Submarine On Board Training

Interactive Multimedia Instruction

Developer's Guide

Version 6.3.1

This Development Requirements document has been approved by the Submarine On Board Training office for use in the production of on board training materials.

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References

(a) Advanced Distributed Learning (ADL) Sharable Content Object Reference Model (SCORM) 2004 3rd Edition, dated 20 October 2006 – http://www.adlnet.gov/

(b) Advanced Distributed Learning (ADL) SCORM Users Guide for Instructional Designers, version 8, dated 15 September 2011 – http://www.adlnet.gov/

(c) Bloom, B., Engelhart, M., Furst, E., Hill, W., & Krathwohl, D. (1956). Taxonomy of Educational Objectives: Handbook I: Cognitive Domain. New York: David McKay Co. Inc.

(d) Chairman of the Joint Chiefs of Staff Instruction, CJCSI 6510.01F, Information Assurance (IA) and Support to Computer Network Defense (CND), dated 9 February 2011

(e) Chief of Naval Operations Instruction (OPNAVINST) 1540.51D, dated 18 September 2008

(f) CNSS (Committee on National Security Systems) Policy, CNSSP No. 26, National Policy on Reducing the Risk of Removable Media, November 2010

(g) COMSUBLANT/COMSUBPACINST 2305.1(series) Doctrine for Submarine Interior Communications (IC Manual)

(h) Department of Defense Manual (DoDM) 5200.01-V2, February 24, 2012, Change 2, March 19, 2013

(i) Department of the Navy Information Security Program SECNAV M-5510.36, dated 30 June 2006

(j) Development of Interactive Multimedia Instruction (IMI), MIL-HDBK-29612-3(series) (not a requirements document)

(k) DoD memo for "Encryption of Sensitive Unclassified Data at Rest on Mobile Computing Devices and Removable Storage Media"

(l) Heinich, R., Molenda, M., & Russell, J. (1993). Instructional Media and the New Technologies of Instruction (4th ed.), New York: Macmillan.

(m) Kibler, R. (1981). Objectives for Instruction and Evaluation. Boston: Allyn & Bacon.

(n) Krathwohl, D., Bloom, B., & Masia, B. (1964). Taxonomy of Educational Objectives: Handbook II: Affective Domain. New York: David McKay Co. Inc.

(o) Navy School House Testing Management Manual, NAVEDTRA 132A, February 2010

(p) OPNAVINST N9210.3 Safeguarding of Naval Nuclear Propulsion Information (NNPI), dated 7 June 2010

(q) Section 508 – http://www.section508.gov/

(r) Task Based Curriculum Development Manual, Volume I - Developers Guide, NAVEDTRA 130B, September 2009

(s) World Wide Web Consortium (W3C) HTML 4.01 Specification – http://www.w3.org/TR/html4/, dated 24 December 1999

(t) World Wide Web Consortium (W3C) Markup Validation Service – http://validator.w3.org/

(u) World Wide Web Consortium (W3C) Extensible Markup Language (XML) – http://www.w3.org/TR/xml11/, dated 29 September 2006

This document is available at: https://www.netc.navy.mil/sobt/web/developers/devmain.htm

i. Changes in this Version

a. When multiple revisions of the same deliverable are needed before it is accepted as final, the word "Delivery" will be used – for example, "Beta Delivery 1", "Beta Delivery 2", etc. Some developers felt that using the word "Revision" for this purpose was not accurate, since strictly speaking, the first delivery is the original and is not actually revised. (sections II.A.5.a., III.H.1., IV.I.5.e., and Appendix B: V.)

b. The number of CD copies required for storyboard and CRP deliverables has been changed from 4, to 2. (section II.A.5.a.vii.)

c. SOBT now requires that rollup rule statements be explicitly implemented in the IMS Manifest for the four conditions of: completed, incomplete, satisfied, and notSatisfied. (sections III.H.8., IV.E.3.a.iv., and Appendix E: all examples)

d. There is a different naming convention for the <identifier><entry> element within the content aggregation metadata file. This naming convention is "SLC-SOBT-XXXXX-N.NN", where X is the 5-digit product number, and N is the product version number. (sections III.H.13., IV.E.3.b.i., Appendix F: II. and III.)

e. The only targeted operating system is Windows 7 (i.e., Windows XP is no longer required). (section IV.A.1.)

f. SOBT courseware is now required to function in browser versions IE 8, IE 10, and IE 11 when either using, or not using, compatibility view. (sections IV.A.1., IV.B.3., IV.G.1., Appendix D: VII.)

g. Flash Player 13 is approved for use in SOBT courseware. (section IV.A.2.)

h. The <organization> element of the manifest must include the objectivesGlobalToSystem attribute, set to "false". Although SOBT courses do not use global objectives, it is an ILE requirement that this attribute be explicitly included. (section IV.E.3.a.i.)

i. Further explanation and rewording has been provided with Table 10, to clarify that it applies to SCO aggregations (cluster activities) as well as to leaf activities. (section IV.E.3.a.iv.)

j. In the "course_metadata.xml" file, the element formerly named <HSTMConfiguration> is now named <ScormEnginePackageProperties>. There are several other changes to the elements within this section. The <statusRollupMode> element is no longer allowed. Also, remember to use the new set of schema files. (IV.E.3.c., Appendix F: II., and III.)

k. The current version of the No LMS Application is version 4.3. As before, the developer should periodically check the SOBT website for newer versions, in order to keep abreast of browser compatibility updates. (section IV.F.)

l. The contact number for Distance Support (as shown in plug-in detection message) is 401-832-2113. (section IV.G.2.)

m. Subjects and titles shall be marked with the abbreviated classification level before, rather than after, the subject or title. (Appendix C: II.E.1.)

n. As of this writing, the current version of the SCORM 2004 3rd Edition Conformance Test Suite is version 1.1.2, which supports Windows 7. (Appendix D: II., and III.)

ii. Definitions

Within this document, these words are used to mean the following:

shall, must ...	This action/behavior/construct is required by the guidelines.
will ...	Refers to an action to be done by SOBT or the Navy, or more general descriptive wording in examples, rather than a requirement under the guidelines.
may ...	This action/behavior/construct is allowed (permitted), but not required.
can ...	Refers to the inherent behavior of software and/or computer languages, rather than to an issue of permission or allowance under the guidelines.
shall not, must not, may not ...	This action/behavior/construct is prohibited by the guidelines.

iii. Use of Examples

Throughout this document, examples are provided to illustrate and clarify the points being discussed. **It is important to note** that in the case of any item identified as an "example", this item is not intended to be copied exactly in all situations, but rather is provided to help clarify the information being discussed. In most cases, the items shown as examples would require some tailoring to individual situations.

I. INTRODUCTION

I.A. Purpose

The Submarine On Board Training (SOBT) Interactive Multimedia Instruction Developer's Guide is intended for contractors and Contracting Officers developing Interactive Multimedia Instruction (IMI) for use on board U.S. Navy submarines. The primary purpose of this guide is to standardize processes, techniques, procedures, formats, and functions relating to IMI. Compliance with the procedures and techniques contained herein is required for IMI contracted after the release date of this guide. In the event of a conflict with contractual documents, the contract takes precedence. Any deviation must be approved by SOBT.

I.B. Background

The SOBT program was established by Chief of Naval Operations Instruction (OPNAVINST) 1540.51D in order to maintain a high quality of on board training programs and material, based on identification of Fleet needs and priorities. The roles and responsibilities of all Navy participants in the process are clearly defined by the Chief of Naval Operations Staff (OPNAV). The SOBT office at Submarine Learning Center (SLC) is the focal point for all SOBT issues for the entire Submarine Force.

SOBT, as detailed in the OPNAV instruction:

- Issues, under Type Commander (TYCOM) direction, all on board training materials.
- Provides primary Fleet point of contact for all SOBT related matters.
- Supports Chief of Naval Operations (CNO) Submarine Trainer/Training Working Group and committees as the representative for on board training.
- Functions as the primary training material review and distribution approval authority. The review will include coordination with Naval Education and Training Command (NETC) training activities to ensure SOBT materials and formal training curricula are consistent and complementary.
- Provides primary support and Fleet liaison for the Fleet introduction and implementation of training programs and material.
- Provides support for the development and implementation of program policy.
- Recommends prioritized training requirements to TYCOMs for approval.
- Reviews and comments on training/trainer proposals related to SOBT.
- Provides day-to-day coordination between the procurement organization, the Fleet, and training commands.
- Ensures adequate quantities of SOBT material are provided to NETC training activities for use in formal and responsive training within the training command.

- Ensures that contracted training developers strictly adhere to SOBT standards for IMI development as defined by SLC / SOBT.

- Ensures SOBT products are submarine Integrated Learning Environment (ILE) compliant and that development guidance is consistent with NETC ILE content development.

I.C. SCORM Considerations

In June 2001 Director, Submarine Warfare Division (N77) signed a letter requiring that all procurements for TEAM Submarine computer-based training be SCORM-conformant. After evaluating the impact on the SOBT program, it was quickly recognized that SOBT needed to develop a standard conformant to SCORM and yet still capable of presenting the courseware without a SCORM-conformant Learning Management System (LMS). Because not all submarines have a SCORM-conformant LMS installed, SOBT requires that the developer include both a standalone (non-LMS) and an LMS-enabled presentation of the same course content. For the purposes of this discussion, these two presentation modes are referred to as the standalone version and the LMS-presented version. The following guidelines apply:

1) The standalone version of the course must function in a similar manner to the LMS-presented version of the course.
2) The standalone version of the course cannot persist data from one session to the next.
3) Both the standalone and the LMS-presented versions shall present one or more completion certificates to document assessment results, based on the course design requirements.
4) Care must be taken in the design phase of the course to ensure learning effectiveness does not vary from one presentation mode to the next.

Current restrictions on the use of some aspects of sequencing and navigation are due to the need for the standalone and LMS-presented versions to behave in a similar manner. SOBT is allowing the use of the <rollupRules> element and local objectives. SOBT is restricting the use of the <sequencingRules> element, global objectives, and some other aspects of sequencing and navigation. See Appendix G for a complete list of allowable and prohibited elements from SCORM 2004 3rd Edition, Content Aggregation Model, Section 5, Sequencing and Presentation.

Sequencing Rules: SOBT provides a basic standalone presentation tool called the No LMS Application (See section IV.F.) which presents a menu of SCOs but does not contain support for sequencing and navigation elements. Since a course designed around the use of sequencing rules could differ based on the mode of presentation (LMS vs. standalone) and potentially affect learning effectiveness, the <sequencingRules> element is <u>not</u> allowed in this version of the SOBT Developer's Guide.

Rollup Rules: If rollup rules are used in the LMS mode of presentation, their absence in the standalone version would not damage learning effectiveness. In the standalone version, completion certificates are an adequate record of the student's progress. (See section IV.H.) Therefore, SOBT is allowing the <rollupRules> element.

Objectives: SOBT is allowing the use of local objectives, but the use of global objectives is <u>not</u> allowed.

Course designers are encouraged to move away from the theme of a course equating to one single SCO. A move to multi-SCO design with more granular SCOs will better position the designer to take advantage of the features of SCORM 2004.

II. THE BUSINESS PROCESS

II.A. The Development Cycle

II.A.1. Relevancy Reviews

Type Commanders (TYCOMs), Mission Chair personnel, and SOBT personnel perform courseware relevancy reviews periodically on all SOBT products. SOBT personnel perform courseware reviews to validate technical accuracy and to validate that content is current in respect to SHIPALT, A&I, SPALT, and other technical documentation changes.

II.A.2. Product Definition

The first step in any project will normally involve completing a Front-End Analysis (FEA) and Statement of Work (SOW) for the project. Project managers are responsible for coordinating the inputs of SMEs, rate leads, and LSOs for the FEA and SOW. The SOBT office will review the FEA and SOW for the On Board Training (OBT) project prior to the kickoff meeting. FEAs generated by contractors do not fall under the requirements of this section.

Following the completion of the FEA and SOW, the sequence of events in the following sections, "Product Development" and "Quality Control," is followed for all new material development to ensure complete and consistent results.

II.A.3. Product Development

The Front-End Analysis, when conducted, will be discussed at the initial or "kickoff" meeting for a project. The kickoff meeting also defines the roles of the participants. The developer, Subject Matter Experts (SMEs), and SOBT are represented at the kickoff meeting. Also critical at this point is identification of any additional Government Furnished Information/Government Furnished Equipment (GFI/GFE) requirements for the project not included in the SOW. The SMEs may identify reference material not listed in the SOW that will need to be provided to the developer. Since ordering and receiving publications within the Navy can be time consuming, it is important to commence the process to obtain the material as soon as its need is identified. GFI/GFE should be provided to the developer at the kickoff meeting whenever possible. During the course of development, if the developer discovers the need for any additional GFI/GFE, they shall make the request known to SOBT as soon as possible. The developer shall supply a developer point-of-contact list. An overview of the process will be discussed so that each organization knows its role.

Delays in product development are often the result of failing to adequately define and reach a common understanding, early in the process, of what the government requests the developer to accomplish. Although not required, it is highly recommended that the development group (developers, SMEs, project manager, and Learning Standards Officer) meet at a Design Strategy Meeting, following the kickoff meeting. The purpose of the Design Strategy Meeting is to further define SOBT's requirements and the developer's intention for course content, and to resolve any technical questions. To facilitate the meeting, the developer shall provide the government an outline of their vision for product development. This outline shall be provided to the government with sufficient time to review and discuss prior to the meeting. The timing of the Design Strategy Meeting, if conducted, shall be discussed at the kickoff meeting. The project manager may adjust the timing of the deliverables in the POA&M to accommodate the Design Strategy Meeting, but the overall timing for completion of the product shall be maintained (e.g., shorten the length of another phase of development).

