USMC TECOM College of Distance Education and Training

MarineNet Courseware Development Technical Standards

Version 2.0

July 18, 2012

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COLLEGE OF DISTANCE EDUCATION AND TRAINING
TRAINING AND EDUCATION COMMAND
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From: Technical Director, College of Distance Education and Training
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Subj: MARINENET COURSEWARE DEVELOPMENT TECHNICAL STANDARDS V2.O

1. *MarineNet Courseware Development Technical Standards* (CDTS) provides technical specifications to produce and deliver electronic training and education products for delivery via the MarineNet Learning Management System (LMS) on the Marine Corps Enterprise Network (MCEN).
2. This CDTS version supersedes Version 1.3 dated 7 Jul 2009 and all previous versions.
3. This document applies to all USMC and other organizations seeking to deliver training and education via MarineNet.
4. Major changes to Version 2.0 include:
    a. Revised and expanded MarineNet integration test and activation process
    b. Revised multimedia file format and size supportability
    c. Revised assessment tool guidance
    d. Added sections related to Course Completion Certificate and MarineNet Library
5. These standards are managed and enforced by the CDET Electronic Courseware Section, cdet_courseware@usmc.mil.

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ABSTRACT

This document defines the technical standards required for content being developed for delivery on the Marine Corps Distance Learning Network (MarineNet). The USMC Training and Education Command's (TECOM) College of Distance Education and Training (CDET) is committed to promoting reusability, durability, accessibility, interoperability, maintainability, and portability of distance learning content. The standards in this document primarily address content interoperability issues.

The technical standards outlined in this document represent a combination of specifications for the various systems and technologies implemented by the current version of MarineNet (MarineNet 4.8). Requirements identified in this document reference the target deployment environments. Courseware vendors developing courseware for hosting on MarineNet shall consult their Statements of Work (SOW) to determine the target deployment environments. Courseware SOWs supersede requirements defined in this document.

Department of Defense Instruction (DoDI) 1322.26 mandates that electronic courseware shall be developed in compliance with the latest possible version of the Sharable Content Object Reference Model (SCORM®). Therefore, this document assumes that the reader has a thorough understanding of the applicable SCORM guidelines.

The standards in this document are effective at the time it was written and may be updated to accommodate changes needed to allow courseware to effectively run on MarineNet. Courseware developers should verify the accuracy and timeliness of this information prior to developing any courseware. Updates to this document will be made periodically to modify and clarify the standards provided in this document when necessary. The latest version of this document is available from your Government Program Manager or from the USMC CDET web site at the following URL:
http://www.tecom.usmc.mil/cdet/courseware.asp

Version History

The following table provides a version history for this document. As the document continues to be updated, this table will reflect the changes made to this document.

Version	Changes	Date
1.0	Provides standards for MarineNet courseware and test development	24 January 2008
1.1	Added guidance in Section 6.3.1	30 January 2008
1.2	Modified guidance, including guidance to resolve the premature course completion issue, non-streaming file size parameters, bandwidth limitations, and other technical issues	13 November 2008
1.3	Updated streaming and non-streaming file size parameters, and Microsoft® Windows® Media Player guidance	7 July 2009
2.0	Overall revision. Major changes include revision of multimedia file format and size requirements; removal of Windows Media streaming requirements; and addition of new sections regarding MarineNet Product Integration Testing, MarineNet Library and Library Objects, and MarineNet Completion Certificates.	18 July 2012

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1 INTRODUCTION

1.1 USMC E-Learning

The Marine Corps Distance Learning Network (hereafter referred to as MarineNet) is a complex system that utilizes and incorporates the following components:

- Centralized Learning Management System (LMS) services developed to requirements generated by the College of Distance Education and Training (CDET) and based on a Microsoft® .NET™ Web services architecture.
- The Rustici SCORM Engine, providing Sharable Content Object Reference Model (SCORM®) 2004 3rd Edition courseware launching, delivery, and tracking.
- Integrated test and survey functionality provided by Question*mark*™ Perception™ Server v5.2 Service Pack 1.
- Remotely located commercial content distribution and delivery services.
- Marine Corps Enterprise Network (MCEN) infrastructure.
- MCEN software baseline requirements.
- Interactive instructional content and static Web-based information resources.

  Learning Resource Centers (LRCs) fielded to the bases/stations to provide operational units and civilian Marines networked computer access to training and education distance learning products.

Many technical and instructional issues must be considered when developing content for delivery on MarineNet. The evolution of the SCORM® standards coupled with the rigid architecture provided by the MCEN amplifies the critical need for specific standards for content development, packaging, distribution, hosting, and progress tracking. Regulation and maintenance of the MCEN is outside CDET's purview, and our Distance Learning Network Operations Center (DLNOC) is not always privy to technical changes that could and frequently do affect MarineNet's ability to deliver and track distance learning products. These standards are intended to minimize potential impacts.

Developers are assumed to have a thorough understanding of the underlying SCORM® development standards as well as general Web technologies and accessibility issues governed by the Department of Defense (DoD) and the United States Marine Corps (USMC). This document is not intended to replace guidance provided by other specification bodies. It is intended to clarify which specific requirements are relevant to MarineNet and must be strictly followed. These

Standards also identify any additional requirements imposed by the MarineNet architecture.

1.2 MarineNet Distributed Architecture

MarineNet content is delivered via a distributed architecture that includes multiple servers called content delivery engines (CDE). CDEs are located centrally at the Distance Learning Network Operations Center (Internet CDE) or behind the firewalls on major USMC installations (Intranet CDEs). See Figure 1 for a high-level diagram of the MarineNet Distributed Architecture and consult the following subsections for more detailed information.

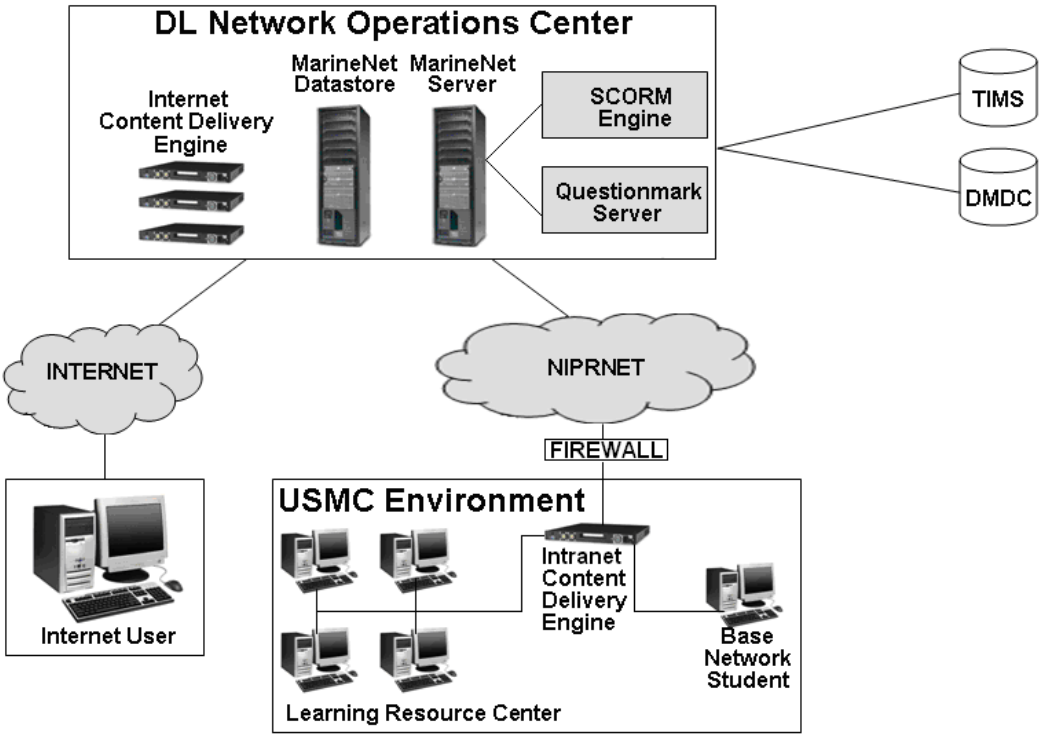


Figure 1 - MarineNet Architecture

The CDEs operate Microsoft® Internet Information Server™ (IIS) and allow for the use of Active Server Pages™ (ASP). Courseware may rely on the virtual and physical storage space provided by the CDEs to store server-side variables and run server-side code to communicate with the LMS Web server in a session-based environment; however, the extent of use is restricted. Note that the session-based environment is not "session-based" on the LMS Web server since the session only exists for the duration of the single transmission.

1.2.1 MarineNet Garrison Environment

MarineNet's Garrison Environment includes all users on military installations who are accessing content from a MCEN workstation (i.e.,

behind the USMC/NMCI firewall). These firewalls typically block content containing the JavaScript, Java, ActiveX, object includes, and/or streaming media typically employed to develop highly interactive multimedia courseware. Content Delivery Engines (CDEs) are hosted on major Marine Corps installations to enable efficient delivery of interactive courseware.

The Content Delivery Network allows users to launch content from a CDE closer to their location, thereby reducing latency, reducing the impact of the firewalls, and enabling users more ready access to the interactive instruction. In order to achieve these efficiencies, content must be packaged and successfully distributed by the MarineNet content management system to each MCEN hosted CDE.

To provide the most optimal learning engagement, DLNOC performs robust evaluation and integration activities to ensure content is able to be integrated with LMS interfaces, content distribution, content hosting, client compatibility and network security controls.

1.2.2 MarineNet Internet Environment

Any content delivery request from a computer outside the NMCI is directed to the MarineNet Internet CDE at the DLNOC. Content is delivered to the Internet user from the Internet CDE located at DLNOC via the SCORM® Engine. Courseware tracking information is sent back to DLNOC via the SCORM® Engine as well.

Firewalls may or may not exist between a given Internet user and the MarineNet Internet CDE. Any such firewalls are outside the control of the MarineNet system; thus their consideration is beyond the scope of USMC-contracted courseware development.

1.3 SCORM® Application Programming Interface (API)

The SCORM® Engine is part of the MarineNet LMS and will be responsible for declaring the SCORM® API. It transmits SCORM® calls from the appropriate standards-based content to the MarineNet LMS. The SCORM® Engine is made up of two main components: Central and Remote.

The Central component is located with the main MarineNet LMS instance and has a database that stores all data on the courses served up through the SCORM® Engine.

The Remote component is a multi-frame window that is responsible for relaying all SCORM® transactions to the Central component (which rolls up the progress data to the centralized MarineNet LMS) and launching

and interfacing with the SCORM® courseware. The Remote component is launched from the distributed courseware servers; therefore both the SCORM® API and the SCORM® courseware are operating within the same security environment.

The Remote component and the SCORM® API are both launched and configured by the MarineNet LMS; therefore, all SCOs launched by MarineNet will not deviate from the SCORM® specification.

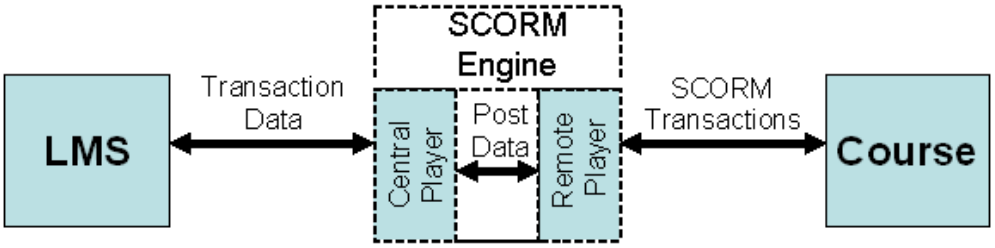


Figure 2 - SCORM® Engine

The Department of Defense Instruction (DoDI) 1322.26 mandates that all new electronic courseware shall be developed in compliance with the latest version of the Sharable Content Object Reference Model (SCORM®) congruent with the platform for which the courseware is being developed. As the Marine Corps currently uses SCORM® 2004 3rd Edition, all new courseware developed for MarineNet must meet this standard. If courseware is being developed for use by multiple Government agencies and the lowest-common-denominator LMS conforms to an earlier SCORM version, the Government sponsor must request a MarineNet CDTS waiver.

