name, address, school code, and e-mail of the ADLPA.

Figure 11 contains sample code showing how the `entity` field appears.

THE ENTITY FIELD IN SCORM 2004 3RD EDITION METADATA

```
<lifeCycle>
<contribute>

   …
   <entity> BEGIN:VCARD
VERSION:2.1
N:U.S. Army Infantry SchoolORG:U.S. Army;Army Infantry School;Fort Benning NOTE:071
ADR;DOM;
WORK:Suite 650;6751 Constitution Loop;Fort Benning;GA;31905- 4502;U.S.
EMAIL;INTERNET:soldierinfo@benning.army.mil
END:VCARD
   </entity>
 </contribute>
</lifeCycle>
```

Figure 11: Code sample for entity field in SCORM 2004 3rd Edition metadata

The vCard format is referenced on the Internet Engineering Task Force (IETF) web page for RFC 6350: https://tools.ietf.org/html/rfc6350.

Date of Submittal

The `date` field contains the date of approved submission of the resource in YYYY-MM- DD format. Note the `datetime` sub-element that contains the field value. Figure 12 contains sample code showing how the `date` field appears.

THE DATE FIELD IN SCORM 2004 3RD EDITION METADATA

```
<lifeCycle>
 <contribute>

   …
   <date>
   <datetime>2004-07-10</datetime>
   </date>
 </contribute>
</lifeCycle>
```

Figure 12: Code sample for date field in SCORM 2004 3rd Edition metadata

Meta-Metadata Identifier Fields

This section discusses the identifier fields within the `metaMetadata` element of the metadata document.

Catalog and Entry

The two meta-metadata identifier fields `catalog` and `entry` are used by the Army for content management purposes. Both fields together represent a mechanism for assigning a unique identifier for the item that the metadata file describes. The required value for both elements is "TBD". Figure 13 contains sample code showing how the meta-metadata identifier fields appear.

THE CATALOG AND ENTRY FIELD IN SCORM 2004 3RD EDITION METADATA

```
<metaMetadata>
 <identifier>
   <catalog>TBD</catalog>
  <entry>TBD</entry>
 </identifier>
 …
</metaMetadata>
```

Figure 13: Code sample for the meta-metadata catalog and entry fields in SCORM 2004 3rd Edition metadata

Meta-Metadata Fields

This section discusses the non-identifier fields within the `metaMetadata` element of the metadata document.

Schema

The `metadataSchema` field identifies the name and version of a specification schema to which the metadata document abides. The Army requires three `metadataSchema` elements with the following values:

"LOMv1.0" "SCORM_CAM_v1.3" "ADLv1.0"

Figure 14 contains sample code showing how the `metadataSchema` field appears.

<div>

THE METADATASCHEMA FIELD IN SCORM 2004 3RD EDITION METADATA

```
<metaMetadata>
…
  <metadataSchema>LOMv1.0</metadataSchema>
  <metadataSchema>SCORM_CAM_v1.3</metadataSchema>
  <metadataSchema>ADLv1.0</metadataSchema>
  …
</metaMetadata>
```

</div>

Figure 14: Code sample for metadataSchema field in SCORM 2004 3rd Edition metadata

Language

The meta-metadata `language` field describes the language for the content of the resource using ISO 639-1 two-letter language codes. Figure 15 contains sample code showing how the `language` field appears.

THE LANGUAGE FIELD IN SCORM 2004 3RD EDITION METADATA

```
<metaMetadata>
 …
<language>en</language>
 …
</metaMetadata>
```

Figure 15: Code sample for meta-metadata language field in SCORM 2004 3rd Edition metadata

The two-letter language codes in ISO 639-1 are referenced on the Library of Congress website. Look under "more" then "Library Standards" and see ISO 639-2 under "Information Resources Retrieval Standards."

Technical Fields

This section discusses the fields within the `technical` element of the metadata document.

Format

The `format` field identifies all the technical data types included within the resource the metadata describes using Multipurpose Internet Mail Extensions (MIME) types. Note that one `format` sub element is required for each discrete data type. Figure 16 contains sample code showing how the format field appears.

THE FORMAT FIELD IN SCORM 2004 3RD EDITION METADATA

```
<technical>
…
 <format>text/html</format>

<format>image/jpeg</format>
<format>video/mp4</format>
 …
</technical>
```

Figure 16: Code sample for format field in SCORM 2004 3rd Edition metadata

Rights Fields

This section discusses the fields within the `rights` element of the metadata document.

Cost

The `cost` field indicates whether use of the resource that the metadata describes requires payment. Note the source sub-element value is always "LOMv1.0", and along with the `value` sub-element that contains the role value. The Army requires the value for the field to be "no". Figure 17 contains sample code showing how the `cost` field appears.