The SOBT product number is a 5-digit number that uniquely identifies the course. The SOBT product number, course title, and version number will be assigned by the SOBT Project Manager. Prior to beginning development work, the developer shall request the SOBT product number, course title, and version number from the SOBT Project Manager. See Appendix A for business rules on creating titles. See Appendix B for business rules on assigning product numbers and version numbers.

II.A.4. Quality Control

Throughout the development process, quality control is paramount. Even before the kickoff meeting, SMEs are identified and briefed. Ideally, the same SMEs are used for the entire project so differing opinions do not hinder the process. A standard sequence of In Process Reviews (IPRs) has been established, based on the type of product and whether it is new product development or an update of an existing product. New IMI products will have four or more IPRs:

1) Kickoff Meeting

2) Draft Instructional Media Design Plan (IMDP)

3) Electronic Storyboards

4) Beta Courseware

The developer shall thoroughly test the entire product in order to ensure that it meets all requirements, prior to the delivery of the first prototype or beta. After the prototype or beta has been checked by SOBT, the developer shall correct all deficiencies prior to resubmission. In addition, the developer shall apply lessons learned from testing, to subsequent development work on other courses.

SOBT will conduct acceptance testing (test and retest as necessary until all deficiencies are corrected). The SOBT Project Manager, together with the SMEs, will conduct a review of the course content and functionality. The SOBT programming staff will conduct a technical review to test requirements such as SCORM conformance, HTML validation, etc. The SOBT programming staff may also provide comments on functionality as appropriate, although it is expected that the primary functionality check will be done by the Project Manager. Although the SOBT programming staff is not responsible for providing comments on content, they may provide comments in the case of obvious errors, such as misspelled words, etc.

See Appendix D for details about the acceptance testing performed by the SOBT programming staff, and instructions on how to use the testing tools.

II.A.5. Deliverables

II.A.5.a. Deliverables for New Course Development

The following applies to all deliverables (including the POA&M): Since the deliverable may require multiple revisions before being considered final, for tracking purposes the first deliverable shall be designated as "… Delivery 1", the second as "… Delivery 2", etc. (For example, betas would be designated as "Beta Delivery 1", "Beta Delivery 2", etc.) Comments will be forwarded to the developer and discussed at the IPR for that deliverable. The SOBT project manager will review, consolidate, and resolve any conflicting comments prior to providing them to the developer. The developer shall wait

until all comments have been received and resolved before sending the next revision of the deliverable. When SOBT has verified that all comments and issues have been satisfactorily resolved, SOBT will inform the developer that the deliverable is considered final.

All media containing classified information, or controlled unclassified information (FOUO, PII, NOFORN) shall be encrypted according to:

- CNSS (Committee on National Security Systems) Policy, CNSSP No. 26, National Policy on Reducing the Risk of Removable Media, November 2010
- Chairman of the Joint Chiefs of Staff Instruction, CJCSI 6510.01F, Information Assurance (IA) and Support to Computer Network Defense (CND)
- DoD memo for "Encryption of Sensitive Unclassified Data at Rest on Mobile Computing Devices and Removable Storage Media"
- OPNAVINST N9210.3

SOBT will provide a 5-digit encryption code which shall be used for all deliverables associated with a specific product's development. The developer shall use the 5-digit encryption code by inserting it into the formula used for building the encryption password (formula provided by separate letter). Note that the 5-digit encryption code is not the same as the product number. The encryption code will be provided at the kickoff meeting.

For prototypes and betas, each CD shall be labeled as required by section IV.I.5. "CD Marking Requirements". For the purposes of the development/revision process, developers shall use Delivery numbers – not to be confused with the version number of the courseware, which is assigned by the SOBT office (see Appendix B). For example: The first beta delivery would be labeled "Beta Delivery 1". When it is resubmitted with corrections, it would be labeled "Beta Delivery 2", etc.

II.A.5.a.i. Plan of Actions and Milestones (POA&M)

The POA&M shall be provided by the contractor at the kickoff meeting, where all the major participants for the project will get together for introductions and to formulate a plan as to what will be covered in the courseware. The POA&M shall indicate the development plan for the project and clearly specify all deliverables. Justification shall be provided if the time periods allotted for each deliverable differ from the development and review guidelines in Table 1.

II.A.5.a.ii. Instructional Media Design Package (IMDP)

The purpose of the Instructional Media Design Package (IMDP) is to demonstrate the design intent for the courseware, and to describe how the courseware will achieve the intended learning. The flow diagram is also delivered as part of the IMDP. For specific requirements of what must be included in the IMDP, see section III.H.

The IMDP shall be submitted in electronic format (Microsoft Word 2007 or 2010) for review and approval as specified on the POA&M delivery schedule. The IMDP shall be submitted on CD-ROM (2 copies), and may also be emailed. The IMDP will be reviewed by the SMEs and SOBT. The IMDP must be approved by SOBT before a prototype may be delivered for review.

II.A.5.a.iii. Prototype Course

The purpose of the prototype course is to demonstrate the developer's understanding of SOBT requirements and of SCORM conformance, for all aspects of the

instructional design identified in the course IMDP. The prototype shall represent the style of user interface, including navigation controls and examples of all screen layouts, to be used in the final course. The prototype shall accurately demonstrate the end course, including detection and use of any plug-ins, external applications, etc. The difference between a beta and a prototype is that the prototype may be only a small portion of the content. If the final course is intended to be multi-SCO, then the prototype shall include at least two SCOs.

For courses containing exams, the prototype must demonstrate the exam behavior including shuffling and randomization. It does not need to include all of the exam questions, since they will be included later in the storyboard delivery.

If the developer is producing multiple courses with the same design and functionality under a single delivery order, a single prototype may be delivered to support all such courses. If courses fall under different delivery orders but all aspects of the design, programming, and functionality are the same, the developer may, with prior approval from SOBT, deliver one prototype to support all such courses. For each such course, the applicable IMDP shall state the 5-digit course number which will be used to identify the prototype supporting it. The prototype shall be accompanied by a complete list by course title, course number and version number of those upcoming courses which it supports. In a case where one prototype is delivered to support multiple courses, use the lowest course number in the set as the "master" number. The information (course number, title, etc.) of the master course in the set shall be used to create the prototype CD. The formatting and usage of the information (product number, version number, title, etc.) must be consistent throughout the package, in order to demonstrate the developer's understanding of the SOBT naming conventions and requirements.

The prototype course shall be delivered to the SOBT office on CD. The prototype shall be tested by the developer, and will be tested by SOBT staff, as outlined in Appendix D: "Testing Procedures". The prototype must be approved by SOBT programmers and Project Managers before a beta based on that prototype may be delivered for review. Thus the prototype may need to be re-delivered until it passes all requirements. SOBT will inform the developer when the prototype is accepted. A separate CD (2 copies) shall be delivered along with each prototype delivery, containing the supporting material in accordance with Table 12 in section IV.I.4.a.

II.A.5.a.iv. Storyboards

A set of storyboards is defined as a sequence of drawings with one storyboard for each intended page in the final course. Each storyboard must show a visual representation of what the page will look like. Specifically, it must show the intended screen layout, including placement of all instructional text and all graphical elements. Words alone are not adequate to convey a visual impression of how the screen will be laid out, nor of the graphics to be used. The storyboard may contain supporting verbiage to further describe the appearance and behavior of the elements on the screen. If the page includes any user interactivity, this must be described.

If the actual graphics to be used in the course are available at the time of the storyboard phase, they may be used on the storyboards, but this is not required. If the actual graphics for the course are not yet available, then the storyboard must contain a diagram or rough sketch with enough detail to show what the intended page layout will look like – i.e., placement of graphic(s), placement of title(s), placement of text, interactive items such as buttons. It is at the discretion of the SOBT Project Manager

to determine if the storyboard contains enough detail to show what the intended graphic and layout will look like. If needed, a rough sketch may be done by the person planning the course, and does not require the involvement of a graphic artist.

The storyboard must also contain the intended audio text for the page, which may be placed below or to the side of the screen layout. In the case where storyboards are delivered in HTML format, the audio text may be programmed in the technique intended for the final course. Only the audio text shall be provided at this time. The developer shall not begin recording of narration until the audio text has been approved. For further help on storyboarding techniques, refer to MIL-HDBK-29612-3 (series) "Development of Interactive Multimedia Instruction (IMI)" (not a requirements document).

An exam key shall be included with the storyboard submittal, containing all questions related to the objectives covered in the set of storyboards being submitted. The exam key shall include the following: 1) a complete list of all questions in the question bank, including the set of distracters if applicable, 2) the correct answer clearly indicated, 3) the related learning objective indicated, and 4) the reference from which the answer was obtained. The questions shall be sorted alphabetically by exam question. There must be enough information included with each question to allow a tester to correctly answer the question based on the exam key. For example, in the case of a "hot-spot" question that uses a graphic image, the graphic must be shown in the exam key, and overlaid with an outline box indicating where the user must click to achieve a correct answer.

The developer shall deliver electronic storyboards to the SOBT office on CD-ROM. Storyboards may be developed and submitted in stages as necessary to support a phased lesson development strategy; the schedule for storyboard development and review shall be outlined in the contractor's POA&M submitted at the kickoff meeting. The storyboards will be reviewed by the SMEs and SOBT. After 45 days or upon receipt of all comments, an IPR will be held to clearly establish for the developer all required changes.

II.A.5.a.v. Content Review Package

The content review package must include all completed learning content, but is not required to include all SCORM files, such as the IMS Manifest, PIF file, metadata, etc. which are required for the complete beta package. The content review package must include all audio text, but is not required to be narrated. The content review package is intended for review by the SMEs and the SOBT project manager (but not by SOBT programming staff). This will allow SMEs and project managers to provide comments on content, prior to creation of all SCORM files.

The content review package is especially useful for the review of exam content. For this deliverable, turn off randomization of exam questions, display the full set of questions rather than a subset pulled from the question bank, and indicate the correct answers. In this way, the reviewer can see each question presented as it would appear in the intended screen layout and behavior, while still maintaining the ability to see all questions. When moving from this phase to the beta, ensure that randomization is turned back on and correct answers are no longer indicated.

The content review package is a required deliverable unless waived by the SOBT Project Manager. During the storyboard IPR, the SOBT Project Manager will decide if the storyboard is robust enough to satisfy the requirements of the content review

package, thus not requiring a separate content review package delivery. If the SOBT Project Manager decides to waive the content review package delivery, he will inform the developer that they can go directly to the next phase.

II.A.5.a.vi. Beta Courseware Package

From the electronic storyboards and all review comments, the developer shall build the beta courseware. The beta package shall consist of browser-compatible web-based training that meets all the technical criteria addressed in this document, shall have the look and feel and complete functionality of the final product, and shall follow the storyboards, with agreed changes, exactly. Any features that were added or modified to more easily enable the review process (such as disabling randomization of exam questions, etc.) must be removed or reset to the intended behavior of the final course. The beta package shall be submitted for review and approval as specified on the Plan of Actions and Milestones delivery schedule. The beta package shall be delivered to the SOBT office on CD-ROM (2 copies, or as designated in the CDRLs).

Betas are not expected to exceed three deliveries. Since design issues are expected to have been resolved at the prototype phase, SOBT feels that three attempts are adequate at the beta phase in order to resolve any mistakes or other issues. Thus, if Beta Delivery 3 fails, SOBT will convene a review board to investigate the cause and determine if the continued failure is indication of deficient performance on the part of the developer. The review board will, at a minimum, consist of the SOBT Director, the SOBT Program Manager, the SOBT Program Coordinator, the SOBT Project Manager, and a SOBT Programmer. The purpose of this review is not to lay blame. The purpose is to identify problem areas on the part of SOBT or on the part of the developer and formally address those problems so that they can be corrected. If it is determined that developer performance is deficient, the developer will be notified in writing and will be provided an opportunity to respond.

Supporting Materials CD: A separate CD (2 copies) shall be delivered along with each beta courseware delivery, which shall contain the supporting materials in accordance with Table 12 in section IV.I.4.a. The supporting materials CD will be retained by SOBT; it is not intended for distribution to the fleet. The CD containing the supporting materials shall be labeled exactly the same as the course CD, with the additional label of "Supporting Materials CD", and it must be clearly marked with the security classification of the material that is on the CD.

For those courses where SOBT is the duplication and distribution agent, the approved beta will be considered the final deliverable. Otherwise, the final CD, properly labeled and packaged, shall be delivered for validation by the SOBT office.

All aspects of the final courseware, including both learning content and programming/scripting code, are wholly owned by the Navy.

II.A.5.a.vii. Delivery Schedule

Courses shall be delivered on Compact Disk – Recordable (CD-R) for reproduction and distribution by SOBT, or as otherwise directed by the SOW. (See section IV.I. "CD Packaging Requirements", for detailed packaging requirements.) Because of NMCI restrictions, FTP from non-.mil addresses to .mil addresses is not allowed; and therefore, FTP is not considered an acceptable delivery method for developers to use to deliver products to SOBT. Note: If deliverables arrive after 1600, they will not be accepted as delivered until the next working day.

Table 1 summarizes the development and review processes. This table represents expected deliverable timeframes for the average SOBT course of about 2.5 hours. There are occasions when the scope of the task requires alterations to this schedule. Justification shall be submitted with the POA&M if deviation from this timetable is required. The POA&M shall always reflect a deliverable schedule that allows review and correction of all comments against the courseware in a reasonable timeframe before the period of performance expires. After passing SOBT's testing, it is not expected that a course would fail ILE's Government Content Acceptance Testing (GCAT). However, if during GCAT testing, it is discovered that the developer failed to correctly follow the guidance given in the SOBT Developer's Guide, the developer may be required to make corrections to the course. Final project acceptance is dependent on GCAT acceptance.