1.4 Relationship between Courseware and the MarineNet Course Catalog

The MarineNet LMS manages the enrollment, tracking, and completion reporting of all courses hosted on MarineNet. As part of this function, the LMS operates a course catalog that provides a description of each course and records the interaction protocol between the MarineNet LMS and the courseware. The catalog also allows the courseware sponsors to identify any prerequisites, restrictions, completion requirements, and accreditation information associated with the course.

2 MARINENET SPECIFICATIONS

The MarineNet environment includes a wide range of target audience workstations. As of this CDTS version, workstations on Marine Corps installations are typically managed by the Navy Marine Corps Intranet (NMCI) and operate with strict hardware and software configurations. Most MarineNet users access the system via NMCI.

All courseware designed for delivery on MarineNet must adhere to the applicable software baseline (NMCI Core Build Contents) available under Development Resources at
http://www.tecom.usmc.mil/cdet/courseware.asp

Using the incorrect baseline can have significant negative impacts when the course is tested for integration with MarineNet and ultimately in delivery to the MarineNet user. For all new development, the developer is responsible for developing to the baseline/load as identified at the time of project start, contract, or delivery order award. If circumstances preclude conformance to the software baseline, the Government sponsor must request a waiver from CDET.

This section establishes a baseline development platform for all courseware intended to run on MarineNet. Courseware that fails to comply with the requirements of the baseline development platform may generate one or more technical incident reports (TIRs) when the product is tested for integration with MarineNet and may not run as intended on NMCI systems.

Users accessing MarineNet via personal computers and the Internet increasingly operate varying configurations. Although the established baseline will not cover all possible configurations, the intent is to simplify development in order to reduce development costs and decrease the time to market for new courses. Developers are encouraged to maximize cross-platform compatibility to the extent it can be done without compromising the baseline.

2.1 Software

Courseware content must run as intended on all systems conformant to the MarineNet software baseline requirements. The baseline requirements can be found under Development Resources at:
http://www.tecom.usmc.mil/cdet/courseware.asp

No courseware shall require a user to accept or install ActiveX code and/or proprietary “players” for multimedia or courseware. NMCI places many restrictions on a managed user’s computer. Users whose computers are managed by NMCI do not have the necessary

permissions to accept or install software or plug-ins that require Microsoft® Windows registry changes.

2.2 Browsers

Courseware must be optimized for delivery via the Microsoft Internet Explorer (IE) version(s) currently specified by the MCEN software baseline. Depending on system upgrades, this may include multiple versions. To the maximum extent possible, development should account for differences among IE browser versions to maximize compatibility with all IE versions.

MarineNet has not demonstrated full compatibility with browsers other than IE (e.g., Chrome, Firefox, Safari, etc.) Additionally, courseware testing for integration with MarineNet will be conducted only for the IE version(s) specified in the current MCEN software baseline.

Note that additional browser requirements may be identified and tested by the Government sponsor.

2.3 Plug-ins

NMCI workstation users do not have the administrator privileges required to install additional plug-ins. Therefore, plug-ins must be limited to those described in the current NMCI Core Build Contents.

In addition, internet users may not have NMCI Core Build-approved plug-ins preloaded on their systems; therefore, all courseware should provide, at a minimum, the following features:

- A list of required plug-ins for the course.
- A page that allows users to test the functionality of all required plug-ins and install any missing plug-ins.

2.4 Java™ Development

Content objects developed using the Java™ Run-time Environment (JRE), should be compatible with as many different versions of the Sun® JRE as possible.

2.5 Server Variables in MarineNet Distributed Environment

The use of server variables in a distributed environment presents several potential problems. This section outlines some of the problems and restrictions for using server variables in the MarineNet distributed environment.

2.5.1 Courseware Web Server Variables and Data Storage

Server-side variables shall only be used to store data that is essential to identifying the user's session and progress within the course.

The use of ASP in courseware must have prior Government approval. If used, it must be limited to the basic interface with the LMS. ASP is NOT to be used to enable graphic manipulation or unnecessary session variables.

Use of the following languages, scripts, or protocols is prohibited under any circumstances:

- ColdFusion® Mark-Up (CFM)
- Common gateway interface (CGI)
- Java™ Server pages (JSP)
- AICC application program interface (API) protocol

2.5.2 Server-Side and Client-Side Web Cookies

Courseware cannot use server-side or client-side Web cookies. NMCI prevents applications from storing cookies on a user's computer.

2.6 Network Connectivity

Develop all courseware for high-bandwidth connections unless otherwise directed by the Government PM.

MarineNet uses high-bandwidth local area networks (LANs) typically providing 400 Kbps to 2 Mbps connectivity between the local content servers and the user workstations (refer to Figure 1, Section 1.2 for an overview of the MarineNet architecture). For the purposes of this guide, a standard 1 Megabytes per second (Mbps) cable modem or DSL connection with an average 512 Kilobytes per second (Kbps) throughput is considered a high bandwidth connection.

For MarineNet intranet delivery (i.e., delivery within the MarineNet content delivery environment), assume that an average connection speed of 512 Kbps will be available to support MarineNet courseware delivery.

3 MULTIMEDIA REQUIREMENTS

This section describes absolute requirements for using multimedia files in MarineNet content.

The following requirements apply to all multimedia file types:

- *All* multimedia content must be optimized for Web delivery, to include application of the following guidelines:
  - Apply anti-alias to all graphic text.
  - Use 72 dpi for static images unless the content is designed specifically for printing.
  - Choose an image file format such as Graphic Interchange Format (GIF), Joint Photographic Experts Group (JPG), or Portable Network Graphic (PNG), that best suits the content displayed while also maximizing quality and minimizing file size.
- Multimedia and interactive element file sizes may not exceed 200 MB without a waiver from the CDET Technical Director or Electronic Courseware Section Head. Within the published limit, file sizes should be kept to the minimum size possible without significantly compromising instructional integrity and flow. Historically, network security actions outside MarineNet's control have proven more likely to complicate the delivery of large files.
- Multimedia file names cannot use spaces or special characters. Underscores (_); however, are permitted

3.1 Audio and Video Formats

This section describes specific requirements for using audio and video files in MarineNet content.

3.1.1 Supported Audio and Video Formats

- The following audio and video formats have been tested and perform reliably on MarineNet and the MCEN:
- Windows® Media Audio (WMA)
- Windows® Media Video (WMV)
- Moving Picture Experts Group Layer-3 Audio (MP3)
- Flash® Video (FLV) (or derivatives thereof)

If other file types are used in audio and video content development and do not perform as expected during sponsor review in the MarineNet Stage environment, the courseware will be deemed unsupportable and will not be submitted for official MarineNet integration testing.

3.1.2 Streaming media requirements

MarineNet does not natively support streaming of media and currently does not stream any content.

3.1.3 Embedded Media Files

Correct object controls shall be used to reference and manipulate Windows Media Player (WMP) objects. For information on the WMP Object Model reference the Microsoft® Developer Network (MSDN)

Embedded media files should use the OBJECT tag for the Windows® Media Player ActiveX™ control within the course's code. The OBJECT tag will ensure the object plays the multimedia file directly in the Web browser without opening its associated media player. Embedding the media player also allows developers to more easily manipulate it using Web scripts and control both the player's functionality and appearance.

A CLASSID is an element of the OBJECT tag used to reference a specific version of the WMP. Courseware developers must use the correct CLASSID for the target WMP since there are different CLASSIDs for the WMP versions. The CLASSID for WMP versions 7.0 and newer is listed in Table 1 below:

Table 1 - Syntax for CLASSID OBJECT Tag

WMP Version	Sample OBJECT Tag creation with corresponding CLASSID

7.0 and newer	<!—HTML File -->
	<html>
	<head>
	  <script src=”external_script.js”
	language=”Jscript></script>
	</head>
	
	<body>
	
	  This test will be replaced by the control
	
	  <script language=”JScript”>
	  CreateControl(“EXAMPLE_DIV_ID”,
	  “clsid:6BF52A52-394A-B153-
	00C04F79FAA6”,
	  “MediaPlayer”, “240”, “180”,
	  “application/x-oleobject”,
	  “media/mediafilename.asx”, “true”)
	  </script>
	</body>
	</html>
	
	// external_script.js
	
	Function CreateControl(DivID, CLSID, ObjectID, WIDTH,
	  HEIGHT, TYPE, URL, AUTOSTART)
	{
	  Var d = document.getElementById(DivID);
	  d.innerHTML =
	  ‘<object classid=’ + CLSID + ‘ id =’ + ObjectID +
	  ‘ width=” + WIDTH + ‘height=’ + HEIGHT + ‘TYPE=’
	+ TYPE +’>
	  <param name=”URL” value=’ + URL + ‘>
	  <param name=”autoStart” value=’ + AUTOSTART +
	‘/>;
	}

When embedding multimedia, PARAM tags should be used within the OBJECT tag to reference the .ASX file. The .ASX file will then reference the media file using the format defined on the previous page. A sample PARAM tag is shown above in the OBJECT Tag. PARAM tags can also be used to control the functionality and appearance of the multimedia when it is embedded (e.g., displaying the player controls like stop and start buttons, auto-playing the multimedia clip).

3.3.4 Active Content in Internet Explorer

All USMC courseware must be developed to accommodate the way earlier versions of Microsoft® Internet Explorer™ interpret Active Content (e.g., handling of ActiveX™ Controls) to include allowing active content to run automatically and ensuring it is always available to the user. The user must not have to click on the embedded active content in order to activate it.

Both Microsoft® and Adobe® have programming references on how to

properly address this Active Content issue. Reference the links below for more information on how to develop content that is not impacted by the active content changes. The guidance provided below will meet the criteria for Active Content in MarineNet; however, there are several strategies capable of meeting the new Active Content criteria, and this document does not take a position on which solution to use.

Changes to the Default Handling of ActiveX Controls (by MSDN)
http://msdn2.microsoft.com/en-us/library/ms537508.aspx (Reference the section on Loading Interactive Controls Externally)

Adobe® Active Content Developer Center
http://www.adobe.com/devnet/activecontent/

4 ACCEPTABLE RESPONSE TIMES

This section outlines the reasonable and acceptable response times for accessing courseware content delivered on MarineNet. These are baseline standards that must be complied with unless otherwise waived by CDET.

4.1 Multimedia Response Times

Table 2 below lists the average and maximum response times for downloading and displaying/playing multimedia contained within courseware. Average response times are based on existing courseware explicitly developed for MarineNet. Maximum response times represent the upper-limit that a user shall wait to view the media.

The maximum response time for static Flash® and Shockwave® media is the time it takes from initial activation to the time the media is downloaded and displayed to the user.

The maximum response time for streaming media is the time it takes for the media to start playing.

Courseware developers may not exceed the maximum multimedia response times without approval from the Government.