THE COST FIELD IN SCORM 2004 3RD EDITION METADATA
| ```
<rights>
    <cost>
  <source>LOMv1.0</source>
  <value>no</source>
 </cost>
 …
</rights>
``` |

Figure 17: Code sample for cost field in SCORM 2004 3rd Edition metadata

Copyright and Other Restrictions

The `copyrightAndOtherRestrictions` field indicates whether copyright or other restrictions apply to the use of the resource that the metadata describes. Note the `source` sub-element value is always "LOMv1.0", and along with the `value` sub-element that contains the role value. The Army requires the value for the field to be "no". Figure 18 contains sample code showing how the `copyrightAndOtherRestrictions` field appears.

THE COPYRIGHTANDOTHERRESTRICTIONS FIELD IN SCORM 2004 3RD EDITION METADATA

```
<rights>
  <copyrightAndOtherRestrictions>
    <source>LOMv1.0</source>
    <value>no</source>
  </copyrightAndOtherRestrictions>
  …
</rights>
```

Figure 18: Code sample for copyrightAndOtherRestrictions field in SCORM 2004 3rd Edition metadata

Classification Types and Fields

This section discusses the fields within the `classification` element of the metadata document. The Army requires a `classification` element for each of the following classifications:

- Military Occupation Specialty (MOS) and Skill Level
- Special Qualification Identifier (SQI; if learning content is classified with SQI)
- Additional Skill Identifier (ASI; if learning content is classified with ASI)
- Tasks
- Learning Objectives
- Revised Section 508 Compliance
- Foreign Disclosure
- ADL Registry (if applicable)

> **IMPORTANT:** Army DL metadata must contain at least five classification elements: MOS and Skill Level, Tasks, Learning Objective, Revised Section 508 Compliance and Foreign Disclosure; the other fields are used only when applicable per direction of the ADLPA.

Purpose, Description, and Keyword

Each classification has the same three fields: `purpose`, `description`, and `keyword`. The values for each field will change depending on the type of classification. Note the `source` sub-element in the `purpose` field, which always has a value of "LOMv1.0", and along with the `value` sub-element that contains the role value. For the `description` and `keyword` fields, note the `string` sub-element that contains the value. Figure 19 contains sample code showing the `purpose`, `description`, and `keyword` fields using the ASI classification as an example.

EXAMPLE ASI CLASSIFICATION IN SCORM 2004 3RD EDITION METADATA

```
<classification>
 <purpose>
 <source>LOMv1.0</source>
 <value>discipline</value>
 </purpose>
 <description>
 <string>Q6 Long Range Surveillance Leader<string>
 </description>
 <keyword>
 <string>Long Range Surveillance Leader</string>
 </keyword>
</classification>
```

Figure 19: Code sample for ASI classification in SCORM 2004 3rd Edition metadata

MOS and Skill Level

The MOS and Skill Level `classification` element requires a `purpose` field value of "discipline" and a textual description and keyword(s) of the MOS for the resource that the metadata describes. Figure 20 contains sample code showing how the MOS and Skill Level `classification` element appears.

<table>
<tr><td align="center">MOS AND SKILL LEVEL CLASSIFICATION IN SCORM 2004 3RD EDITION METADATA</td></tr>
</table>

```
<classification>
 <purpose>
  <source>LOMv1.0</source>
  <value>discipline</value>
 </purpose>
 <description>
  <string>11C2 Indirect Fire Infantryman<string>
 </description>
 <keyword>
  <string>Indirect Fire Infantryman</string>
 </keyword>
</classification>
```

Figure 20: Code sample for MOS and Skill Level classification in SCORM 2004 3rd Edition metadata

SQI

The SQI `classification` element requires a `purpose` field value of "discipline" and a textual descriptions and keyword(s) of the SQI for the resource that the metadata describes. Figure 21 contains sample code showing how the SQI classification element appears.

SQI CLASSIFICATION IN SCORM 2004 3RD EDITION METADATA

```
<classification>
 <purpose>
  <source>LOMv1.0</source>
  <value>discipline</value>
 </purpose>
 <description>
  <string>E Mountaineer<string>
 </description>
 <keyword>
  <string>Mountaineer</string>
 </keyword>
</classification>
```

Figure 21: Code sample for SQI classification in SCORM 2004 3rd Edition metadata

ASI

The ASI `classification` element requires a `purpose` field value of "discipline" and a textual descriptions and keyword(s) of the ASI for the resource that the metadata describes. Figure 22 contains sample code showing how the ASI classification element appears.

ASI CLASSIFICATION IN SCORM 2004 3RD EDITION METADATA