Note: Many products will not undergo GCAT testing, but this consideration should be discussed at the kickoff meeting.

Development Phase		Date*	Responsible	# Copies
Kickoff		Day 0	SOBT, SME, Developer	N/A
IMDP	Delivery	K/O + 15 days	Developer	2
	Review		SOBT, SME	
	Final	K/O + 51 days	Developer, SOBT	
Prototype	Delivery	K/O + 65 days	Developer	2 (prototype) 2 (source)
	Review		SOBT, SME	
	Final	K/O + 140 days	Developer, SOBT	
Storyboards w/ assessment items	Delivery	K/O + 90 days	Developer	2
	Review		SOBT, SME	
	Final	K/O + 175 days	Developer, SOBT	
Content Review Package	Delivery	K/O + 190 days	Developer	2
	Review		SOBT, SME	
	Final	K/O + 260 days	Developer, SOBT	
Beta Courseware	Delivery	K/O + 275 days	Developer	2 (beta) 2 (source)
	Review		SOBT, SME	
	Final	K/O + 305 days	Developer, SOBT	
GCAT Acceptance	Review		NETC, SLC	
	Final	K/O + 335 days	NETC	

*Calendar days

Table 1: Development and Review Process

II.A.5.b. Deliverables for Content Updates

A Content Update is defined as a modification to the learning content of pre-existing courseware. See Appendix B for more details on Content Updates and Format Upgrades.

All Content Updates shall also include a Format Upgrade to comply with the SOBT Developer's Guide published at the time the product was contracted, unless specifically exempted in the Statement of Work.

The deliverables for a Content Update are the same as the deliverables for new courseware, with the exception that the storyboards shall only include those parts of the content that are to be modified from the previous version.

II.A.5.c. Deliverables for Format Upgrades

A Format Upgrade is defined as a modification to the presentation format, such as changing from SCORM 1.2 to SCORM 2004.

- Minor changes, such as correcting spelling errors, if agreed to as no-cost items, are included.
- Conversion of existing media (graphics, animation, audio, and video) to upgraded file formats to minimize bandwidth required for the converted course is required. New file formats must be selected from the list of acceptable file formats in this document. (See section IV.A.3.a.)
- Screen redesign is required, as described in section IV.B. of this Guide, in order to make the content material of the new course blend more effectively with the original media sizes and to incorporate navigation within the learning object.
- Format Upgrade-only courseware has less than 5% total content changes.

The deliverables required for a Format Upgrade-only are:

- POA&M
- Instructional Media Design Package (IMDP)
- Storyboards (for content changes only)
- Prototype Course
- Beta Courseware

II.A.6. Distribution Approval

Once the product is complete, and any comments from the final review of the courseware are resolved, SOBT will provide the developer with a courseware acceptance letter. All products that are approved for distribution by the SOBT Director will be distributed to the Fleet with a letter of promulgation.

III. INSTRUCTIONAL DESIGN

III.A. Team Members

It is essential that the design phase of every product development include:

- Instructional Designers to provide input on creating meaningful learning objectives, develop effective strategies to achieve the learning objectives, create substantive assessments to fully evaluate learning effectiveness, and recommend methods of remediation.

- Subject Matter Experts to help define the learning objectives within the context of the training requirement, provide input with respect to the fleet standards for satisfying the training requirement, and provide guidance on the best training content for presentation to the student and on how to achieve the learning defined by the learning objectives.

- Graphic Artists to provide input on user interface design, graphic capabilities, and level of effort.

- Programmers to ensure that the intended design can be implemented following valid SCORM concepts, and within the scope of SOBT requirements.

It is good practice for instructional designers to work together with their programmers in the planning of the course design – in order to ensure that the course structure, presentation by the LMS, tracking of data, and rollup behavior follow valid SCORM concepts. As the flow diagram for the IMDP is being created, it is a good practice for the programmer to build an implementation of the basic course structure – including location of exams, API calls, and rollup rules, but little or no actual content. This will demonstrate whether or not the idea works in practice prior to building all of the content. Do not wait until nearing the end of product development to find out that a plan you visualized in the beginning cannot actually be implemented. You cannot plan a course design with disregard to SCORM concepts and then "SCORM-ize" it at the end. For further guidance, please review: ADL's "SCORM Users Guide for Instructional Designers".

III.B. Learning Objectives

III.B.1. Structure of a Learning Objective

A Learning Objective (LO) is a statement of what the student can **do after training** (completing the course or part of the course). It is constructed based on principles of learning and should align to the job, duty, task analysis. Based on Benjamin Bloom's (1956) taxonomy, there are three broad categories of learning:

1) Cognitive: mental skills (Knowledge)
2) Affective: internal state that may influence behavior (Attitude)
3) Psychomotor: manual or physical skills (Skills)

The first step in developing a learning objective is to determine the category of learning, or goal of the learning process. Once the category is selected, the learning objective is further refined by selecting a verb from a subcategory to further define the outcome of learning. The

subcategories in the following table are listed in a hierarchy, from top to bottom, representing simple to complex respectively.

Cognitive	Affective	Psychomotor
Knowledge	Receive	Imitation
Comprehension	Respond	Manipulation
Application	Value	Precision
Analysis	Organize	Articulation
Synthesis	Characterize	Naturalization
Evaluation		

Table 2: Categories and Subcategories of Learning

Bloom, et al (1956); Krathwohl, Bloom, and Masia (1964); and Heinich, Molenda, & Russell (1993)

There are three components to a learning objective:

- Behavior or action
- Condition(s)
- Standard(s)

For the purposes of SOBT products, the learning objective shall be constructed with the components in the following order: Behavior or Action, Condition(s), Standard(s).

III.B.1.a. Behavior

The behavior details what the student is expected to do (performance) after training. The behavior element is made up of three parts:

- Subject. The student is always the subject and therefore implied. Therefore, it is not necessary to state the subject "Student."
- Verb. Use a performance action verb to state what the student is expected to do. The action must be observable and measurable. Examples include adjust, align, troubleshoot, and operate. A list of action verbs for use in SOBT courseware is available in the developer's section of the SOBT website at https://www.netc.navy.mil/sobt/web/developers/devmain.htm. The verbs in the list are sorted based on the category of learning and subcategory.
- Object. The object is what the performance action verb acts upon. This may be a single word or group of words.

For the purposes of SOBT courseware, there shall be only one behavior or action listed and the subject does not need to be provided. The behavior shall contain only one verb (although it may contain multiple objects).

III.B.1.b. Conditions

The conditions detail the circumstances under which the behavior will be performed. Include only meaningful conditions. Do NOT list a condition just to have a condition. For example, do not use the conditions "using interactive multimedia instruction," "from memory," and "upon completion of this course." Only use conditions to clarify the manner in which the behavior will be performed. Use conditions aligned to the Submarine Force Commander Directives. An example might be "during rough weather."

For the purposes of SOBT courseware, there may be more than one condition provided for a learning objective or none. A learning objective without a condition implies that the condition is understood.

III.B.1.c. Standards

The standards detail how well the student is expected to do the behavior. The standard reflects the quantity and/or quality of student performance. Do not state a standard unless the standard is meaningful to the objective.

The standard describes what behavior will be acceptable or the limits within which a behavior must fall. With some cognitive skills, responses may vary within established parameters. For variation, the standard should include the degree of tolerance for an acceptable response. Grading rubrics in the form of checklists or rating scales may assist with measuring variable responses. Categories of common standards include:

- Accuracy (student's answer must be within X degrees)
- Number of errors (with five mistakes or fewer)
- Number of correct responses (with minimum score of 80%)
- Time (not to exceed 30 minutes)
- Consistency within an established standard (in order listed on the chart)
- Satisfaction (person walks away satisfied)

For the purposes of SOBT courseware, there may be more than one standard provided for a learning objective or none provided. A learning objective without a standard implies that the learning objective must be performed with 100% accuracy.

III.B.2. Types of Learning Objectives

For the purposes of SOBT courseware, three types of learning objectives are defined as follows:

The course objective describes the overall scope of the entire course. Every course shall have one (or more) course objective(s).

A terminal objective (TO) is a major objective that describes the overall learning outcome for a topic or task. One terminal objective covers approximately one hour of instruction, or one sharable content object (SCO).

An enabling objective (EO) is a more specific statement that supports a terminal objective. It describes the specific behavior that demonstrates or shows evidence of learning in accomplishment of the TO.

For the purposes of SOBT courseware, the behavior for the TO shall be at a complexity level equal to or higher than that of the EO. The TO represents the culmination of learning that occurred at the EO level. The TO must reflect the final overarching instructional goal.

For further guidance please review: NAVEDTRA 130B, Task Based Curriculum Development Manual, Volume I - Developers Guide

III.C. Designing for SCORM

III.C.1. Course Structure

All SOBT courseware is required to be in SCORM format. SOBT courseware is intended to be presented by a Learning Management System (LMS) in units known as Sharable Content Objects (SCOs). The decisions on how to organize the content into SCOs must be made at the IMDP stage. A SCO consists of approximately 60 minutes of instruction. When determining how the course is broken down into SCOs, the instructional designer must organize the material in the way that is most beneficial to the student. The SCO titles must be determined at this time. SCO titles shall follow the general rules for titles given in Appendix A: II.

The term content aggregation refers to the course as a whole, i.e., the top level (also referred to as "root aggregation"). The term SCO aggregation refers to a "parent" item that contains a grouping of SCOs nested within it.

The content aggregation may contain one or more SCOs; two or more SCO aggregations; or one SCO aggregation with at least one other SCO. However, the content aggregation shall not consist of only one SCO aggregation.

A SCO aggregation can occur at any level below the content aggregation (top) level. A SCO aggregation, when presented by the LMS, will appear as a menu item with a sub-menu of links beneath it. Therefore, it is important to realize that the decisions that are made in designing the course structure (and in creating the flow diagram) will ultimately determine how the finished course appears in the LMS. If no SCO aggregations are used, then all SCO links will appear at the top level, with no sub-menus. A SCO aggregation shall contain 2 or more child SCOs.

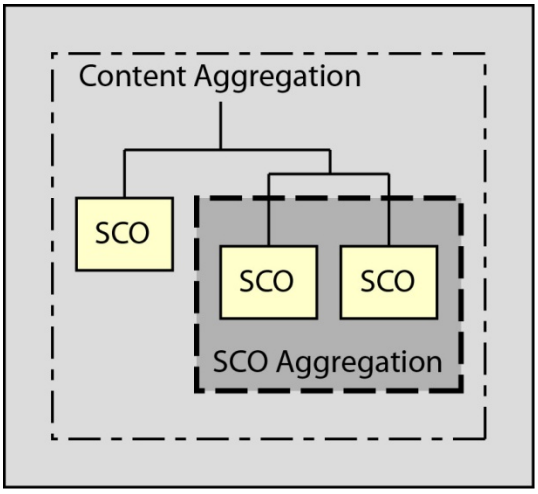


Figure 1: Basic SCORM Terminology

The purpose of using SCO aggregations is to organize the learning material in a logical way for presentation to the user, as well as to provide for utilization of the more advanced features of SCORM, such as rollup and sequencing. Additional levels of SCO aggregations can be grouped inside the first SCO aggregation level, if there is a need for sub-groupings of SCOs. However, SOBT recommends against the creation of a structure that becomes needlessly complicated.

During the initial design process, determine whether all the uncompressed content will be greater than 1.8 GB. If it is estimated that the uncompressed content will be greater than 1.8 GB, the course shall be redesigned as two or more courses (i.e., separate content aggregations). Each will be assigned a unique product number with the same title followed by "Volume 1", "Volume 2", etc.

III.C.2. Rollup

The term rollup refers to the process whereby the LMS derives completion, satisfaction, and score for the overall (top level) course, by combining or "rolling up" statuses and scores from lower levels. Although rollup is executed by the LMS, there is information built into the course that tells the LMS what to do. Therefore, content designers must decide during the design phase, what rollup behavior their programmers will need to implement during the development phase.

SCORM uses a different set of terms when it talks about rollup, than when it talks about content packaging. This second set of terms was introduced in SCORM 2004, and is used to explain sequencing and navigation concepts, including rollup. SCO aggregations and SCOs are referred to by the generic term "activity." Activities are nested in parent-child relationships that form them into an "activity tree." The activity tree is the entire content aggregation, or "root" aggregation. Activities that have children are called "clusters." An activity that does not have any children is a "leaf" activity. Cluster activities have no way to directly set their status information; thus, the status of a cluster activity is based on the status of its children. Rollup tells the LMS which activities contribute to status, how their scores are weighted, and under what conditions status is rolled up throughout the entire activity tree.

Activity	SCOs, SCO aggregations, and the root aggregation are all considered to be activities. SCORM defines two distinct types of activities – leaf and cluster.
Leaf Activity	A leaf activity is an activity that has no children (no other activities contained within it). A leaf activity equates to a SCO.
Cluster Activity	A cluster activity is a parent and its immediate children. Aggregations (SCO aggregations and the root aggregation) are clusters.
Activity Tree	The activity tree is the entire course structure. The activity tree is the content aggregation, including all SCOs and SCO aggregations.

Table 3: SCORM 2004 Terms Used in Rollup

Figure 2 shows how the terminology used in SCORM content packaging equates to the terminology used in SCORM rollup.

An activity may have either rollup controls or rollup rules (or both) applied to it, depending on whether it is the root, a cluster, or a leaf.