Table 2- Response Times for Multimedia

Type of Media	Average Response Time (seconds)	Maximum Response Time (seconds)
Static Media	~ 2	10
Flash® & Shockwave® Media	~ 3	10

4.2 Overall Page Response Times

While multimedia governs the response times for users accessing content, the MarineNet program requires that all content perform within acceptable standards. Under normal conditions, any page within the courseware shall display in entirety (multimedia and text) within ten (10) seconds. Furthermore, the navigational option(s) allowing the user to progress to the next screen shall be active and effective within five (5) seconds without delay for the entire page to load.

Courseware developers may not exceed these response times without approval from the CDET Electronic Courseware Section Head.

5 CONTENT DEVELOPMENT AND PACKAGING

This section specifies the absolute requirements for content development and packaging.

All courseware must include required SCORM 2004 files in the content package.

5.1 Courseware Development Tools

MarineNet-deliverable content can been developed effectively using a variety of programming tools and aids; however, any content development tool used for developing MarineNet courseware must comply with the following requirements:

- Must not require the use of non-NMCI-approved plug-ins or players.
- Must not generate underlying code that impairs or impedes course performance, delivery, or functionality in any MarineNet environment.
- Must not develop content objects that can only be revised or updated with the specific, non-industry-standard software used for development.
- Must not generate output in a file size that exceeds the maximum listed in Section 3.

Many rapid development tools and PowerPoint conversion tools used for courseware development will package an entire course as a single electronic file, which can easily and inadvertently exceed allowable file sizes and/or cause unacceptable courseware response times. In some cases, such courseware has completely failed to load. Developers using these tools should consider subdividing content into smaller modules or courses to ensure that the final product functions properly during MarineNet delivery.

5.2 File and Directory Naming Conventions

Courseware packaged for delivery on MarineNet shall adhere to the following file and directory naming conventions:

- Courseware file and directory names shall be no longer than thirty-two (32) characters; plus the appropriate file type extensions.

- Courseware file and directory names may not include special characters that can interfere with the distribution of content to the distributed MarineNet Content Servers. These restrictions include, but are not limited to, the following:

    - No spaces within file or directory names. Underscores (_) are permitted.
    - No capital characters shall be allowed (lowercase only)
    - No URL-encoded values using the % value. Ex. %20, %09, %0A

5.3 Code Reuse and Open Source

No courseware packaged for delivery on MarineNet may directly rely, in run-time, on another course or any other external source other than that contained within the course's subdirectory.

The reuse of code and use of open source programming is encouraged, where appropriate when developing courseware. However, the reuse of code and use of open source code from another development may not impact the Government ownership of any or all source and compiled code delivered to the Government. Furthermore, the Government does not permit the use or reuse of code that includes restrictions, conditions, or other limitations on ownership, warranty, free distribution or licensing unless such limitations and conditions are explicitly defined and accepted in the Delivery Order or contract for the developed courseware. In such instances, if the conditions or terms of the courseware licensing and/or distribution cited in the delivery order or contract are violated, or expire, the product will immediately be removed from MarineNet.

5.4 Screen Display Resolution

All MarineNet courseware should be developed for proper display at the standard video screen resolution of 1024x768.

5.5 Course Size

The recommended range for the total size of a course, to include associated references as applicable, hosted on MarineNet is 500-750MB. Courseware may exceed the recommended range, but should only do so when absolutely necessary.

MarineNet is capable of configuring multiple courses as a "curriculum." This configuration will require the user to complete all curriculum sub-elements to generate a single completion certificate. Developers should consider configuring course content in excess of 750MB into multiple

smaller courses for presentation in a curriculum.

5.6 Embedded Resources

Many MarineNet courses offer additional resources to supplement the training/education or support subsequent job performance. Most of these documents are configured as PDF files that may be opened or saved to the learner's desktop. Examples of such resources include but are not limited to:

- USMC manual and publication excerpts
- Diagrams
- Charts
- Maps
- Study Aids

Resource files accessible from within the courseware should be limited to 1 MB or less to ensure courseware is within the size limit requirements identified in the Course Size section of this document (Section 5.5).

To further limit course size, resource files accessible within the courseware by multiple SCOs should not be included with each SCO. Instead, these resource files shall be included in the content package only, to be called from within individual SCOs as needed. The only exception to this rule will be if the decision is made to list individual SCOs in the ADL Registry (as opposed to the typical content package entry).

Resources downloadable from MarineNet that are not accessible from within developed courseware, such as study guides, Flash-based learner interaction files, standalone video or audio files, etc. must not exceed the 200 MB limit (see Section 11 for more information about the MarineNet Library).

6 INTERACTIONS WITH THE MARINENET LMS

This section uses the term "MarineNet LMS" to refer to the USMC's current LMS. The use of the generic "LMS" term is used to refer to "any SCORM® conformant LMS."

6.1 Interfacing with the SCORM MarineNet LMS

The MarineNet LMS provides courseware with all of the required and optional SCORM® 1.2 and 2004 functions.

6.2 Courseware Launch Window Sizing

In order to maximize available screen space for content and instruction, the MarineNet LMS opens a new window to display all courseware.

When a course is launched from MarineNet, the MarineNet courseware window will open. The courseware window contains a MarineNet-generated menu frame, a course-level navigation frame, and a course content area frameset (see figure 3).

- MarineNet-generated menu frame- Displays active course-level menu on the left side of the screen. The initial configuration of this menu is a closed state. The learner can display the Course Menu at will; however, active course content launched within the content area while the Course Menu is open may not display properly (see figure 5).
- Course-level navigation frame - Allows learner to return to MarineNet and is continually displayed at the top of the courseware screen.
- Course content area frameset –Displays active course content configured to launch in this area. The size of the course content frame is static; therefore any course developed to display in this frameset should not exceed 1010 pixels by 630 pixels in size.

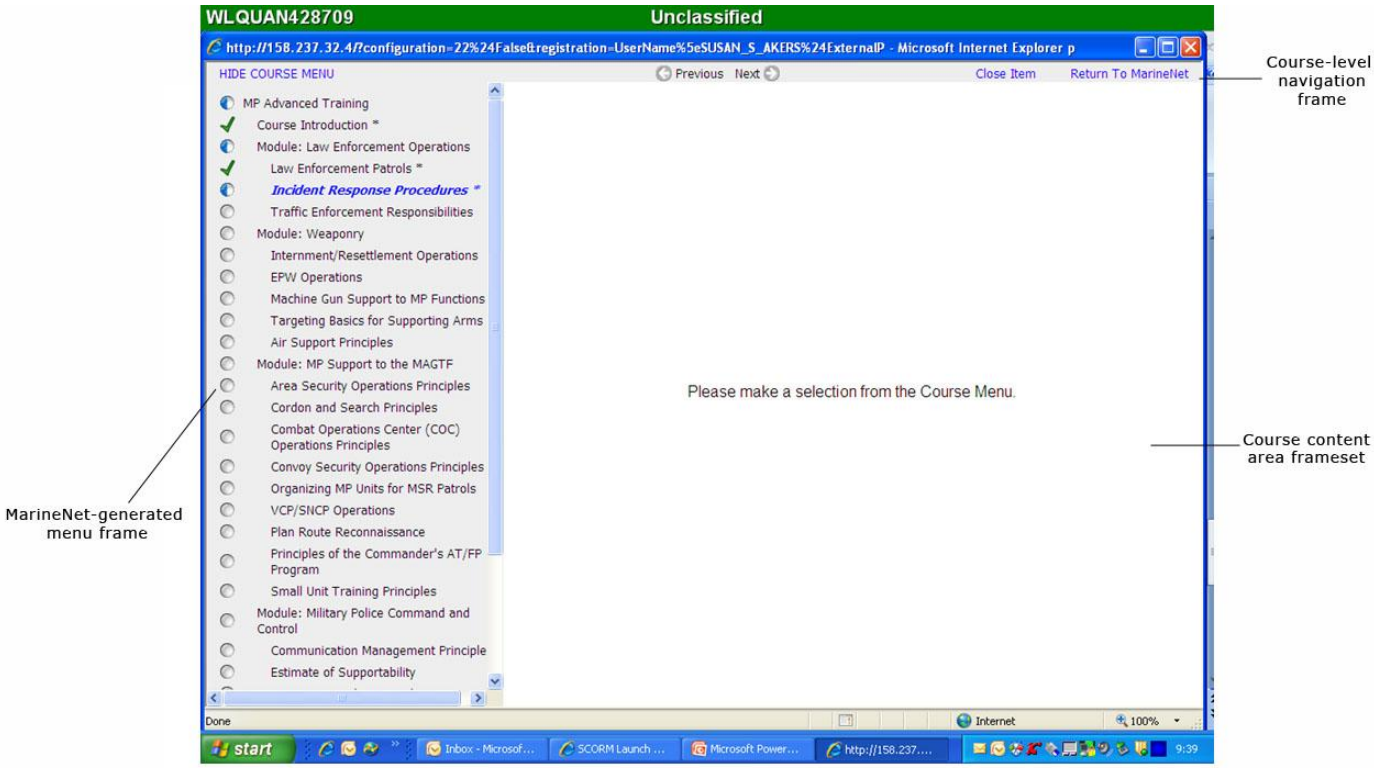


Figure 3 - MarineNet Courseware Window

MarineNet can display content via two methods; within a separate window that opens on top of the MarineNet courseware window, which is the default, or within the MarineNet courseware content area frameset. Regardless of the method used, for any multi-SCO course the MarineNet courseware window will remain open and accessible to the learner.

6.2.1 Content Launched in a Separate Window

MarineNet will launch courseware in a separate window to avoid conflict between the courseware and the SCORM Engine that may prevent successful communication (see figure 4).

Courseware intended to launch in a separate window can be developed to 1010 pixels wide by 655 pixels high (including all GUI elements).

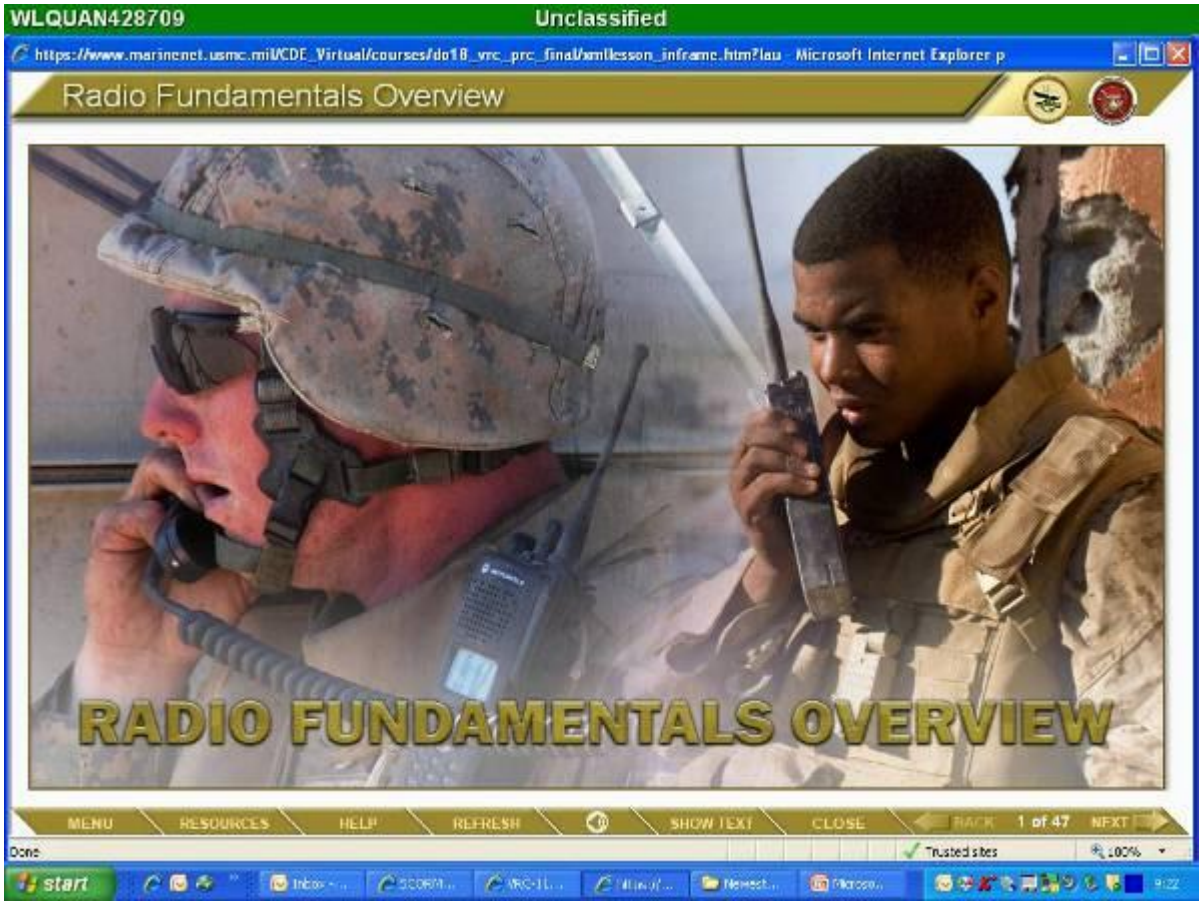


Figure 4 - Courseware launched in separate window

6.2.2 Content Launched Within the Content Area Frameset

Courseware must be specifically configured to use the content area frameset. Courses launched within the content area frameset require only one open browser window and may be easier for the user to manage (see figure 5 and figure 6). Developers who program for frameset use should specify that configuration when submitting the courseware for MarineNet integration testing.