```
<classification>
 <purpose>
  <source>LOMv1.0</source>
  <value>discipline</value>
 </purpose>
 <description>
  <string>Q6 Long Range Surveillance Leader<string>
 </description>
 <keyword>
  <string>Long Range Surveillance Leader</string>
 </keyword>
</classification>
```

Figure 22: Code sample for ASI classification in SCORM 2004 3rd Edition metadata

Tasks

The Tasks `classification` element requires a `purpose` field value of "educational objective" and a textual descriptions and keyword(s) of the critical tasks for the resource that the metadata describes. Figure 23 contains sample code showing how the Tasks classification element appears.

TASKS CLASSIFICATION IN SCORM 2004 3RD EDITION METADATA

```
<classification>
 <purpose>
  <source>LOMv1.0</source>
  <value>educational objective</value>
 </purpose>
 <description>
  <string> 071-312-3003 Lay An M60 Machine Gun Using Field Expedients; 071-312-
3007 Prepare A Range Card For An M60 Machine gun; 071-312-3025 Main An M60 Machine
Gun<string>
 </description>
 <keyword>
  <string>Range Card</string>
 </keyword>
</classification>
```

Figure 23: Code sample for Tasks classification in SCORM 2004 3rd Edition metadata

Learning Objectives

The Learning Objectives `classification` element requires a `purpose` field value of "educational objective" and a textual descriptions and keyword(s) of the Action, Condition, and Standard for the resource that the metadata describes. Figure 24 contains sample code showing how the Learning Objectives classification element appears.

LEARNING OBJECTIVES CLASSIFICATION IN SCORM 2004 3RD EDITION METADATA

```
<classification>
 <purpose>
  <source>LOMv1.0</source>
  <value>educational objective</value>
 </purpose>
 <description>
  <string>Action: Lay An M60 Machine gun Using Field Expedients; Condition: Given
Interactive Multimedia Instruction; Standard: The Standards are met when the
learner has completed the IMI lesson and achieved a passing score on a separately
administered test.<string>
 </description>
 <keyword>
  <string>M60 Machine Gun using Field Expedients</string>
 </keyword>
</classification>
```

Figure 24: Code sample for Learning Objectives classification in SCORM 2004 3rd Edition metadata

---

Revised Section 508 Compliance

The Revised Section 508 Compliance `classification` element requires a `purpose` field value of "accessibility restrictions". The `description` field requires a value of either "508 Compliant" or "Not 508 Compliant". The keyword field requires a value of either "508" or "Not 508". Figure 25 contains sample code showing how the Revised Section 508 Compliance classification element appears.

REVISED SECTION 508 COMPLIANCE CLASSIFICATION IN SCORM 2004 3RD EDITION METADATA

```
<classification>
 <purpose>
  <source>LOMv1.0</source>
  <value>accessibility restrictions</value>
 </purpose>
 <description>
  <string>508 Compliant</string>
 </description>
 <keyword>
```

```
    <string>508</string>
  </keyword>
</classification>
```

Figure 25: Code sample for Revised Section 508 Compliance classification in SCORM 2004 3rd Edition metadata

Foreign Disclosure

The Foreign Disclosure `classification` element requires a `purpose` field value of "security level". The `description` and `keyword` fields each require a value of the Foreign Disclosure statement in three-character format (e.g., FD1). Figure 26 contains sample code showing how the Foreign Disclosure classification element appears.

FOREIGN DISCLOSURE CLASSIFICATION IN SCORM 2004 3RD EDITION METADATA

```
<classification>
 <purpose>
  <source>LOMv1.0</source>
  <value>security level</value>
 </purpose>
 <description>
  <string>FD1</string>
 </description>
 <keyword>
  <string>FD1</string>
 </keyword>
</classification>
```

Figure 26: Code sample for Foreign Disclosure classification in SCORM 2004 3rd Edition metadata

ADL Registry

The ADL Registry `classification` element requires a `purpose` field value of "collection" and a textual description and keyword(s) for the taxonomy of the content the metadata describes. Figure 27 contains sample code showing how the ADL Registry classification element appears.

ADL REGISTRY CLASSIFICATION IN SCORM 2004 3RD EDITION METADATA

```
<classification>
 <purpose>
  <source>LOMv1.0</source>
  <value>collection</value>
 </purpose>
 <description>
  <string>ADL/DOD Content Taxonomy Category</string>
 </description>
 <keyword>
  <string>DOD</string>
 </keyword>
</classification>
```

Figure 27: Code sample for ADL Registry classification in SCORM 2004 3rd Edition metadata