III.C.2.a. Rollup Controls

Rollup controls enable a content designer to determine if and how a child activity contributes to its parent's rollup. Rollup controls apply to both cluster activities and leaf activities. By using rollup controls, three things can be restricted:

1) completion
2) satisfaction
3) score

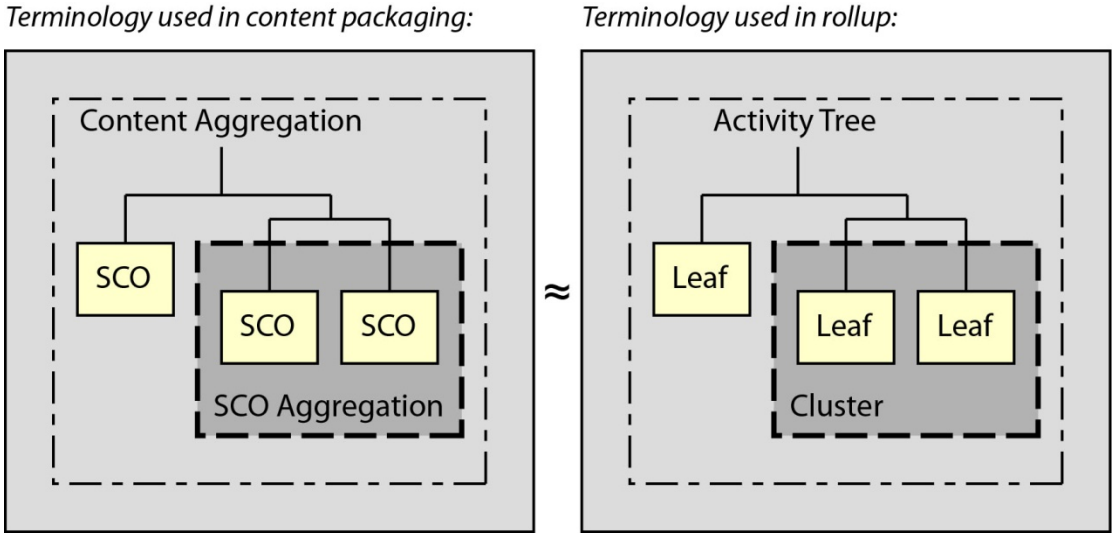


Figure 2: SCORM Content Packaging Terms that Equate to SCORM Rollup Terms

All activities shall contribute to the rollup of completion, unless they are defined as optional (i.e., not required for completion) in the IMDP. This requirement applies both to SCOs that contain assessments and to SCOs that do not contain assessments.

SOBT requires that only those activities that contain assessments (i.e., its associated SCO or one of its children passes back a score) are allowed to contribute to the rollup of satisfaction and score. If the course includes some activities that do not contain assessments, they shall not contribute to the overall course satisfaction and score. For courses with no exams in any SCO of the course, satisfaction shall be handled as described in Example 4 of Appendix E.

III.C.2.b. Rollup Rules

Rollup rules are logic statements that determine a parent's status, based on the status of its children. Rollup rules apply to clusters only, not to leaf activities. A rollup rule is a statement consisting of one or more condition(s), and one action. The rollup rule condition is the "if" part of the statement. The rollup rule action is the "then" part of the statement. The rollup rule action sets the satisfaction or completion of the cluster based on whether or not all rollup rule conditions have been met.

For example:

Rollup Rule:	If all my children are satisfied, then I am satisfied.
Rollup Rule Condition:	if all my children are satisfied
Rollup Rule Action:	then I am satisfied

See section III.H.8. for IMDP requirements regarding rollup. See Appendix E for example scenarios, including an example of an IMDP section on rollup.

III.C.3. Planning the Structure to Utilize Rollup

III.C.3.a. Making Content Optional

Sometimes it is desirable to include material which is considered optional. In other words, the student is not required to go through this content in order to achieve a "completed" status for the course. Instructional designers should be aware of, and should make the decisions as to, whether or not it is appropriate for specific material to be optional. If content is optional, the student can go through this material if he wants to, but he is not required to do so in order to achieve completion of the course. An example of this is a "how to use this course" section, such as the Tutorial SCO in a typical Piloting Brief.

In order to use SCORM rollup to make content optional, that content needs to be placed in a separate SCO. Once the content is structured in this way, the programmer can add the XML code to implement the rollup control in the course manifest which will make that SCO optional. The instructional designer does not need to know the details of the XML code, only the fact that the optional content needs to be placed in its own SCO. The IMDP shall indicate for each SCO whether it is required (i.e., "contributes to completion: yes") or optional (i.e., "contributes to completion: no").

This example involves using a rollup control. The rollup control will be applied to indicate that one of the SCOs does not contribute to rollup of completion.

III.C.3.b. Providing a Choice between Topics

In some courses, there may be a need to provide students with a choice of taking one topic or another. In other words, the student is not required to complete both of these topics in order to achieve a "completed" status for the course. He can go through both topics if he wants to, but he is only required to do one of them. An example of this is an SSBN/SSGN course in which most of the material is common, but for one of the lessons the content for SSBN boats differs from that for SSGN boats. The student is only required to go through the content that applies to his class of ship.

In order to use SCORM rollup to provide an either/or choice between pieces of content, each of these pieces of content needs to be in a separate SCO, and then these two SCOs need to be grouped together in a SCO aggregation. There cannot be any other SCOs in this same aggregation or else they would also become optional choices. Once the two SCOs are grouped in this way, the programmer can add the XML code to implement the rollup rule in the course manifest which will indicate that only one of these SCOs (either one) is required for completion. The instructional designer does not need to know the details of the XML code, only the technique of grouping the SCOs into an aggregation.

This example involves using a rollup rule. In this case, it would be if any one of the children is completed, then the parent (the aggregation) is considered to be completed.

"If any of my children are completed, then I am completed."

See Figure 5, which shows a course flow diagram for an example similar to the one described above.

III.D. Presentation Categories and Interactivity Levels

The complexity of IMI is determined by its presentation category and interactivity level. The presentation category determines the amount of user control. Presentation categories range from

one to four, with one being linear format on the low end, and four being full simulation on the high end. Interactivity is user involvement with the learning experience. Similar to presentation categories, interactivity levels also range from one to four, with one being passive on the low end, and four being high user involvement on the high end.

Presentation Category	Description
1	Knowledge or familiarization provided in a linear format. User has little or no control over sequence of timed events.
2	Allows more user control over sequencing and choice of material.
3	High simulation – some limited branching bounded by scenarios.
4	Real-time simulation – unlimited or extensive branching to model real-world situations or equipment.

Table 4: Description of Presentation Categories

Interactivity Level	Description
1	Passive – The student acts solely as a receiver of information.
2	Limited participation – The student makes simple responses to instructional cues.
3	Complex participation – The student makes a variety of responses using varied techniques in response to instructional cues.
4	Real-time participation – The student is directly involved in a life-like set of complex cues and responses.

Table 5: Description of Interactivity Levels

III.E. Assessments

III.E.1. Definitions of Assessment Types

For the purposes of discussion in this document, the following different types of assessments are defined.

III.E.1.a. Exams

Exams shall be used for assessing the student's comprehension of the course material. An exam reports a score and status to the LMS. Exams shall also provide results that are displayed to the student. Justification for not including an exam must be clearly stated in the IMDP. A passing score for SOBT exams is 80% or greater. If a course requires different criteria, such criteria shall be determined as part of the design process and clearly stated in the IMDP.

III.E.1.b. Quizzes

A quiz is a short test used to measure achievement of recently taught material (such as an end-of-lesson quiz). In SOBT courses, a quiz shall be used as a self-check for the student – i.e., to help him identify his weak areas, to provide feedback, and to provide remediation (see section III.F.). A quiz does not report a score or status to the LMS. A quiz could be used at the end of an individual topic or lesson when a scored final exam is

provided later at the end of the course. The IMDP must state the planned location of all quizzes and exams.

III.E.1.c. Comprehension Check Questions

A comprehension check question is a single question that is used for the student's own self-assessment. Comprehension check questions are an effective means of refocusing the student on the training material. Comprehension check questions shall be presented at intervals within the topic to help the student understand the expected level of knowledge. A comprehension check question shall be provided once every five screens or about every five minutes of instruction, or as specified in the IMDP. This question must pertain to the information presented in that previous five minutes. Comprehension check questions shall be remediated as described in section III.F. Comprehension check questions do not report a score or status to the LMS. Comprehension check questions shall be similar as far as format, question type, level of knowledge, etc. to the course exam questions; but shall not be the same questions as the course exam questions.

III.E.2. Assessment Instructions

All exams and quizzes shall begin with an "Assessment Instructions" screen that explains the behavior of the exam or quiz to the student. The Assessment Instructions screen shall contain a button or link to start the exam or quiz. Although the verbiage on the Assessment Instructions screen must be tailored to describe the specific exam or quiz, some examples of general information that should be included are as follows:

For example, an Assessment Instructions screen for an exam might say:

> "A passing score for this exam is 80% or higher. If you pass this exam, you will be provided the opportunity to print out a certificate showing your passing score. If you are using a Leaning Management System (LMS), your score will be saved by the LMS. Select START to begin the exam."

For example, an Assessment Instructions screen for a quiz might say:

> "This is a quiz for your self-check only. This quiz is not graded. Select START to begin the quiz."

III.E.3. Question Bank and Question Pools

Exams shall be derived from a question bank. A question bank is the entire set of questions used to generate an exam. The question bank is sub-divided into several question pools. A question pool covers a specific objective, either an enabling objective (EO) or a terminal objective (TO), but not both together. All EOs shall be covered with a minimum of at least three questions for each EO. If an EO contains multiple objects, a question shall be generated to cover each object. It is not required to have TO level questions; however, if questions are developed at the TO level, then a pool shall be created for each TO that has questions related to it. If a single question covers several EOs, it shall be designated as one question that relates to the TO level. Do not duplicate questions.

The exam shall be built by pulling one third of the questions from each pool. Once the complete set of questions has been obtained by pulling from all the pools, the questions shall be shuffled. For questions that are multiple-choice (with some exceptions, see below), the answers that are supplied for that question (correct answer and distracters) shall be shuffled when the question is first displayed and shall not be re-shuffled until the student moves to a different question.

The exceptions for when questions shall not have their answers shuffled, are as follows: 1) True/False questions shall not have their answers shuffled – rather "True" shall always be first (see example 1); and 2) Alternatives which are numerical values, letters, or alpha-numeric characters must be arranged in ascending or descending order – i.e., not shuffled (see examples 2 and 3). For further guidance, review: NAVEDTRA 130B, NAVEDTRA 132A.

Example 1 – True/False:

(U) (TRUE/FALSE): A Simpson 260 multi-meter may be used to measure impedance.

(U) A. True
(U) B. False

Example 2 – numerical:

(U) What is the condition code of the 9mm Pistol when off the range?

(U) A. 1
(U) B. 2
(U) C. 3
(U) D. 4

Example 3 – alpha-numeric:

(U) Which circuit provides negative feedback for Q12?

(U) A. C21
(U) B. L10
(U) C. R22
(U) D. R32

Complex questions, such as those designed to assess at the TO level, shall have a greater weight or be assigned as mandatory (see section III.E.4. "Question Development"). When a question pool contains a mandatory question, this means that the question shall always be pulled. For example: A question pool contains 30 questions, of which 10 questions will be pulled for the exam. There are 2 mandatory questions in the pool. Therefore, include the 2 mandatory questions, and then randomly select the remaining 8 questions from the remaining pool of 28 (non-mandatory) questions.

Figure 3 illustrates the Question Bank and Question Pool concept. (For the sake of simplicity, Figure 3 shows question pools evenly divisible by 3. It is understood that in most real-world situations, the question pools will not be evenly divisible. Therefore, use standard rules for rounding up or down to the nearest whole number.)

The developer may use any format for the question bank and any programming implementation for presenting the questions, provided that it meets the SCORM 2004 standard for passing back the results to the LMS.

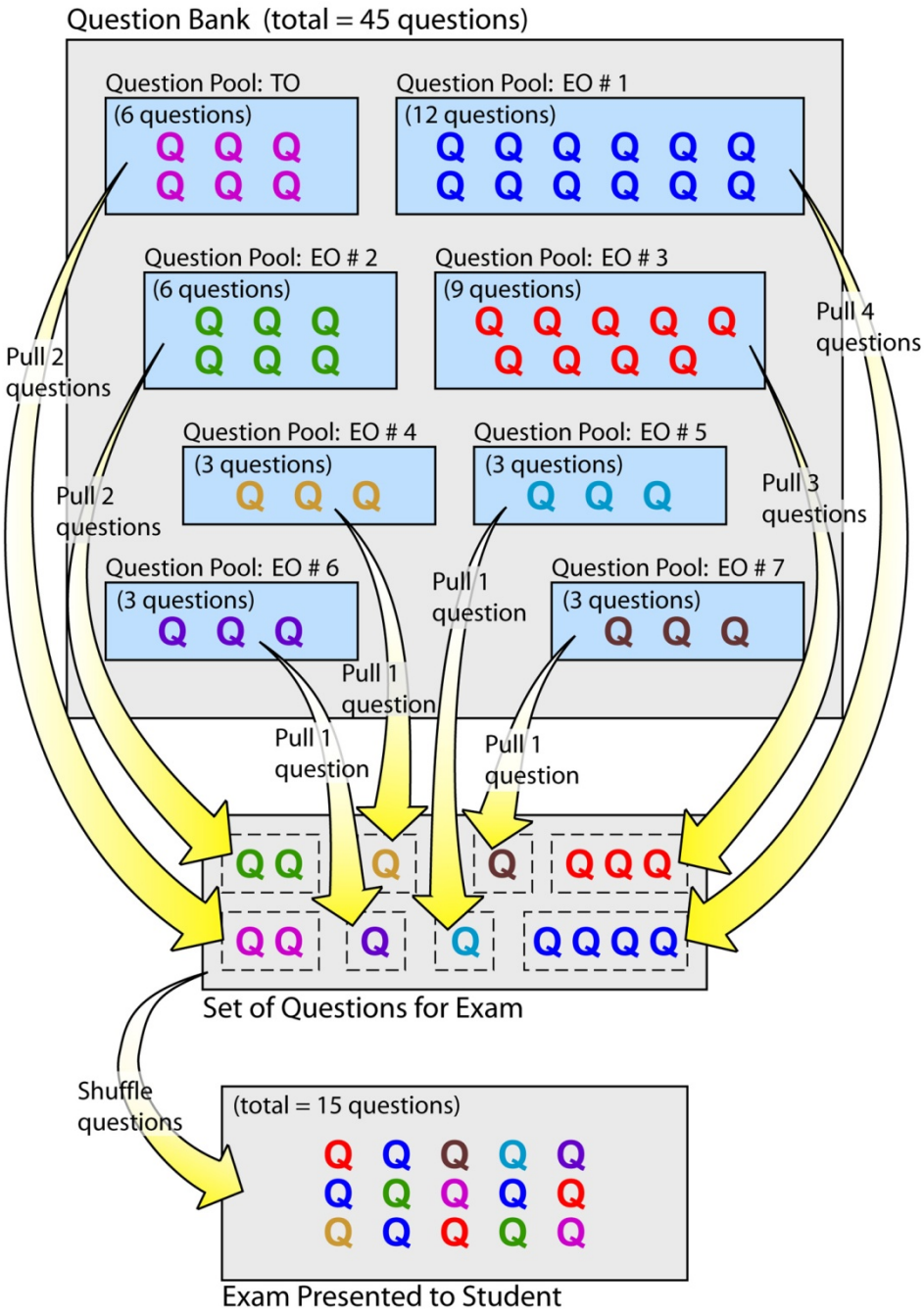


Figure 3: Example of Question Bank and Question Pools
(Total questions, and number in each pool, are for example only, and will vary in courses.)