Courseware intended to launch in the content area frameset must be developed to 1010 pixels wide by 630 pixels high (including all GUI elements).

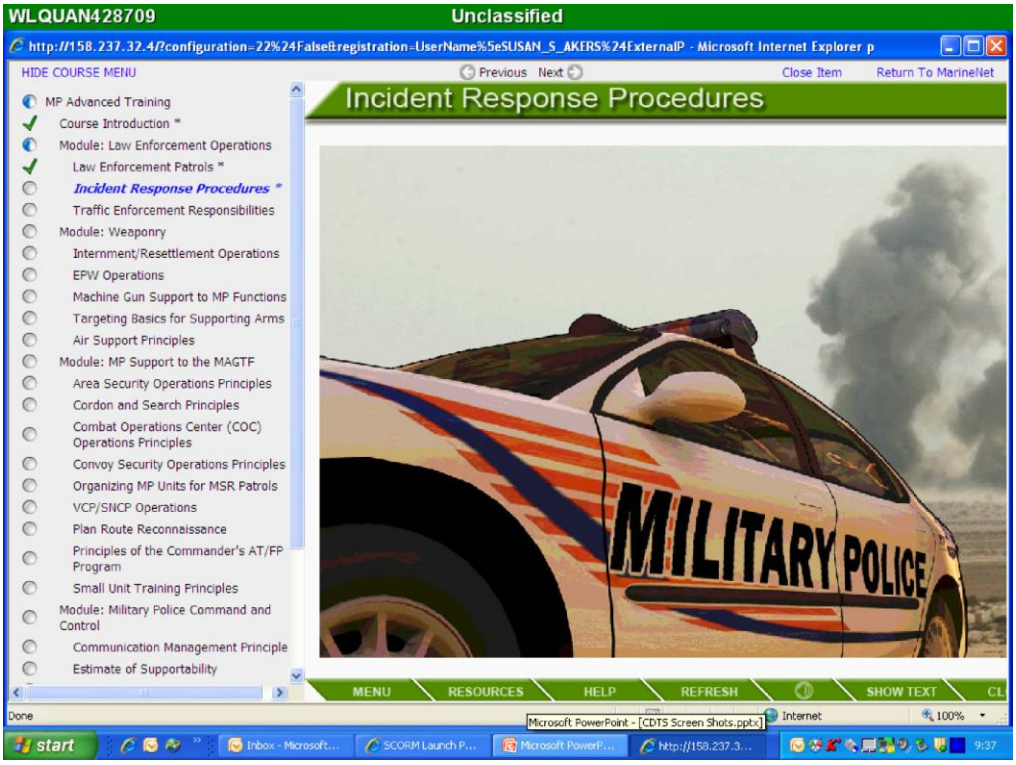


Figure 5 - Courseware launched in content area frameset with Course Menu open

Figure 6 - Courseware launched in content area frameset with Course Menu closed

Courses with content developed to launch in the content area frameset must also take care when using document.top, document.all, parent.XXX and other similar relative object addressing within a SCO since they may also reference variables outside the scope of the content frame.

Additionally, if the window.close() function is called from within the frameset, the SCORM engine will inadvertently close and the user will be logged out of the course. A possible solution to this problem is for developers to have learners navigate to a static html page that simply instructs the learner to choose another selection from the course menu. This page should automatically appear after the Terminate API function has been called. This can be accomplished by adding "window.location = "YOURHTMLPAGE"", right after the terminate function, wherein YOURHTMLPAGE is the full path name where the static html page is located.

6.3 SCORM® 2004 Development Standards

All mandatory and optional SCORM® 2004 data model elements are supported in MarineNet. The SCORM® Engine is capable of serving up both single and multi-SCO SCORM® 2004 courseware.

All courseware developed using SCORM® 2004 standards must be tested to ensure, at a minimum, it successfully initiates and terminates when delivered with MarineNet.

For general instructions on how to develop SCORM® 2004 courseware, refer to the documentation located at http://www.adlnet.gov. More information on the creation of SCORM® 2004 metadata files for MarineNet can be found in Appendix A.

7 COURSE COMPLETION

All MarineNet-delivered courses MUST be configured to successfully communicate a status of "completed" to the LMS and must clearly convey completion requirements to the learner. MarineNet learners expect to see a status of "completed" on their individual transcripts after finishing a course.

The value "completed" shall be used to indicate that the user has finished reviewing all of the information within a SCO or objective and met any additional completion requirements specified by the courseware sponsor. All such completion requirements must be specifically identified and documented by the courseware sponsor prior to integration testing.

Note that if the course has an associated final evaluation developed in Question*mark*™ Perception™, the student will be unable to access the associated evaluation until the course is shown as "completed" in the transcript entry.

If an in-line evaluation is required for the learner to complete the course, the courseware must communicate both pass/fail and completion statuses to the MarineNet LMS. For additional information about in-line evaluations and assessments reference the Evaluation and Assessment section of this document (Section 8).

7.1 Completion Issues

Individual SCOs or the imsmanifest.xml file must be configured to send completion status to the LMS in order to avoid premature completion.

7.2 Roll-up Rules

If a user exits the course before the course is completed, the desired visual effect is an "in progress" status symbol (half-filled circle) displayed to the left of the course title within the LMS-generated Course Menu. In order to achieve this visual indicator, the following roll-up rules must be included as part of the imsmanifest.xml file. These rules are not generated automatically. Including them will ensure that an undesired red "X" does not appear next to the course title in the Course Menu indicating that the learner has not mastered the content and thus the learner's transcript will not display the proper information if the course is exited prior to completion.

```
<imsss:sequencing>
  <imsss:rollupRul
```

```
          es>
    <imsss:rollupRule childActivitySet="all">
      <imsss:rollupConditions>
          <imsss:rollupCondition condition="completed" />
     </imsss:rollupConditions>
       <imsss:rollupAction action="satisfied" />
   </imsss:rollupRu
           e>
 <imsss:rollupRule childActivitySet="all">
 <imsss:rollupConditions>
       <imsss:rollupCondition condition="completed" />
     </imsss:rollupConditions>
       <imsss:rollupAction action="completed" />
   </imsss:rollupRule>
<imsss:rollupRule childActivitySet="any">
   <imsss:rollupConditions>
         <imsss:rollupCondition condition="attempted" />
       </imsss:rollupConditions>
        <imsss:rollupAction action="incomplete" />
      </imsss:rollupRule>
   </imsss:rollupRules>
  </imsss:sequencing>
```

8 ASSESSMENT AND EVALUATION INSTRUMENTS

MarineNet supports a variety of assessment and evaluation instruments, including but not limited to the following:

- Pre-assessment
- Quiz or practical application assessment
- Practice exam or practical evaluation preparation
- In-line End-of-Course (EOC) exam or practical evaluation
- Question*mark*™ EOC exam
- Question*mark*™ survey

8.1 Pre-Assessments, Quizzes, Practical Application Assessments, and Practice Exams

Integrate pre-assessments, quizzes, practical applications, and practice exams within the courseware. Per individual course requirements, results of these components may or may not be reported to the MarineNet LMS for completion tracking purposes. MarineNet transcripts can display only a final grade for any given course.

8.2 In-Line EOC Exams or Practical Applications

An in-line EOC assessment refers to a summative exam or practical application delivered to the learner within the course. An in-line EOC assessment should be developed as a single SCO or as multiple sequenced SCOs within the course content package. Learners should not be required to launch a separate SCO from the course menu for each EOC assessment item.

To maintain assessment security, developers must configure in-line evaluation items in a manner that prevents learners from accessing source code for the answers.

An in-line EOC assessment must communicate a score and a pass/fail status to the MarineNet LMS. If the SCO contains an in-line EOC assessment to determine the student's mastery of the SCO (i.e. requires a minimum score for passing), then the SCO shall change the *cmi.success_status* to record the user's progress.

- If the student has not mastered the SCO, the SCO shall store a value of "failed."
- If the student has mastered the SCO, the SCO shall store a value of "passed."

If the SCO contains an in-line EOC assessment, but that assessment is not required to determine the student's mastery of the SCO (i.e. a

passing score is not required for completion), then the SCO shall change the cmi.success_status to "passed."

If the user's transcript of completed courses must display a score as well as pass/fail status, the SCO shall also pass the student's score on the in-line exam (or EOC practical application, as applicable) to the MarineNet LMS.
Note: The cmi.success_status needs to be set when the SCO loads, or when the SCO is exited in order for the status to be passed to the LMS successfully.

8.3 Question*mark*™ EOC Exams and Surveys

MarineNet currently uses Question*mark*™ Perception™ (QMP) Server version 5.2 with Service Pack 1 (update is planned) to deliver all EOC exams and surveys not incorporated within the courseware. QMP authoring software should be used to create all such EOC evaluations.

The following overarching requirements and constraints apply:

- By Government sponsor request to CDET Operations, Courseware development contractors may be allowed use of Question*mark*™ Live under the USMC license. Use and duration will be constrained to the specific USMC project.
- Contractors are responsible for their own QMP training. CDET can be used as a resource to provide limited documentation for MarineNet-specific procedures only.
- Only one external exam and one survey can be associated with each course in the MarineNet LMS.
- All MarineNet exams and surveys must be delivered using one of several customized MarineNet QMP templates. Upon receipt of the assessment, the files will be imported into the appropriate MarineNet QMP template.
- Each exam or survey must be exported and provided as a Qpack, a Question*mark*™ proprietary format that contains all of the questions within that exam or survey.
- Due to specific MarineNet implementation for improved assessment security, developers may not make use of the "introductory text" option in an assessment. If an introduction is needed, developers must create a separate question block to present that information.
- The use of special fields to store question answers or outcomes is limited in the MarineNet instance of Question*mark*™. Six of the ten special fields (S1-S6) are reserved for communication from the MarineNet LMS. Special fields S7-S10 are open for developer use.If multimedia files are included in questions or response

choices, developers must identify and include in the exported Qpack file all related source files.

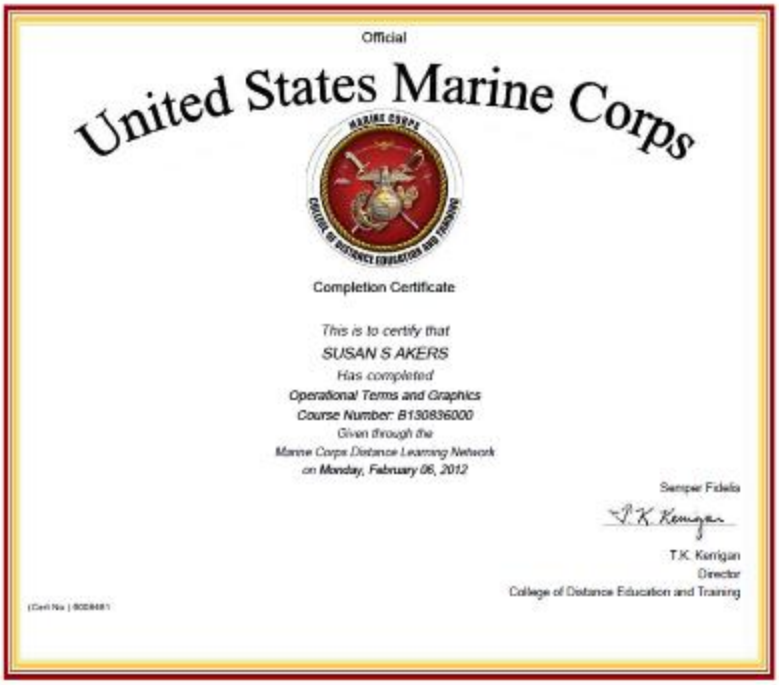
The following QMP question types are prohibited from use in any courseware developed for MarineNet:

- Essay
- Spoken Response
- File Upload

The use of Text Match, while technically supported, is discouraged due to the difficulty in anticipating and programming for common misspellings, etc.

9 MARINENET COMPLETION CERTIFICATES

For all tracked items, MarineNet can provide the student with an official certificate upon successful completion of any course or curriculum. The certificate is viewed and printed from the student's transcript of completed courses. MarineNet automatically populates certificates with the student name as displayed on the transcript and a unique identification code, offering greatly enhanced student authentication as compared to a typical completion certificate embedded within the e-learning product.


Official

United States Marine Corps

Completion Certificate

This is to certify that
SUSAN S AKERS
Has completed
Operational Terms and Graphics
Course Number: B130836000
Given through the
Marine Corps Distance Learning Network
on Monday, February 06, 2012

Semper Fidelis

T.K. Kerrigan
Director
College of Distance Education and Training

Figure 7 - MarineNet course completion certificate

If a completion certificate is required, developers are encouraged to refer students back to MarineNet rather than providing a certificate within the course. Display the following screen verbiage upon course completion: Return to your MarineNet transcript of completed courses to view and print the [insert course or curriculum name] completion certificate.

If an inline course certificate is necessary due to alternate distribution methods (e.g., via CD or DVD), developers should take all possible measures to enhance certificate security.

10 MARINENET PRODUCT INTEGRATION TESTING

All MarineNet courseware progresses through a multi-phase integration testing and activation process to determine MarineNet supportability. CDET ECS collaborates closely with the USMC sponsor to ensure that MarineNet delivery is possible and in the best interests of the Marine learner. To this end, the ECS Head or Deputy makes supportability go/no-go decisions at several key junctures in the test and activation process.

MarineNet integration testing focuses on successful:

- Communication with the LMS, including completion status
- Delivery via the NMCI environment
- Compliance with CDTS and USMC software/hardware requirements

MarineNet integration testing does not evaluate:

- Screen-by-screen functionality
- Content accuracy, editorial correctness, or instructional effectiveness
- ADA Section 508 compliance

See the following CDTS appendices for more detailed information:

- Appendix B: MarineNet Testing and Activation Process
- Appendix C: MarineNet Stage Review Checklist
- Appendix D: MarineNet Integration Test Checklist

10.1 Test Process Overview

Unless courseware is fully designed and developed by CDET ECS, the USMC sponsor must initiate a request for MarineNet integration testing. After signature on a MarineNet Support Agreement, the sponsor or designee must submit the courseware package—including content package, ADL SCORM CTS log demonstrating SCORM compliance, course flow chart, and answer keys to all required assessment items and instruments—via CD/DVD or ftp by arrangement--for load to the MarineNet Stage server test environment.

The sponsor subsequently conducts screen-by-screen review and completes the instruction via NMCI workstation. The sponsor must then submit a completed Stage Review Checklist for ECS review and confirmation of a transcript completion.

Upon agreement that the courseware is ready for integration testing, ECS submits a formal test request. Time for test completion varies according to the number of content packages in the queue at time of

request. Upon test conclusion, ECS provides the sponsor with a Test Summary Report, an updated estimate of supportability, and next steps. With the exception of CDET-developed courseware, CDET is not responsible for correcting courseware issues identified during testing or after activation on MarineNet.

External courseware developers cannot officially represent a sponsor in these matters, nor will they be allowed direct contact with the USMC Distance Learning Network Operations Center unless test results reveal functionality issues the developer cannot replicate.

11 MARINENET LIBRARY AND LIBRARY OBJECTS

The MarineNet Library is essentially a repository of content objects (referred to as library objects): electronic-format, non-tracked instructional and/or performance support materials. Most library objects directly support a tracked MarineNet course or curriculum; however, other instructional materials that support home station training will be considered. Exceptions require approval by CDET Technical Director or Operations Officer. MarineNet library objects may or may not require formal product integration testing, but hosting does require a Government sponsor-signed MarineNet Support Agreement.

Typical library objects include but are not limited to reference materials, job aids, supplementary practice activities, and interim lesson plans for temporary instructor/trainer use during courseware development or maintenance. Library objects that are readily available to users via other USMC content repositories (e.g., doctrinal publications, technical manuals, etc.) will be hosted only if the user must directly consult the library object in order to complete required course activities and assessments.

Library objects may not exceed 200 MB without a waiver from the CDET Technical Director or Operations Officer. If a proposed library object requires a multimedia file type or size other than those described in Section 3, contact CDET Operations for specific information and approval.

A group of related Library objects may be zipped into a single downloadable package as long as it does not exceed maximum file size. Alternatively, individual related objects may be configured as a selectable list, allowing the user to select one or more for download. Library object distribution can be assigned as “Unlimited” (all MarineNet account holders) or “FOUO” (limited to users with Active or Reserve Service Status).

Users access the Library catalog via persistent links in the MarineNet banner and footer areas. The Library catalog is subdivided into configurable categories, which currently include both material types (Reference Publications/Documents, Job Aids, Multimedia, etc.) and content areas (Officer PME, Language, Optics, etc.).

The MarineNet Library catalog is also searchable via standard MarineNet Search functionality or via an independent Library search. MarineNet searches the Name, Short Description, and Keywords library object metadata fields; search does not include file contents.

Library Content object metadata is entered into MarineNet during

catalog entry creation and must be entered directly by the content owner or provided to CDET via text file. Metadata requirements include the following:

Table 3 - Metadata Requirements for Library Content Objects

Metadata Field	**Data Input**	**Max Characters & Spaces**	**Prohibited Characters**	**Metadata Use(s)**
Name	Text entry	128	& < >	Search
Short Description	Text entry	256	& < >	Search; presented to user in Search results
Long Description	Text Entry	2048	& < >	Search; presented to user on Library download page
Category	One or more selections from available MarineNet Library categories	N/A	N/A	Displayed on catalog tabs

In addition, if enabled, users can access library objects via the More > View References menu link on their “My Active Courses” page.

12 OFF-THE-SHELF (OTS) COURSEWARE

Third-party off-the-shelf electronic training and education being considered for MarineNet delivery must, at a minimum, successfully initiate, terminate, and communicate a status of "completed" to the LMS. It is strongly recommended that USMC agencies considering the purchase or licensing of off-the-shelf courseware products intended for delivery with MarineNet request a provisional copy of the course and submit it for MarineNet integration testing prior to committing funding.

13 WEB ACCESSIBILITY GUIDELINES

Section 508 of the Rehabilitation Act of 1996 requires all Federal agency electronic and information technology to be accessible to people with disabilities, including employees and members of the public. A summary of Section 508 Standards is provided in Appendix C. The degree of compliance may vary based on content type per Section 508, Subpart A, 1194.3 (a).

Developers shall consult their Government sponsor for specific compliance requirements. Government sponsors are responsible for verification that requirements have been met. MarineNet integration testing does not include specific evaluation for Section 508 compliance.

14 ADL-REGISTRY

The Advanced Distributed Learning Registry (ADL-R), created under DoD Instruction 1322.26, is a first step in providing central access to DoD learning and performance content. More information can be gained by visiting the ADL-R website at http://adlregistry.adlnet.gov/.

APPENDIX A. COURSEWARE DEVELOPMENT BEST PRACTICES

1. Acceptable Software Programming Tools and Aids

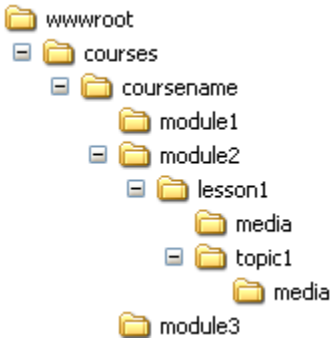
The use of any content development tool used to develop CDET courseware should not constrain the designer's selection of effective instructional strategies and interactive elements or decrease usability for the learner (e.g., use an accepted convention for a completely new purpose).

2. Directory Structures for Content Packages

Some basic principles dealing with directory structure include:

- The course shall be maintained in a single directory.
- Directory hierarchy should be limited to five (5) levels below the course, with a minimum of three (3) levels. This hierarchy shall utilize a traditional Lesson-Topic-Subtopic type structure for ease of navigation.
- Multi-Sharable Content Object (SCO) courses shall have a sub-directory for each SCO.
- All media should be contained within a 'media' subdirectory (or group of subdirectories inside a parent 'media' subdirectory) directly below the directory hosting the Web page that references the media. Streaming media and non-streaming media shall be collocated in the appropriate media directory.
- Media directories can exist at any branch where content is assigned and media files are required.

Example



File and directory naming schemas must ensure facilitation of lifecycle maintenance by clearly associating each file with its location within the courseware.

3. Course Completion Issues

It has been noted during courseware testing that some courses have

SCOs marked with a completion status of completed and a success status of passed either before they are completed, or sometimes without having viewed the content. These behaviors are in accordance with SCORM standards. By default, if a SCO is accessed by the user and no completion or success status is sent to the LMS, then the SCO will be automatically completed/passed.

A solution to this issue is to have the developer program the course in such a way as to update the completion and success statuses. Due to the numerous methods available, it is impossible to capture every instance of how a developer could set the completed/passed statuses on the LMS; however, the two methods of avoiding the premature completion issues detailed below have been tested on the MarineNet Server.

- Method 1: Set the completion status to "incomplete" immediately upon entering a SCO for the first time, and communicate this status to the LMS.
- Method 2: Configure each SCO in the imsmanifest.xml file to require a completion and success status from the course, per the details below.