III.E.4. Question Development

The behavior, conditions, and standards specified in a learning objective will help to determine the most appropriate question method to use. A knowledge-based learning objective can be assessed using conventional question types, such as multiple-choice-single-answer (MCSA), multiple-choice-multiple-answer (MCMA), true-false, fill-in-the-blank, matching, and drag-and-drop. Questions that are used to measure psychomotor skills, in which the student must follow a series of steps, require an interactive question type (e.g., simulator, emulator, or scenario-based assessment that records steps performed).

It is desirable to assess at higher levels of learning (refer to Table 2: Categories and Subcategories of Learning located in section III.B. "Learning Objectives"). Some learning objectives will be identified as critical, while others may not. Questions designed to assess at the terminal objective level, will be as complex, if not more complex, than those questions designed to assess at the enabling objective level. Such complex questions must have a greater weight or may be assigned as mandatory (i.e., pulled every time an exam is generated rather than being subject to random selection).

The goal of SOBT courseware is to train and test at the higher levels of learning. For the purposes of SOBT courseware, follow these general test item development guidelines:

Ensure that the assessment item matches the intent of the learning objective. Do not write a test item that focuses on a relatively minor aspect of training.

A test that contains assessment questions with differing weights must include a statement on the Assessment Instructions screen that some questions have a greater weight than others.

Do not use subjective words or phrases (e.g., could, should, and might).

Avoid using negative phrases in question and answer options (e.g., not or never).

Write multiple-choice (MCSA and MCMA) questions in the form of a question, ending with a question mark. Begin with the interrogative of why, when, where, what, or how.

Avoid the use of "Which of the following" in multiple choice (MCSA and MCMA) because it forces the student to look at the answer alternatives first, instead of focusing on the details of the question.

Include at least four answer options for MCSA questions, one correct answer and three distracters.

For MCMA questions always include the statement: "(Select all that apply.)"

For further guidance, please review: NAVEDTRA 132A, Navy School House Testing Management Manual.

III.F. Feedback and Remediation

Feedback is informing the learner if the response to a question was correct or incorrect. Feedback is best when it is varied (i.e., Good, Good Job, Very Good, Excellent, Well Done) rather than using the same feedback for every question. Remediation is a method of helping a learner understand why an answer was incorrect. Remediation shall always cite the portion of the source document used to generate the material (Book, Chapter, Section), and may also allow the learner to review the related course material. Utilization of the source documents is a critical element of the learning experience; therefore, remediation screens shall recommend the learner record the references for the material related to any missed questions that they will need to review. Remediation for a correct response is not required.

The following approach shall be used for Category 2 presentation with Level 2 interactivity. Higher Category/Level combinations should use an increased level of remediation.

Exams: Feedback for exams, if used, shall not show the actual correct answers. For each incorrectly answered question, exam remediation shall always cite the reference, and may also direct the student to additional instruction to build on his weak areas or may redirect him to the related page in the course material. Remediation shall be provided after the completion of the exam.

Quizzes: For each incorrectly answered question, the quiz shall always cite the reference, and may provide remediation by directing the student to new material that presents the original information in a different way (i.e., different format, different wording, different perspective, reference document, etc.). The remediation is best designed as a learning experience to address the student's needs. However, a quiz may also be designed to provide immediate feedback combined with remediation displaying the question, the correct answer, and an explanation of why it is correct.

Comprehension check questions: The learner shall be provided with more than one opportunity to answer a comprehension check question correctly. After the first incorrect response, feedback and a hint shall be provided, along with the instruction to try again. After the second incorrect response, provide feedback stating 1) the correct answer, 2) if appropriate, why it is correct, and 3) the reference document. The learner shall not be allowed to continue on (by clicking Next) without first attempting to answer the question.

III.G. Spelling and Grammar

All submittals, including prototypes, samples, etc., shall be in English, not in other languages. Spelling errors, typographical errors, and grammatical errors are considered to be a distraction to effective learning, and at worst case, negative training. Therefore, editing and quality checks shall be performed on all deliverables.

III.H. Information Required in IMDP

SOBT requires that all aspects of the intended course design be clearly identified in the Instructional Media Design Package (IMDP). The IMDP shall be delivered as an MS Word document (see section II.A.5.a.ii.) with a naming convention beginning with the 5-digit course number, followed by the version number. The following example shows what the file name would be for a course with course number 01234 and version number 1.00.

Example:

01234v1p00_imdp_rev1_name_of_course_etc.docx

For courses containing NNPI, the file name shall begin with the appropriate prefix per Exhibit 7 paragraph 3 of OPNAVINST N9210.3, followed by the naming shown above.

The IMDP shall be specific to the course. The IMDP shall list the instructional theories and techniques that are intended to be used in the course.

The IMDP shall contain all of the following sections:

1) Cover page – as described below
2) Second page – as described below
3) Table of contents
4) Overview
5) Course flow diagram – showing content flow and breakdown of SCOs (and SCO aggregations, if any)
6) Learning objectives – course, terminal, and enabling objectives

7) Topical outline – lessons/topics covered, and breakdown of SCOs (and SCO aggregations, if any)
8) Rollup behavior – how will the LMS roll up status and score?
9) Presentation category/interactivity level strategy
10) Assessment strategy – how will the objectives be measured?
11) Remediation strategy – how will areas of deficiency be re-taught?
12) User interface design – graphic depiction of user interface (screen captures)
13) Metadata items

A separate complete IMDP document must be delivered for each course.

III.H.1. Cover Page

The cover page of the IMDP shall include:

1) Course information:
    a) The title of the course
    b) The 5-digit course number
    c) The course version number
2) The delivery number of the IMDP document. The first delivery of the IMDP shall be labeled "Delivery 1". Subsequent revisions shall be designated with whole numbers, i.e., "Delivery 2", "Delivery 3", etc.
3) The date of the IMDP document. The date shall be a complete date including day, month, and year.

III.H.2. Second Page

The IMDP shall include a single page immediately after the cover page that contains:

1) The applicable version of the SOBT Developer's Guide
2) All exemptions from requirements in the Guide that have been agreed upon by the developer and SOBT. If no exemptions have been authorized by SOBT, then the exemptions section shall state "None" to indicate that the final product will fully comply with all requirements in the Guide. There shall not be anything elsewhere in the body of the IMDP that is contrary to the SOBT Developer's Guide unless it is listed here as an exemption.
3) Any plug-in(s) that the developer anticipates using in the courseware. List plug-ins used by each SCO; if a particular SCO uses no plug-ins, state "None" for that SCO. If any SCO in the course uses plug-ins, provide the plug-in detection message that will be used by each SCO. This is required because the wording of the message must be tailored to the situation – for example, if all SCOs use a plug-in, as opposed to cases where only some SCOs in the course use the plug-in. For more details, refer to sections IV.G.2. and IV.B.3. See section IV.A.2. for the list of allowable plug-ins.

III.H.3. Table of Contents

The IMDP shall contain a Table of Contents listing the major sections in the document with the page number of each.

III.H.4. Overview

The IMDP shall include an overview section that contains:

1) Course title
2) Brief course description
3) Length of course
4) Security level classification
5) Presentation category/Interactivity level
6) Target audience

In the case of content updates and format upgrades (as opposed to new development), some of the following sections (III.H.5. through III.H.13) may not apply. For these tasks, the IMDP shall specify which things are being changed and shall only include those of the following sections which apply.

III.H.5. Course Flow Diagram

The flow diagram is a map or chart that illustrates the major components of the course. The flow diagram shall show the student's sequential progression through the course as it would be if he started at the beginning and went through everything in order. It is understood that the student can jump back and forth from one part of the course to another (via the internal drop-down menu, or via the LMS's menu); therefore, the flow diagram shall not attempt to show all possible paths the student could take through the content, but rather show only the sequential flow from beginning to end. If the course includes branching (e.g., one screen contains multiple links to various pieces of content), the flow diagram shall show as much of the branching as is known at this phase of development. The flow diagram shall depict the course structure by clearly identifying:

1) Each SCO (including assessment-only SCOs)
2) SCO aggregations, if any
3) The placement of all assessments, including those that are contained within a SCO that also contains learning content, as well as assessment-only SCOs
4) The student's expected progression through the course content, including all SCOs, and the internal flow through the topics within each SCO (but not internal drop-down menu)

If a very small course consists of only a single SCO, the flow diagram must clearly show that the course is intended to be a single SCO.

For more complex courses, the flow diagram can be broken up into multiple pages, as needed to show all the information.

Figures 4 and 5 show examples of flow diagrams. For additional examples of flow diagrams please review: ADL's "SCORM Users Guide for Instructional Designers".

III.H.6. Learning Objectives

The IMDP shall contain a list of all learning objectives (LOs) that apply to the course. Learning objectives shall be written in the format described in section III.B.1.

1) Course learning objective
2) Terminal learning objectives (TOs)
3) A set of enabling learning objectives (EOs) to support each terminal objective