Any SCOs that are meant to complete based on a user's action (e.g., viewing all content, passing quizzes) must turn off this feature. This is done by setting properties of the <imsss:deliveryControls> in the imsmanifest.xml file for each SCO as seen in the following example. (*Please note that the references to "LESSON1", "RESOURCE LESSON1" and "Lesson 1 – Interface" included in the example are placeholders and should be updated to reflect the proper course construct.)*

```
        <item identifier="LESSON1"
identifierref="RESOURCE_LESSON1">
                <title>Lesson 1 – Interface</title>
                <imsss:sequencing>
                        <imsss:deliveryControls
completionSetByContent="true" objectiveSetByContent="true" />
                </imsss:sequencing>
        </item>
```

Each SCO should contain the above code in the content organization section of the imsmanifest.xml file, within the SCO's <item> tag. CompletionSetByContent="true" specifies that the SCO will only update the completion status with statuses sent by the SCO's content. ObjectiveSetByContent="true" specifies that the SCO will only update the success status with statuses sent by the SCO's content. Below are correct and incorrect examples of the imsmanifest.xml file, with the

appropriate areas highlighted for emphasis. Both examples are based on the <organizations> section from the imsmanifest.xml file of the Combating Trafficking in Persons course, a course currently available on MarineNet.

CORRECT IMSMANIFEST.XML – The deliveryControls are defined within each <item>.

```
 <organizations default="ORG-4976">
<organization identifier="ORG-4976" structure="hierarchical">
   <title>Combating Trafficking in Persons Leadership
Training</title>
<item identifier="ITEM-B9FC" identifierref="RES-814D">
<title>Module 1: Review from General Awareness</title>
<imsss:sequencing>
<imsss:deliveryControls completionSetByContent=”true”
 objectiveSetByContent=”true” />
</imsss:sequencing>
</item>
<item identifier="ITEM-0A7F" identifierref="RES-FFAD">
<title>Module 2: Operating Procedures</title>
<imsss:sequencing>
<imsss:deliveryControls completionSetByContent=”true”
 objectiveSetByContent=”true” />
</imsss:sequencing>
</item>
     <item identifier="ITEM-4AB5" identifierref="RES-F6F7"
isvisible="true">
<title>Module 3: Stories from the Field</title>
<imsss:sequencing>
<imsss:deliveryControls completionSetByContent=”true”
 objectiveSetByContent=”true” />
</imsss:sequencing>
</item>
<item identifier="ITEM-DF79" identifierref="RES-3D86">
<title>Certificate of Completion</title>
<imsss:sequencing>
<imsss:deliveryControls completionSetByContent=”true”
 objectiveSetByContent=”true” />
</imsss:sequencing>
</item>
</organization>
</organizations>
```

INCORRECT IMSMANIFEST.XML – The deliveryControls is defined in the wrong place.

```
<organizations default="ORG-4976">
  <organization identifier="ORG-4976" structure="hierarchical">
```

```
<title>Combating Trafficking in Persons Leadership
 Training</title>
<item identifier="ITEM-B9FC" identifierref="RES-814D">
<title>Module 1: Review from General Awareness</title>
</item>
<item identifier="ITEM-0A7F" identifierref="RES-FFAD">
<title>Module 2: Operating Procedures</title>
</item>
<item identifier="ITEM-4AB5" identifierref="RES-F6F7"
isvisible="true">
<title>Module 3: Stories from the Field</title>
</item>
<item identifier="ITEM-DF79" identifierref="RES-3D86">
<title>Certificate of Completion</title>
</item>
<imsss:sequencing>
<imsss:deliveryControls completionSetByContent="true"
objectiveSetByContent=”true” />
</imsss:sequencing>
</organization>
</organizations>
```

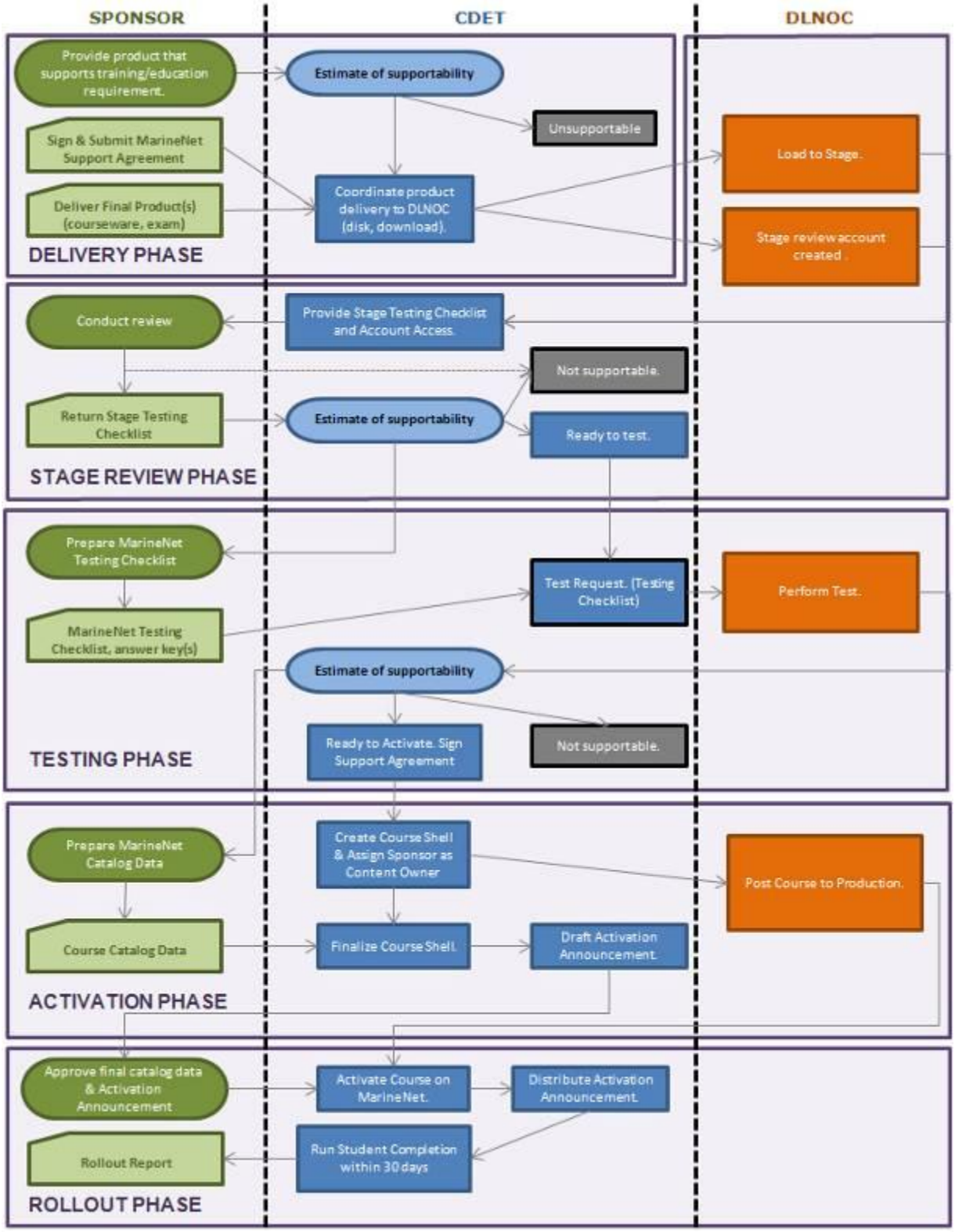
Either of the cited methods or another method must be utilized in order to avoid the premature completion problem.

4. Book-Mark Functionality

If a content package’s predicted average learning “seat time” exceeds 30 minutes, the courseware should be programmed to book-mark the user’s exit location from a standard content screen. Upon return to the course, the user should either be automatically returned to the exit location or offered the option to return to the exit screen or restart the instructional segment.

If the user will lose progress by exiting from a given screen (e.g., a practical application, assessment instrument, or other interactive element), the course should clearly caution the user that they will have to re-start the activity or assessment and be returned to the first screen of that segment upon re-launch.

APPENDIX B. MARINENET COURSEWARE TESTING AND ACTIVATION PROCESS



APPENDIX C. MARINENET STAGE REVIEW CHECKLIST

Stage Course Code:	**Course Name:**
Reviewer Stage Account Name:	**NMCI Computer Name:**
Reviewer Telephone:	**Reviewer E-mail:**
Sponsoring Agency:	**Date Review Completed:**

As the USMC sponsor for this distance learning product, your thorough, screen-by-screen product review is crucial to MarineNet delivery of effective training and education. In order to ensure full functionality in the most restrictive online environment, you must access MarineNet Stage via a standard USMC workstation on the NMCI network, preferably with monitor display resolution set to 1024x768.

CDET will use your completed and signed checklist to determine readiness for formal MarineNet Integration Testing. MNET Integration Test procedures focus on successful product-system delivery and communication but do not assess screen-by-screen functionality.

Directions:

1) Complete the reviewer and sponsoring agency information at the top of this page.
2) Locate and record the NMCI Computer Name for the workstation from which you will conduct Stage Review. You can find the computer name on the "Unclassified" banner or with the My Computer icon on your desktop.
3) Please familiarize yourself with checklist criteria, then proceed through the instructional content and the test (if applicable) in the role of a student who:
    a. needs to master the instructed knowledge and skills in order to perform his/her job, and
    b. is required to pass the course.
4) Using the username and password provided, log in to https://www.marinenet.usmc.mil/stage/MarineNet/ .
5) Enter the provided course code in the Search box.

6) Enroll, launch the course, and proceed with your review.
7) Place X in the Yes or No column to answer the question. If your response is No, please explain the problem. If the problem is confined to particular screens, please note the module/lesson/topic title and screen identifier (typically a "page number") for each instance of the problem.
8) Record the completion date for your review.

Review Criterion	Yes	No	If No, explain:
Launch Behavior			
Launch the course for the first time. Does the course open to the expected screen?			
Exit the course prior to completion. Does your MarineNet *My Active Enrollments* page display "Enrolled" in the *Status* column?			
Bookmarking (if applicable)			
Re-launch the course. Does the course re-open at your "book mark" (the last screen you viewed or as otherwise required)?			
Menus			
As you proceed through the course, pay attention to the MarineNet Course Menu. You should see empty circles fill and/or change to green checks as you complete course requirements. a) Does each hyperlink take you to the indicated location? b) Does the Course Menu correctly record and display your progress through the course?			
If applicable, open the course's internal menu and try each hyperlink. Does each hyperlinked item bring up the appropriate course segment? If intended to do so, does the internal menu indicate visited segments and/or progress through course segments?			

Screen Load Time			
As you move through the course, pay attention to the time required to load content to each new screen. Does every screen load content in less than 10 seconds?			
Navigation			
Move forward and backward among screens. Does the course provide a consistent way to move through the content? Does the navigation function correctly?			
Keep aware of where you are in the course. Does the course consistently and accurately display your position with the course (via screen counter, progress bar, etc.)?			
Other User Interface Elements (as applicable):			
From various screens within each course segment, try all available user interface elements (e.g., Resources, Glossary, etc.) . Do all elements function correctly at several points within the course? Can you successfully print any printable files?			
As you move through the course, pay attention to the availability of help and the quality of directions to the learner. Is such learner support sufficient to allow the learner to successfully complete the course without additional explanation or outside assistance?			
Select every hyperlink (text or image links) within the course content. Do all hyperlinks take you to the intended location or open the expected file?			
Pay attention to and note any unusual messages generated by the browser. For example, can you get through the entire course without a request for you to “accept cookies”?			