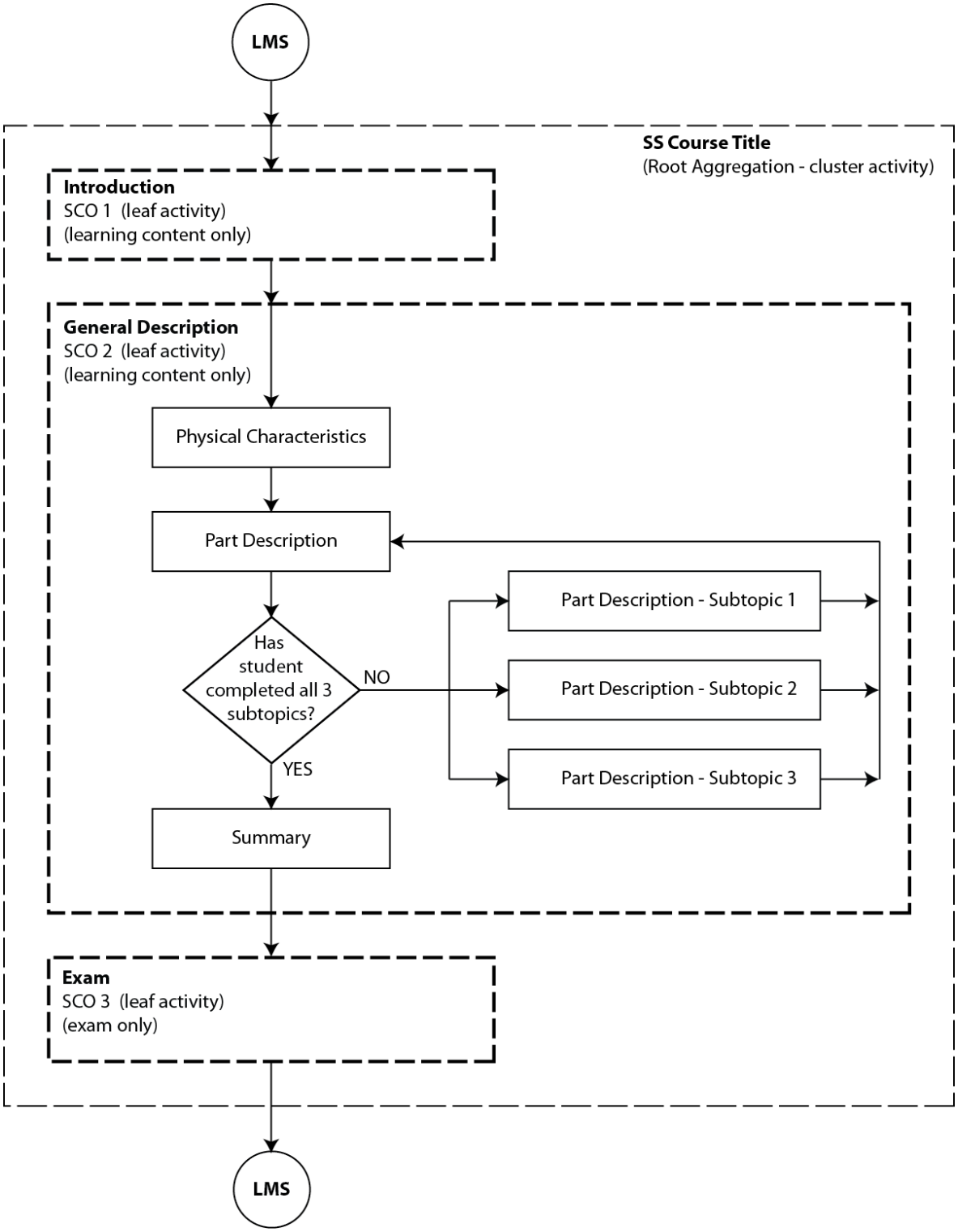


Figure 4: Example of Flow Diagram with Internal Branching within a SCO

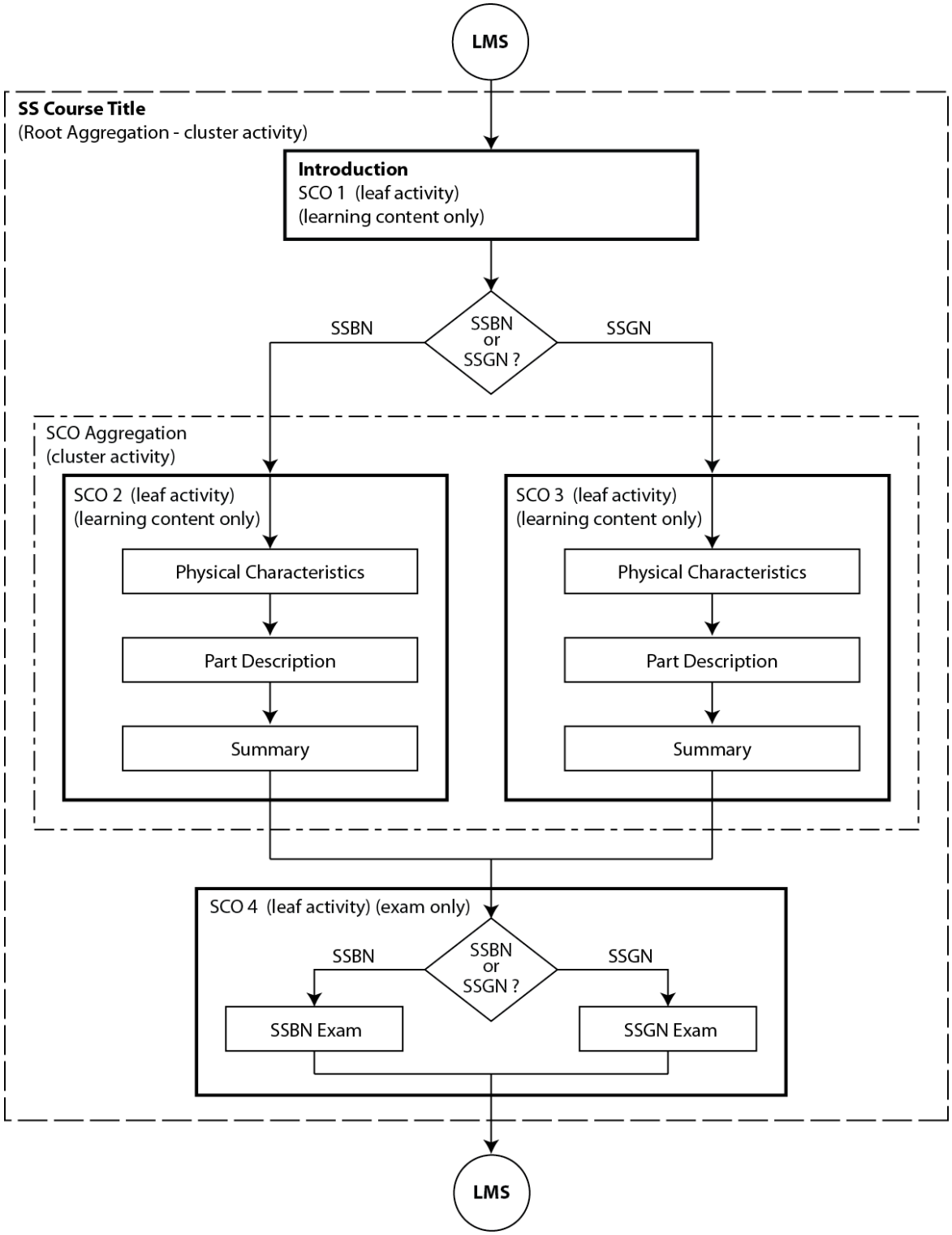


Figure 5: Example of Flow Diagram with both Internal Branching and Branching between SCOs

III.H.7. Topical Outline

The IMDP shall contain a topical outline, including a detailed breakdown of the lessons/topics covered by the course, and also including the following information for each item (i.e., SCO or SCO aggregation) in the course structure. The developer shall ensure that this topical outline is consistent with what is shown in the course flow diagram.

1) The title for each item in the hierarchy
2) Its level in the hierarchy
3) Whether it is a SCO, a SCO aggregation, or the root aggregation
4) The LO number (or other designator) indicating which learning objective(s) apply to each item in the hierarchy
5) The internal topics included within each SCO

III.H.8. Rollup Behavior

The IMDP shall specify the rollup behavior for the entire activity tree, including:

1) Rollup controls for each activity (either cluster or leaf) except the root aggregation:
   a) If it contributes to rollup of completion
   b) If it contributes to rollup of satisfaction
   c) If, and what percentage, it contributes to its parent's score
2) Rollup rules (conditions/action) for clusters only, including the root aggregation:
   a) Rollup rules for rolling up completion (2 rules: "completed" and "incomplete")
   b) Rollup rules for rolling up satisfaction (2 rules: "satisfied" and "notSatisfied")

See section III.C. for definitions and explanations of rollup terminology. See Appendix E for examples of several different course structures and the rollup information that would be included in the IMDP for each of them.

III.H.9. Presentation Category/Interactivity Level Strategy

The IMDP shall identify how the IMI will meet the presentation category/interactivity level required by the statement of work, including:

1) Types of presentation used (decision-based navigation, scenario-bounded branching, etc.)

2) Types of interactivity used (hyperlinks, hotspots, rollovers, etc.)

3) Types of media used (videos, 2D or 3D animations, user-controlled animations, etc.)

III.H.10. Assessment Strategy

The IMDP shall include a section on assessment strategy, containing:

1) Where all assessments will be placed in the course structure (for example: at end of internal topics, at end of SCO, as a separate Exam SCO, etc.)
2) The corresponding learning objective(s) to be evaluated by each assessment
3) For each assessment, whether it a) provides score and success status for the SCO to send back to the LMS (exam); or b) is for the student's self-check only (quiz)
4) For each assessment, whether it is knowledge-based or performance-based
   a) For knowledge-based assessments:
      i) Question types used

ii) Scope of question bank and question pool (see definitions in section III.E.3.)
iii) Randomization scheme and percentage of utilization (e.g., 1 of 3 questions from each pool, etc.)

b) For performance-based assessments:
i) Describe to what extent the exam will simulate actual behavior of the real component/system. (Simulated Part-Task Performance Evaluation)
ii) Grading rubric

5) How the score will be calculated and what is considered a passing grade (**for example:** *A SCO contains both a knowledge-based exam and a performance-based exam. The knowledge-based exam counts for 60% of the grade, and the performance-based exam counts for 40%. The two scores are averaged together using the 60/40 weighting. The student must achieve an overall grade of 80% or greater to pass.*)

6) Whether comprehension check questions will be used, an approximation of how frequently they will appear within the SCO, and the number of attempts that will be provided to the learner

(Also see more detailed information on Assessments in section III.E.)

III.H.11. Remediation Strategy

The IMDP shall contain a section on remediation strategy, stating how areas of deficiency will be re-taught. The remediation strategy must include consideration of the limitations placed on sequencing rules by this version of the SOBT Developer's Guide.

The remediation strategy shall also contain:

1) Number of times the content will be presented to the student as remediation
2) The granularity of the assessment results and the remediation. Remediation should never require the student to experience a significant portion of unrelated content.
3) How the deficient areas will be re-assessed
4) If and how new attempts at the assessment(s) will contribute to score and satisfaction status (**for example:** *The student is allowed to retake the assessment in order to improve his score. If he obtains a higher score, the new higher score will be saved to the LMS, overwriting his previous score. If he gets a lower score, the lower score will not be saved.*)

III.H.12. User Interface Design

The IMDP shall include a sample screen capture for each screen type utilized. The purpose of the screen captures is to depict the user interface design that will be used for the course. The screen captures do not have to show the actual content from the course – they can be taken from another course that uses the same user interface design. The screen captures shall depict an appropriate use of portion marking, in order to demonstrate that the developer understands the requirements for portion marking. The screen captures shall be kept Unclassified. If any situations necessitate a use of higher level classification markings for demonstration purposes, such screens shall be labeled with a disclaimer stating "This graphic is Unclassified. All classification markings are for example only."

Screen captures of the following screen types shall be included:

1) First page of a SCO, to show appropriate classification and warnings specific to the SCO. This must be an aggregate of the most restrictive markings in the SCO.
2) Instructional screen including top navigation menu
3) Assessment item screen
4) Assessment summary screen
5) Remediation screen (as applicable)

III.H.13. Metadata Items

The IMDP shall contain a list of metadata items to be used in the course metadata file. In addition, for each SCO metadata file in the course, the IMDP shall contain a list of metadata items to be used in the metadata file that corresponds to that individual SCO. The metadata items that shall be listed in the IMDP are:

1) ID
2) Title
3) Description
4) Keywords (See Appendix F:V.)
5) Version
6) Other Platform Requirements
7) Duration
8) Educational: interactivity type, learning resource type, interactivity level, typical age range, and difficulty *
9) Classification: security level, distribution restrictions (and accessibility restrictions, if applicable. See Appendix C:II.G.2.)

*Note: Assign the difficulty level based on the target audience.
("TypicalAgeRange" field in SCORM) Is it easy or hard for that target audience?

The purpose of including these metadata items at the IMDP phase is so that they can be easily reviewed by SMEs and SOBT Project Managers. Alternate and additional metadata items can be suggested if necessary. The list of approved metadata items is then ready to be put directly into the metadata file(s) when the beta is created. When SOBT staff reviews the beta, the metadata items in the metadata file(s) will be checked against the approved list from the IMDP. This approach provides better quality metadata items, as well as streamlining the effort required at the time of delivery of the beta.

Examples of course metadata items are:

Course Metadata	
ID	SLC-SOBT-08005-1.01
Title	SS Piloting Brief Halifax, Nova Scotia
Description	This IMI is designed to provide piloting information for the port of Halifax, Nova Scotia, that will aid navigators in providing Navigation Piloting briefs for entering or leaving port. It is also designed to train periscope operators to recognize visual navigation aids.
Keywords	Halifax Navigation Nova Scotia Piloting
Version	1.01
Other Platform Requirements	Flash Player 13
Duration	PT2H00M
Educational – Interactivity Type	mixed
Educational – Learning Resource Type	narrative text
Educational – Interactivity Level	medium
Educational – Typical Age Range	Journeyman
Educational – Difficulty	easy
Classification – Security Level	Unclassified
Classification – Distribution Restrictions	DISTRIBUTION STATEMENT D.
Classification – Accessibility Restrictions	(Required for all courses, including Unclassified. See Appendix C:II.G.2. and Appendix F.II.)

Table 6: Examples of Course Metadata

Examples of SCO metadata items are:

SCO Metadata	
ID	DODUSNSLCSOBT_08005_01
Title	Piloting Directions – Inbound
Description	This SCO is designed to provide piloting directions along the inbound track for the port of Halifax, Nova Scotia.
Keywords	Charts Inbound Navigation Piloting Navaids
Version	1.01
Other Platform Requirements	Flash Player 13
Duration	PT0H24M
Educational – Interactivity Type	mixed
Educational – Learning Resource Type	narrative text
Educational – Interactivity Level	medium
Educational – Typical Age Range	Journeyman
Educational – Difficulty	easy
Classification – Security Level	Unclassified
Classification – Accessibility Restrictions	(Required for all courses, including Unclassified. See Appendix C:II.G.2. and Appendix F.IV.)

Table 7: Examples of SCO Metadata

IV. TECHNICAL SPECIFICATIONS

IV.A. Software Specifications

IV.A.1. Minimum Requirements

All SOBT courses are required to run both web-based (i.e., from a web server, e.g., IIS) and file-system-based. All SOBT courseware must be capable of running on the following minimum software platforms:

Software	
Operating Systems:	Windows 7
Browser:	MS Internet Explorer 8, 10, and 11 (strict standards, and compatibility view)

Table 8: Minimum Software Specifications

SOBT courseware is now required to function in browser versions IE 8, IE 10, and IE 11 when either using, or not using, compatibility view. All features of the course must function properly in each of these target browsers, and the browser detection must detect and report the correct browser version being used, whether or not compatibility view is being used.

SOBT products (with the exception of simulators) may not contain executables. In other words, the products may not contain .EXE, .BAT, or .COM files.

IV.A.2. Plug-ins

IV.A.2.a. Approved Plug-ins

The following plug-ins are approved for use in SOBT courseware:

Flash Player 13 (see IV.A.2.b.)
Acrobat Reader 9 (see IV.A.2.c.)
Windows Media Player

Note that ActiveX controls and Java are considered plug-ins, and they are not allowed by SOBT at this time.

IV.A.2.b. Flash Restrictions

SOBT is placing some restrictions on the use of the Flash Player. Although Flash development is still allowed, SOBT is limiting the use of components that require the Flash player. Navigation menus shall not be done in Flash. The Flash Player shall not be used to display still graphics. A page or component must use either interaction or animation to justify the use of the Flash Player. The reason for this limitation is that SOBT expects, in the future, courses will be required to run on tablets which do not support the Flash Player. Things that can be done without Flash, should be done without Flash.

IV.A.2.c. PDF Restrictions

PDF files may not contain embedded JavaScript, since it is expected that Acrobat JavaScript (using Adobe Acrobat Reader) will be disabled by group policy on the SubLAN.

IV.A.3. Multimedia Content

IV.A.3.a. Allowable File Formats

The following is a list of file formats which may be used:

*.gif	*.mp4	*.pdf	*.wav
*.jpg	*.mpeg	*.png	
*.mp3	*.mpg	*.swf	

IV.A.3.b. Graphics

The height and width attributes used in the HTML code shall match the actual size of the graphic (i.e., do not use the height and width attributes to "stretch" or resize the graphic). The exception to this rule is when a transparent .gif image is used for spacing purposes.

IV.A.3.c. Audio

All SOBT courses shall contain full audio narration. The narrator shall not read the screen text to the student. Rather, audio shall expound on the screen presentation to enhance the learning effectiveness. Audio is required on every screen with learning intent. Audio supporting individual page narration shall play automatically as soon as the page is loaded.

IV.A.3.d. Video

Video in standard SOBT courseware shall be used only when it is essential to effectively teach a specific learning objective. Due to bandwidth limitations, consideration should be given to other media (still images with audio, animations, etc.) before considering video. The height and width attributes used in the HTML code shall match the actual size of the video.

Along with standard SOBT courseware, SOBT has also been involved in distributing certain HTML-based video products to the fleet, referred to as Digital Video Products for the purposes of this discussion. Digital Video Products are products that are essentially all video content and do not contain exams. These products must be in SCORM format to track utilization requirements specified in reference OPNAVINST 1540.51D. There is a reduced set of SCORM calls that SOBT requires in this type of product. Digital Video Products shall follow the specifications given in this section (section IV: "Technical Specifications") with some exceptions, which are noted throughout this section in the applicable subsections.

IV.B. User Interface Design

IV.B.1. Screen Area and Layout

Screen design shall be planned with the assumption that the presentation area for the course is 800x600. The course presentation area shall be sized to 800x600 pixels. The size of 800x600 supports a course running within an LMS on a computer set to a 1024x768 screen resolution, because the LMS may take up some of the screen for LMS-presented menus. All pages shall have the scrolling attribute set to "auto" in order to allow a scroll bar to appear if the course material does not fit in the available window area.

The screen layout for the course presentation area shall consist of a navigation menu area at the top, with a course content area beneath it. The top navigation menu area shall be sized to a height of approximately 40 pixels. The bottom content area shall be sized to a height of approximately 560 pixels. The sizing of these two areas is flexible, as long as the overall size of the course presentation area does not exceed 800x600 pixels. The top navigation menu is used for internal navigation within the SCO (as opposed to SCO-to-SCO navigation which is provided by the LMS). An example of the screen layout is shown in Figure 6.

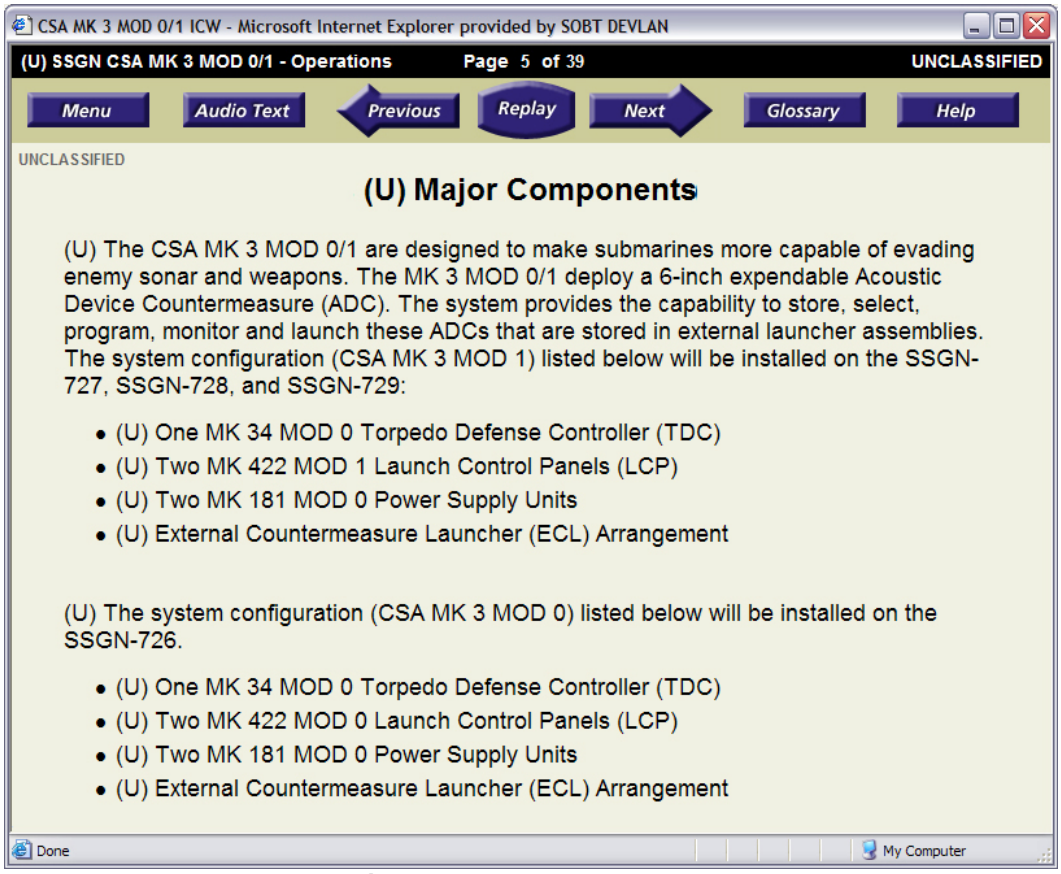


Figure 6: Screen Layout

IV.B.2. Menu Buttons

The top navigation menu shall contain the following buttons: Previous, Next, Replay, Audio Text, Glossary, and Help – each labeled with the corresponding text. An Exit button shall not be included, since this functionality is expected to be provided by the LMS. The top navigation menu shall not be done in Flash – top navigation menu items may not be rendered using Flash components. All buttons shall be designed so that they change when the user mouses over the button. The buttons shall appear depressed when the user clicks on the button. If symbols are included with the text, the symbols shall be appropriate per commonly-used conventions.

In addition to the required buttons, a "Menu" button may be included within the top navigation menu to provide a drop-down menu (Figure 7) with links to more granular parts of that SCO. It should be noted that this internal menu button is not a replacement for breaking down a large course into multiple SCOs. The majority of courses are expected to consist of multiple SCOs, and thus the major divisions of the content should be at the SCO level.

The Previous and Next buttons shall be used to navigate between pages within the SCO. The Replay button shall refresh the content displayed in the bottom screen area (note that this is different than clicking the Refresh button on the browser's menu, which reloads the entire page). The Audio Text button shall open a box displaying the narrator's words in text format for the benefit of the hearing impaired, in order to satisfy 508-compliancy requirements. (See section IV.C.1.) The Glossary button shall open a glossary in a separate overlay. The glossary shall contain definitions of all acronyms used within the course, and other technical terms that require definition. The Help button shall open a help file or section in a separate overlay.

The top navigation menu must be visible at all times; individual buttons shall be dimmed as follows: When any menu button is inactive, it shall appear dimmed (gray, or unavailable). When any menu button appears dimmed, it shall be inactive, shall not respond to the user clicking on it, and also shall not throw any error messages if the user does click on it. On the first page of a SCO, the Previous button shall be inactive and appear dimmed. On the last page of a SCO, the Next button shall be inactive and appear dimmed. (Note that if an assessment is included at the end of a SCO, that assessment is also considered to be one of the pages of the SCO and is numbered accordingly. See section IV.B.4.) Glossary shall be unavailable during exams.

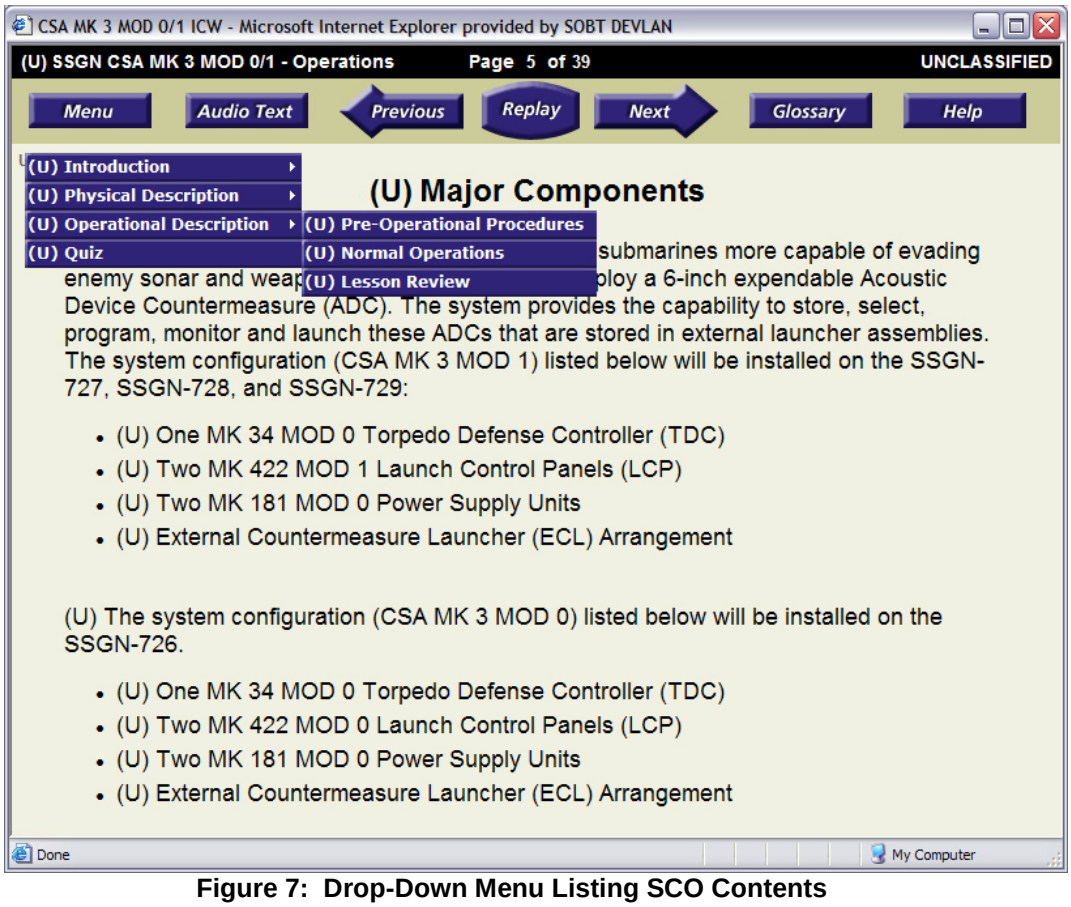


Figure 7: Drop-Down Menu Listing SCO Contents

IV.B.3. Help Section

Information on supported browsers and required plug-ins shall be included in the help section of each SCO. The wording of the browser and plug-in information must be tailored to the

specific situation. In the case of plug-ins, the information may need to address individual SCOs, as well as the course as a whole. Following are some examples:

Example 1: "This courseware is designed to run in Internet Explorer 8, 10, or 11.
This lesson requires Adobe Flash plug-in version 13.
This lesson requires Adobe Acrobat Reader version 9.
If the required plug-in is installed and you still experience issues, contact your system administrator to review the current group policies and the security settings for your browser."

Example 2: "This courseware is designed to run in Internet Explorer 8, 10, or 11.
Although this lesson does not require the Flash plug-in, other lessons in this course do require Adobe Flash plug-in version 13.
This lesson requires Adobe Acrobat Reader version 9.
If the required plug-in is installed and you still experience issues, contact your system administrator to review the current group policies and the security settings for your browser."

Example 3: "This courseware is designed to run in Internet Explorer 8, 10, or 11.
This courseware does not require any plug-ins."

IV.B.4. Page Numbering/Branching

SOBT requires that every screen indicate the page currently being viewed and the total number of pages in the SCO (for example: "page 10 of 65"). The intent is to give the student a reasonable expectation of how much total content is in the SCO and how far he or she has progressed through the content. Branching within the SCO can add significant confusion to what would otherwise be a simple progression. Several rules apply:

1) The preferred method is that the number of pages in the SCO indicates the total number of pages the student is expected to view in the entire SCO, including branching.

2) Branching shall be used as a method of enhancing the learning process and not as an alternative to normal flow progression within a SCO. Branching is certainly appropriate in a SCO designed to allow a student to explore or practice a troubleshooting flow diagram. Branching is not appropriate as a method of presenting material that the student is required to know, where the student is required to cycle through all of multiple branches to view the instructional material (e.g., "click on components A through E to learn more".)

3) The final page of the SCO shall be the last page the student is expected to view. This means the assessment needs to be included, and the assessment summary needs to be completed as the last screen. Numbering should not exceed the final screen (e.g., not 66 of 65).