Multimedia Elements			
Exercise all multi-media functions throughout the courseware. Do all visual and audio elements display and play correctly? a) If no controls are provided for media elements, do the media play automatically without requiring user intervention? b) If specific learner action is prompted (either on the screen or as a course-wide convention), does the media respond as expected? c) If controls are provided, do all media controls work properly and consistently? d) Do all media elements play without generating error messages?			
If applicable, check the text display (e.g., Show Text or audio transcript) for audio files at several points in the course. Does the text accurately match the audio being played?			
Interactive Items			
Try every interactive item (e.g., knowledge checks, practice exercises, practical applications, learning games, etc.). Pay attention to learner actions and courseware responses. a) Does each interactive item function as expected? b) Does the course provide you with adequate feedback in response to your choices/actions to facilitate learning (especially from your mistakes)?			
Course Completion (complete only the <u>one applicable section</u>)			
No End-of-Course (EOC) Assessment			
After course completion, return to the MarineNet *My Completed Courses* transcript. Does your transcript show *Status* as "Completed"?			

Inline EOC Assessment: Test/ Exam or Practical Application			
After completing all instructional segments, attempt to access the EOC assessment. Can you open the assessment segment?			
First, deliberately fail the assessment. a) Do the questions function correctly? b) Does the assessment provide a final score and the expected feedback? c) If multiple attempts are allowed, does your MarineNet enrollments page still display "Enrolled"? d) If only one attempt is allowed, does the course restrict you from re-entering the assessment? If not, what behavior do you see?			
Next, return to the course and pass the assessment. a) Do the questions function correctly? b) Does the assessment provide a final score and the expected feedback? c) Does your MarineNet transcript now show the course *Status* as "Passed"?			
End-of-Course Exam (Question*mark*™)			
After course completion, return to the MarineNet transcript. Is the EOC exam icon visible on your enrollments page? Does the icon correctly launch the QMP exam?			
First, launch and deliberately fail the QMP exam. a) Does the exam provide the expected number of test questions? b) Does question presentation (all on one page or one at a time) match your expectation? c) Do the questions function correctly? d) Does the exam provide a final score and the expected feedback? e) Does your MarineNet transcript reflect how many attempts			

remaining?			
Next, launch and pass the QMP exam. a) Does the exam provide a final score and the expected feedback? b) Does your MarineNet transcript now display a status of "Passed"?			

APPENDIX D. MARINENET INTEGRATION TEST CHECKLIST

MarineNet Integration Test Checklist	
TEST LOG ID:	[For MNET ITEST admin use only]
TEST DATES:	[For MNET ITEST admin use only]
CDET POC:	[For MNET ITEST admin use only]
TESTERS:	[For MNET ITEST admin use only]
SUPPORT REQUEST #	[For MNET ITEST admin use only]
BASELINE:	[For MNET ITEST admin use only]
TEST SUPPORT INFORMATION (THIS SECTION TO BE COMPLETED BY EA POC OR DEVELOPER)	
USMC SPONSOR:	[USMC agency sponsoring the course.]
SPONSOR POC--CONTACT INFO:	[Government point of contact in sponsor agency—provide name, telephone number, and e-mail address.]
DEVELOPER:	
DEVELOPER POC:	[Point of contact for technical questions about the courseware—provide name, telephone number, and e-mail address.]
COURSE TITLE:	[Course name as it appears in the courseware.]
COURSE CODE:	[Developer-created temporary code for testing; must be alphanumeric, 6 characters.]
INTEGRATION TEST TYPE:	[Courseware, End-of-Course exam, EOC survey]
SCORM VERSION*:	[If waiver has been granted for use of anything other than SCORM 2004, Third Edition, please provide the exact version and edition number.]
SINGLE-SCO OR MULTI-SCO CONFIGURATION*:	[Indicate single-SCO or multi-SCO in this cell and include a detailed course flow chart with the courseware.]
BOOK MARK STRATEGY:	[Applies to all course types—If applicable, describe intended book mark behavior. Is the book mark saved across sessions? At what level does it mark (e.g., the exact screen from which the learner exits; the first screen of the current topic)? Does the book mark strategy differ for assessments and evaluations?]
SEQUENCING/NAVIGATION STRATEGY*:	[Applies to SCORM 2004 courses only—if sequenced, must clearly depict sequencing on course flow chart.]
COURSE "COMPLETION" REQUIREMENTS*: **(PROVIDE ANSWER KEY FOR ANY REQ'D INTERACTIONS)**	[Tell us exactly what a learner must do to enable communication of "complete" status to the LMS. What screens must be touched? What interactions must be completed and to what extent (e.g., if required to answer a question, must the learner repeat until s/he submits a correct response?), etc.]

SEPARATE TEST/EXAM/SCORED PRACTICAL APPLICATION INCLUDED FOR TESTING*: **(PROVIDE ANSWER KEY)**	[Yes or N/A—if yes, must be delivered as an in-line SCO (or multiple sequenced SCOs) or a Question*mark*™ Perception™ Q-Pack with list of required QMP settings—specify type and must also provide an answer key and pass fail criteria for both types. Also specify whether or not a passing or failing score should display on the MarineNet transcript.]
QPACK SURVEY INCLUDED FOR TESTING:	[Yes or N/A—if yes, must be delivered as a Question*mark*™ Perception™ Q-Pack with list of required QMP settings.]
OPTIMAL DISPLAY RESOLUTION*:	
CONTENT AREA DIMENSIONS **(INCLUDING GUI)*:**	[Specify height and width of the course screen in pixels—include any GUI elements like banners and navigation bars.]
MNET TECHNICAL STANDARDS WAIVERS*:	[List any CDET-approved waivers, if granted.]
SPECIAL INSTRUCTIONS:	[List any special instructions for testing.]
DELIVERY METHOD TO TEST FACILITY:	[If shipped, include tracking number.]
ADDITIONAL COMMENTS:	

* **SEE *MARINENET COURSEWARE DEVELOPMENT TECHNICAL STANDARDS* FOR SPECIFIC REQUIREMENTS.**

---------- AREA BELOW FOR MNET I-TESTER USE ONLY----------

TEST CRITERIA	
DIRECTIONS: Place a Y, N, or N/A in the comments column of the checklist in response to each corresponding system testing guideline. Add comments where appropriate.	**COMMENTS**
1. PRE-INSTALLATION INSPECTION:	
1.1. COURSE DOCUMENTATION INSPECTION:	
Note: If documentation is incomplete, do not initiate testing without ECD Section Head authorization.	
1.1.1. *MarineNet Support Agreement:* Is the MarineNet Support agreement signed by sponsor? (should have been provided in Load to Stage request)	
1.1.2. *Stage Review Checklist:* Is the Stage Review Checklist complete and signed?	
1.1.3. *SCORM Conformance Test Suite Log:* Does the SCORM CTS log indicate SCORM conformance?	
1.1.4. *Course Flow Chart:* If the course is multi-SCO, was a complete course flow chart provided?	
1.1.5. *Test Checklist-Test Support Information:* Check the MarineNet Integration Test Checklist. Is all Test Support Information provided?	
1.1.6. *Test Checklist-Completion Requirements and Answer Keys:* In the test checklist, did the developer describe all requirements to achieve "complete" status? If required for completion, were correct responses for all activities/assessments/evaluations provided?	
2. INSTALLATION TESTS:	
2.1. LMS MODE:	
2.1.1. *SCORM Import Manifest:* Does the courseware include the SCORM manifest file "imsmanifest.xml"?	
2.1.2. *Import the Course:* If the "imsmanifest.xml" file is provided, import the course into the SCORM Engine. Did the course import without errors?	

TEST CRITERIA	
DIRECTIONS: Place a Y, N, or N/A in the comments column of the checklist in response to each corresponding system testing guideline. Add comments where appropriate.	**COMMENTS**
2.1.3. *Default SCORM Settings:* The SCORM Engine's default settings for a SCORM course are listed here. Note any differences or settings specified that are not listed here: ***SCORM 2004 defaults*** • SCO Launch Type: New Window without browser toolbar. • Wrap SCO Window With API: No • Player Launch Type: New Window without browser toolbar. • Desired Width: 1010 • Desired Height: 655 ***SCORM 1.2 defaults (Waiver needed)*** • SCO Launch Type: New Window • Wrap SCO Window With API: Yes • Player Launch Type: Frameset • Desired Width: 1024 • Desired Height: 768	
3. TEST OF SYSTEM LAUNCH:	
3.1. SCREEN SIZE:	
3.1.1. *Window Size:* Are courseware screens displaying properly in the standard video screen resolution of 1024x768? Note: If the courseware is intended to run at 800x600, it should simply generate a window that does not occupy the entire monitor screen—do not change the testing monitor resolution.	
3.1.2. *Content Frame Size:* Does the courseware window display content without generating scroll bars? Note: Some EA courseware may intentionally use vertical scrolling. Generate TIR(s) only for horizontal or vertical scrolling that is clearly unintended.	
3.2. LAUNCH BEHAVIOR (LMS MODE):	

TEST CRITERIA	
DIRECTIONS: Place a Y, N, or N/A in the comments column of the checklist in response to each corresponding system testing guideline. Add comments where appropriate.	**COMMENTS**
3.2.1. *Opening Screen:* Launch the courseware from the LMS using the included procedures. Do the launch procedures display the proper opening screen under LMS operating mode?	
3.2.2. *Transcript Record:* After launching the course, navigate through a representative sample of the course then exit the course to return to the LMS. Does the enrollment record still appear with a status of "Enrolled"?	
4. IMI INTEGRATION TESTS:	
4.1. STATIC CODE REVIEW:	
4.1.1. *Server Side Code:* Browse through the courseware directory. Is the courseware free of the use of any type of server side code (i.e., CFM, CGI, JSP)?	
4.1.2. *Server Side Code Communications:* If the courseware uses server side code, identify why it is used in the comments.	
4.2. SCORM ENGINE-GENERATED COURSE MENU:	
4.2.1. *SE Menu SCO Display:* Compare the SE menu to the course flow chart. If the course uses simple sequencing, does the menu reflect each SCO within the course? If the course uses complex sequencing and navigation, does the SE menu reflect the provided flow chart?	
4.2.2. *SE Menu Functionality:* Test each link in the SE menu. Does each menu item respond as expected per the course flow chart?	
4.2.3. *SE Menu Display:* Monitor the menu display as you test the course for completion/success status. Does each menu item correctly display current completion/success status?	
4.3. PAGE ENTRY AND EXIT:	

TEST CRITERIA	
DIRECTIONS: Place a Y, N, or N/A in the comments column of the checklist in response to each corresponding system testing guideline. Add comments where appropriate.	**COMMENTS**
4.3.1. *Normal Operation*: **If applicable**, test book-marking using three methods for exiting: CLOSE button, selection of a different SCO from SE Menu (if applicable), and selection of the SE "Return to MarineNet" link. Does the courseware set and retrieve bookmarks without error?	
4.3.2. *Alternate Operation*: **If applicable**, test book-marking using alternative methods for exiting (i.e. using ALT-F4 or the browser's "X" button). Does the courseware set and retrieve bookmarks without error?	
4.3.3. *Abnormal Termination*: **If applicable**, test book-marking under conditions of abnormal termination or software crash. Does the courseware either retrieve the last page before the page that crashed (objective), or the default page for the courseware (threshold)? *The courseware must not crash, hang, or trap the user on the page where the crash occurred.*	
4.3.4. *Cookie Use:* Exit the course and examine the cookies directory on the workstation. Has the courseware avoided cookie use?	
4.4. COURSE COMPLETION :	
4.4.1. *Course Completion Functionality:* Step through the course, following all instructions for course completion, then exit the course. Review the transcript for the test user. Does the transcript list the course completion status as "Completed"?	
4.5. SCORM SEQUENCING AND NAVIGATION *(FOR SCORM 2004 COURSES):*	

TEST CRITERIA	
DIRECTIONS: Place a Y, N, or N/A in the comments column of the checklist in response to each corresponding system testing guideline. Add comments where appropriate.	**COMMENTS**
4.5.1. *Sequencing and Navigation Rules Provided:* If the course is a multi-SCO course, examine the Supporting Information and the Flow Chart. Does the vendor clearly describe and/or illustrate the sequencing rules and strategy applied in the course?	
4.5.2. *Sequencing and Navigation Rules Validity:* Compare the intended sequencing and navigation to actual course behavior as you progress through the course. Does the course's sequencing operate as described in the flow chart by the vendor?	
5. OPERATIONAL (DYNAMIC) TESTS:	
5.1. PLUG-INS AND MEDIA PLAY:	
5.1.1. *Version Compatibility:* Are plug-in versions expected by the courseware compatible with those provided by NMCI?	
5.1.2. *Standard Plug-In Use:* Exercise the courseware, particularly the multi-media functions. Does the software expect and use USMC-approved plug-ins?	
5.1.3. *Media Play:* Exercise the courseware, particularly the multi-media functions. Do all assets play correctly? a) If no controls are provided for media elements, do the media play automatically without requiring user intervention? b) If specific learner action is prompted (either on the screen or as a course-wide convention), does the media respond as expected? c) If controls are provided, do all media controls work properly and consistently?	

TEST CRITERIA	
DIRECTIONS: Place a Y, N, or N/A in the comments column of the checklist in response to each corresponding system testing guideline. Add comments where appropriate.	**COMMENTS**
5.1.4. *Media File Types:* If audio and or video media are used in the course, is the courseware using approved media file types (WMA, WMV, MP3, FLV)? If other media file types are used, has a CDET waiver been noted? Browse through the course directory and note the number and file size range for the various media files types in the comments column.	
5.1.5. *Media Codecs:* If media is used in the course, are the media files using audio and video codecs in accordance with the MarineNet Courseware Development Technical Standards v2.0?	
5.1.6. *Flash Multimedia:* Does the courseware use Flash files? Browse through the course directory and note the number and file size range of Flash files in the comments column.	
5.1.7. *Static Media:* Are all static media (i.e., .GIF, .JPG, .SWF) files located underneath the relevant MEDIA subdirectory?	
5.2. PERFORMANCE:	
5.2.1. *Courseware Media Responsiveness:* During system testing, be aware of the overall responsiveness of the courseware under test. Does the courseware provide response times as specified in the MarineNet Courseware Development Technical Standards v1.1 (i.e., 2 – 8 seconds for Static Media, up to 10 seconds for Streaming Media and 3 – 8 seconds for Flash & Shockwave Media)?	

TEST CRITERIA	
DIRECTIONS: Place a Y, N, or N/A in the comments column of the checklist in response to each corresponding system testing guideline. Add comments where appropriate.	**COMMENTS**
5.2.2. *Overall Page Responsiveness:* During system testing, be aware of the overall responsiveness of the courseware under test. Under normal conditions, does the courseware display in entirety (multimedia and text) within 10 seconds?	
5.2.3. *Page Navigation Responsiveness:* Evaluate the response time of advancing to the next screen (using the next button). Does the courseware allow the user to progress to the next screen within 5 seconds without delay for the entire current page to load? Note: Courseware navigation menus or frames are not considered in the time a page takes to load.	
6. COURSE-LEVELUSER INTERFACE	
Note: The USMC sponsor has already conducted a screen-by-screen GUI functionality test in the MarineNet Stage environment. Section 7 is a spot-check for verification only.	
6.1. NAVIGATION	
6.1.1. *Navigation Functionality:* Does the course provide a means for the learner to move forward and backward between screens? If not, is another navigation scheme employed to move the learner through the content? Does the existing navigation function properly?	
6.1.2. *Screen Counter Functionality:* **<u>If applicable</u>**, check the screen counter display on several screens in each SCO. Does the screen counter consistently and correctly display the current screen number and the total number of screens within the SCO (or according to an alternative numbering scheme)?	
6.2. INTERNAL COURSE MENU (AS APPLICABLE)	

TEST CRITERIA	
DIRECTIONS: Place a Y, N, or N/A in the comments column of the checklist in response to each corresponding system testing guideline. Add comments where appropriate.	**COMMENTS**
6.2.1. *MENU Contents:* Open the courseware's internal menu. Does the menu appear to reflect course structure (at least to the lesson level)?	
6.2.2. *MENU Functionality:* Try several hyperlinks on the Menu in the courseware under test. Does each tested hyperlinked item on the screen bring up the appropriate course segment?	
6.2.3. *MENU Functionality:* Spot-check the internal Menu as you proceed through the course. If intended to do so, does each hyperlinked item display the correct unvisited/visited status or correctly track the learner's progress through the course?	
6.3. OTHER GUI ELEMENTS (AS APPLICABLE)	
6.3.1. *GUI Element Functionality*: From various screens within each SCO of the courseware under test, try each available user interface element at least once. Do all elements function correctly?	
6.3.2. *Help/Directions Sufficiency:* As you move through the course, pay attention to the availability of help and the quality of directions to the learner. Is such learner support sufficient to allow the learner to successfully complete the course without additional explanation or outside assistance? Note anything that is likely to prompt a learner call to the MarineNet Helpdesk.	
7. FINAL STUDENT ASSESSMENT INSTRUMENT	
This section applies to final student assessments that must be passed in order to complete the course. Use the support request information and/or examine the course content package to determine the type of EOC student assessment provided (if any). Select the appropriate 8.x section to test the EOC assessment.	
7.1. END-OF-COURSE ASSESSMENT (QUESTION*MARK*™ EXAM):	

TEST CRITERIA	
DIRECTIONS: Place a Y, N, or N/A in the comments column of the checklist in response to each corresponding system testing guideline. Add comments where appropriate.	**COMMENTS**
7.1.1. *EOC QMP Exam Existence:* Was EOC exam for delivery in QMP provided?	
7.1.2. *EOC QMP Exam Access:* After course completion, return to the MarineNet transcript. Is the EOC exam icon visible in the transcript? Does the icon correctly launch the QMP exam?	
7.1.3. *EOC QMP Exam Format*: Launch the QMP exam. Does it conform with the USMC EOC exam template?	
7.1.4. *EOC QMP Exam Operation (Items):* Evaluate the EOC exam in the LMS. Does the template function properly? Do the questions function properly?	
7.1.5. *EOC QMP Exam Operation (Feedback):* Complete the EOC exam in the LMS. Does the EOC exam provide a final score to the user when the exam is completed? Does the exam provide the standard feedback messages when completed? Does the exam correctly provide topic-level feedback?	
7.1.6. *MarineNet Course Completion:* Pass the EOC QMP exam and then return to the Transcript page of the LMS. Does the course's transcript record display a status of "*Passed*"? If applicable per the Test Support Information, does the course's transcript record display a correct score?	
7.2. END-OF-COURSE EVALUATION (IN-LINE EXAM):	
7.2.1. *EOC In-Line Exam Existence:* If a QMP exam was not provided, examine the support request information and the course content package. Was an In-line EOC exam provided as one or more SCOs within the content package?	

TEST CRITERIA	
DIRECTIONS: Place a Y, N, or N/A in the comments column of the checklist in response to each corresponding system testing guideline. Add comments where appropriate.	**COMMENTS**
7.2.2. *EOC In-Line Exam Operation (Items):* Evaluate the EOC *In-Line exam* in the LMS. Do the questions function properly?	
7.2.3. *EOC In-Line Exam Operation (Feedback):* Complete the EOC In-Line exam in the LMS. Does the EOC exam provide a final score to the user when the exam is completed? Does any additional feedback display correctly?	
7.2.4. *MarineNet Course Completion:* Pass the EOC In-Line exam and then return to the Transcript page of the LMS. Does the course's transcript record display a status of "*Passed*"? If applicable per the Test Support Information, does the course's transcript record display a correct score?	
7.3. END-OF-COURSE EVALUATION (IN-LINE PRACTICAL EVALUATION [PE]):	
7.3.1. *EOC In-Line PE Existence:* If a QMP exam was not provided, examine the support request information and the course content package. Was an in-line EOC PE provided as one or more SCOs within the content package?	
7.3.2. *EOC In-Line PE Operation:* Execute all required interactions. Do all interactive elements appear to function properly?	
7.3.3. *EOC In-Line PE Operation (Feedback):* Complete the PE according to the provided instructions. Does the evaluation provide a final score (or pass/fail status) to the user when the exam is completed? Does any additional feedback display correctly?	

TEST CRITERIA	
DIRECTIONS: Place a Y, N, or N/A in the comments column of the checklist in response to each corresponding system testing guideline. Add comments where appropriate.	**COMMENTS**
7.3.4. *MarineNet Course Completion:* Pass the EOC practical evaluation and then return to the Transcript page of the LMS. Does the course's transcript record display a status of "*Passed*"? If applicable per the Test Support Information, does the course's transcript record display a correct score?	
7.4. END-OF-COURSE SURVEY (QUESTION*MARK*™):	
7.4.1. *EOC Survey Existence:* Is a QMP EOC survey provided?	
7.4.2. *EOC Survey Operation:* Observe the MarineNet transcript and note when the EOC Survey icon appears. Does it appear upon completion of the EOC final evaluation? Is the course grade and completion correctly withheld from the transcript at this point in the process?	
7.4.3. *EOC Survey Format*: Does the survey conform to the USMC EOC survey template?	
7.4.4. *EOC Survey Operation:* Evaluate the EOC survey in the LMS. Do the questions function properly?	
7.4.5. *EOC Survey Completion:* Complete and submit the survey. Does the final course grade and completion now appear on the transcript?	

APPENDIX E. ACRONYM LIST

ADL.....Advanced Distributed Learning
AGR.....AICC Guidelines and Recommendations
AICC.....Aviation Industry Computer-Based Training Committee
API.....Application Program Interface
ASP.....Active Server Pages
AU.....Assignable Unit
CDET.....College of Continuing Education
CFM.....ColdFusion® Mark-Up
CGI.....Common Gateway Interface
CMI.....Computer Managed Instruction
CSS.....Cascading Style Sheet
DoD.....Department of Defense
EOC.....End of Course
GIF.....Graphic Interchange Format
GUID.....Globally Unique Identifier
HTML.....HyperText Markup Language
HTTP.....HyperText Transfer Protocol
IEEE.....Institute of Electrical and Electronics Engineering
IIS.....Internet Information Services
IMS.....Instructional Management System Global Learning Consortium, Inc.
ISD.....Instructional System Designer
ISP.....Internet Service Provider
JPG/JPEG.....Joint Photographic Experts Group
JRE.....Java™ Run-time Environment
JSP.....Java™ Server Pages`
LAN.....Local Area Network
LMS.....Learning Management System
LOM.....Learning Object Metadata
LRC.....Learning Resource Center
LTSC.....Learning Technical Standards Committee
MCEN.....Marine Corps Enterprise Network
MCSC.....Marine Corps Systems Command
MP3.....Moving Picture Experts Group Layer-3 Audio
MSDN.....Microsoft® Developer Network
NMCI.....Navy Marine Corps Intranet
PDF.....Portable Document Format
PKI.....Public Key Infrastructure
PM.....Program Manager
PNG.....Portable Network Graphic

SCO .....Sharable Content Object
SCORM® .....Sharable Content Object Reference Model
SME.....Subject Matter Expert
SOW.....Statement of Work
SSLI .....Standard SCO-Level Interface
TECOM.....Training and Education Command
URI .....Uniform Resource Identifier
USMC .....United States Marine Corps
VM .....Virtual Machine
WMA.....Windows™ Media Audio
WMP.....Windows™ Media Player
WMV.....Windows™ Media Video
XML.....eXtensible Markup Language