4) If an assessment is a part of the SCO, the assessment instructions page, the assessment itself, and the assessment summary page shall be included in the page numbering sequence. This may be done in one of two ways: 1) by having all three parts as a single page number which is the final page of the SCO; or 2) by having separate page numbers for the instructions page, the assessment, and the summary page. In either case, the questions within the assessment shall be numbered in their own sequence, which is separate from the page numbering sequence. (This applies in

both of the following cases: 1) when all questions reside on one HTML page and are changed dynamically, and 2) when each question is a separate HTML page.)

5) Typically, there must not be additional branching within an already-branched segment of a SCO. The exception to this is simulations or emulations of a piece of equipment, in which case the branching must behave in the same way that the equipment behaves, in order to accurately model the equipment.

6) It may be best to not include page numbers where complex branching would make it impossible to accurately represent total pages and location in the SCO. In this case, the first page of the SCO shall indicate the expected completion time for the SCO. This design intent shall be identified in the IMDP. This method shall only be used when the nature of the learning material requires complex branching, such as a process or procedure that involves complex branching.

7) Branch page numbers shall never start the page numbering sequence over – i.e., there must never be two page 1's within a SCO. Page numbers, as intended for the final product, shall be included within the storyboard deliverable.

IV.B.5. Text

On-screen text shall be used to emphasize important concepts within the content material of the course. Since all SOBT courses are to be fully narrated, the text that appears on the screen should be "bulletized" and must not be a verbatim copy of the narrator's words. Additionally, the Audio Text button (as described above) shall provide the complete audio narration in text form which can be opened in a separate overlay.

IV.B.6. Fonts

IV.B.6.a. Font Size in HTML

In the CSS standard, there are numerous ways to specify font sizes. Developers of SOBT courseware shall specify font sizes by using either point sizes (pt) or pixel sizes (px), since these methods of font sizing cause the text to remain at a constant size and are not affected by the browser's Text Size setting or the computer's Display Properties Font Size setting. Some examples of using a CSS style attribute to specify font sizes are:

```
style="font-size:14pt"

style="font-size:32px"
```

Since this method ensures that the layout of the page is not affected by unexpected changes in font size, a message which was included in previous SOBT standards (such as "Your computer's display should be set to 'Small Fonts' and the Text Size within Internet Explorer should be set to 'medium'.") is no longer needed and shall not be used.

IV.B.6.b. Font Face in Flash

Flash components shall use standard fonts, such as Arial, Times New Roman, or the computer's system fonts. If non-standard fonts are used, they must be embedded in the Flash object. However, keep in mind that embedding of fonts will increase the file size of the SWF. Therefore, it is best to use standard fonts wherever possible.

IV.C. Section 508 Compliance

All SOBT products shall be made Section 508 compliant. (Exception: Digital Video Products are exempt from Section 508 compliance requirements.)

Section 508 requires that Federal agencies' electronic and information technology is accessible to people with disabilities. IT Accessibility & Workforce Division, in the U.S. General Services Administration's Office of Government-wide Policy, has been charged with the task of educating Federal employees and building the infrastructure necessary to support Section 508 implementation. Using the website at http://www.section508.gov/, Federal employees and the public can access resources for understanding and implementing the requirements of Section 508.

There are four main areas that are of concern for SOBT products:

IV.C.1. Audio Text

The term "audio text" refers to text that is displayed on the screen, providing the same information as in the audio narration. Audio text shall be provided for all narration. The audio text shall be a duplication of the narrator's exact words. In cases where terminology is defined in the Submarine Interior Communications (IC) Manual, the narrator shall use the spoken wording as given in the IC Manual, and the audio text shall use the written abbreviation as given in the IC Manual. The audio text shall not contain typos or misspelled words. The purpose of audio text is to make the content accessible to people who are hearing impaired.

Audio text shall be displayed in a box which can be opened and closed by a button on the top navigation menu (see section IV.B.2.) The audio text display box shall be implemented as a separate overlay (not a pop-up window). If the student leaves the audio text box open, then the audio text that is displayed shall be refreshed when the content screen changes. The audio text shall stay on top of the main course content, if the student leaves it open when advancing to another page. The audio text box shall be draggable and resizable. Multiple audio text boxes shall not be allowed to be open at the same time.

IV.C.2. Alt Tags

The term "alt tag" refers to the alt attribute of the <img> tag (image tag) in HTML code. Users who are visually impaired can be provided with a type of software known as a screen reader, which reads aloud to them the text contained in the HTML alt tag.

Per the HTML standard, every <img> tag is required to have the alt attribute. SOBT requires that all graphics placed on the HTML page via an <img> tag, contain within the alt attribute a short specific description of the image in question. The alt attribute must contain a short, but correct, description of the image. The alt cannot be an empty string, i.e. `alt=""`, cannot say `alt="none"`, etc. There is one exception, which is that in the case of a transparent .gif used as a spacer or placeholder, the alt can be an empty string.

Note that this requirement does not apply to background graphics or Flash components, since they are not implemented with the <img> tag. In the case of Flash components, do not create small pop-ups that mimic the appearance of an alt tag, since this adds extra work and serves no purpose. The screen reader cannot read this description if it is not contained in an actual HTML alt tag. The purpose of the Section 508 alt tag requirement is not to provide a pop-up window on mouse-over of the graphic (although that is a side-effect since the browser also obtains the mouse-over pop-up text from the alt tag), but rather it is for the sake of the visually-impaired user who is using screen reader software.

IV.C.3. Color Alone Not Used to Convey Information

Section 508 states that "color alone shall not be used to convey information". Color may be used, as long as some other accompanying method is also used to give the same information. The purpose of this requirement is to make the content accessible to people who are color blind.

For example, highlighting the correct answer in green is not an acceptable technique, unless it is also accompanied by another method of giving the information, such as an additional statement that says "The correct answer is...", or a checkmark next to the correct answer, etc.

IV.C.4. Acceptable Color Contrast Differences

When text (or items such as a highlight box) of one color are placed on a background of another color, the developer shall ensure that adequate contrast in intensity (i.e., light/dark contrast) is provided, as well as just color contrast. For example, red/green color contrast is not the best to use, due to the fact that red/green color-blindness is the most common form of color-blindness. However, if a dark red text is used on a light green background, this would be better because more contrast is provided by the difference in light/dark intensity as well as just the differences in color. The strongest contrast is achieved with black text on a white background, or white text on a black background.

IV.D. HTML/JavaScript Specifications

IV.D.1. HTML

All SOBT HTML-based courses shall be programmed to the W3C's HTML 4.01 standard at http://www.w3.org/TR/html4/. All required tag elements and attributes shall be included. Tag elements and attributes which are invalid or deprecated (examples: <font>,) in the HTML 4.01 standard shall not be used. The functionality previously provided by the deprecated tag element or attribute shall be replaced by the technique recommended in the W3C's HTML 4.01 standard; for example, the <font> tag is deprecated in favor of Cascading Style Sheets (CSS). Prior to delivering the prototype or beta courseware, the developer shall test all of their HTML pages with an HTML validator. SOBT does not require the developer to use any one particular validator. The W3C's Markup Validation Service at http://validator.w3.org/ is considered to be the authority on the HTML standard. However, since many SOBT courses cannot be tested online due to the courses being classified or NOFORN, it is required for many (and highly recommended for all) SOBT courses that some other validator be used. Since different validators sometimes give slightly different results, for any cases that are in question, the W3C's validator will be used to make the final determination, by creating a test page that contains the code in question but does not contain any classified or NOFORN content.

All pages shall be valid per the HTML 4.01 standard, with the additional requirement that the <frameset> and <frame> elements shall not be used. Although these elements are allowed in the HTML 4.01 standard, they are not allowed in HTML5. It is expected that SOBT will move up to HTML5 at some time in the future. The <iframe> element is still allowed in HTML5 and may still be used in SOBT courseware.

A document type declaration which specifies the document type definition (DTD) shall appear as the first line of each HTML page (before the <html> tag). For SOBT courses, all HTML pages shall use either the Strict DTD or the Transitional DTD. An example of the document type declaration for the Strict DTD is as follows:

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01//EN"
"http://www.w3.org/TR/html4/strict.dtd">
```

An example of the document type declaration for the Transitional (loose) DTD is as follows:

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN"
"http://www.w3.org/TR/html4/loose.dtd">
```

The content type ("text/html") and character encoding of an HTML document shall be indicated with the <meta> tag which must be nested within the <head> section of the document. There are a number of different character encodings that could be used, but if in doubt, "UTF-8" is a good one to use. Example:

```
<meta http-equiv="Content-Type" content="text/html; charset=UTF-8">
```

IV.D.2. CSS

Cascading Style Sheets shall follow the CSS 2.1 standard, and may use any CSS 2.1 properties providing that the specific functionality works properly in the target browser(s). There shall be a single external CSS style sheet within each SCO which shall contain the majority of style information for that SCO. In this way, a consistent look can easily be maintained within the SCO. A consistent style can be maintained from SCO to SCO, by copying the external style sheet from one SCO into the next SCO. Embedded style sheets shall be used on an individual page or pages, when it is necessary or desirable to override a general style rule that has been established by the external style sheet. Similarly, inline styles may be used to override either the external or the embedded style sheet information, when a contrasting style is needed for special emphasis or for unusual circumstances.

IV.D.3. Scripting Languages

JavaScript is the only approved scripting language for use in SOBT courseware. JavaScript is needed in order to provide the functionality that SOBT requires. Use of VBScript is not allowed. Java and ActiveX are not allowed. The use of Dynamic HTML (DHTML) is encouraged. JavaScript files shall not be encoded.

IV.D.3.a. Cookies

Cookies shall not be used in any SOBT courseware. All data that needs to be persisted shall be handled by SCORM calls to the LMS. It is understood that this functionality will not be available when running the course without an LMS. SOBT prohibits the use of cookies for the following reasons: 1) the user's browser settings might be configured to not accept cookies, 2) cookies that do not have unique names across courses, cause one course to react to previously saved data from a different course, 3) when a different user is using the computer, his attempt on the course is affected by the previous user's cookies, and 4) when a user starts a course on one computer, and then attempts to continue it on a different computer, data saved in cookies on the first computer is not available to the second computer.

IV.D.3.b. Display of JavaScript Error Notifications

The course must run error-free in the target operating systems and the target browsers described in section IV.A.1. During the development process, developers must ensure that their browser is configured to display JavaScript errors, in order that errors can be identified and corrected early in the development process. Do not deliver courseware that contains JavaScript errors.

See Appendix D for instructions on how to configure Internet Explorer to display JavaScript error notifications.

IV.D.3.c. Use of "parent"

Following are some caveats about use of the JavaScript keyword "parent" as a frame reference, which are especially significant when the course is run from within an LMS:

- **"parent" vs. "top"**

  Do not use "top".
  When working with framesets, the JavaScript language provides the keywords "parent" and "top". When a frameset is loaded into a window, that first frameset becomes "top" – at which point, "top" and "parent" refer to the same thing. When a second frameset is loaded into one of the frames of the first frameset, a new level is added in the frame tree hierarchy. If you have a function on one of the pages at the lowest level, "parent.functionName", it references the frameset immediately above it, but a call on the same page to "top.functionName" references the first frameset, the one at the very top of the hierarchy. In other words, "parent" and "top" are no longer the same.

  Some LMSs use an additional outer frameset as a wrapper around the frameset that is built into the developer's courseware. Since this is done by the LMS, the developer of the content does not have control over this, and thus the use of "top" becomes very unreliable. Therefore, do not use "top".

- **use of "parent"**

  In a similar vein, the use of "parent" must be precise. If you incorrectly use "parent" when already at the top of the frame tree hierarchy, it can default to "self" (since there is nothing else above it) and can appear to be working correctly. Then when an LMS puts an additional outer frameset around the developer's frameset, things that used to work, might no longer work.

Correct functionality relating to the above issues can be tested by stepping through the course in the "Sharable Content Object (SCO) Run-Time Environment (RTE) Conformance Utility Test" option of the SCORM Conformance Test Suite, by testing in any LMS that adds an outer frameset when launching the content, or by creating a dummy frameset for testing.

IV.D.3.d. Use of "document.write"

The use of "document.write" is allowed to dynamically write HTML tags to the page. However, there are a few guidelines to ensure that the code is "clean" and well-formed:

- If you are using "document.write" to create a start tag, then use it to create the corresponding end tag also (rather than placing the end tag explicitly within the markup). Examples:

```
<script type="text/javascript">
  document.write('<a href="' + nextPage +'">');</script>
To Go to the Next Page, Click Here
<script type="text/javascript">
  document.write('</a>');</script>
```

```
<script type="text/javascript">
  document.write('<div style="color:' + newColor + ';
  font:' + newFontSize + 'pt Times,serif;">');</script>
Welcome to this Course
<script type="text/javascript">
  document.write('</div>');</script>
```

…or, conversely, place both the start tag and the end tag explicitly within the markup, and use a CSS style sheet to define attribute values (which may be done with "document.write").

Example:

```
<head>
<script type="text/javascript">
document.write('<style type="text/css">');
document.write('.headerText { ');
document.write(' color:' + newColor + ';');
document.write(' font:' + newFontSize + 'pt Times,serif;');
document.write('} ');
document.write('</style>');
</script>
...
</head>

<body>
<div class="headerText">
Welcome to this Course
</div>
...
</body>
```

- Always place the <body> tag (and its corresponding end tag) explicitly on the page. If needed, use an external style sheet, or an embedded style sheet which may be created with "document.write" (similar to the above), to define the attributes of the <body> tag.

IV.E. SCORM Conformance

IV.E.1. Sharable Content Object Reference Model (SCORM)

All SOBT courses shall be conformant with SCORM 2004 3rd Edition (release date 10/20/06). Courses shall be broken down into Sharable Content Objects (SCOs). The initial start page of each SCO shall be named "lms_start.htm". This document is not meant to include a comprehensive description of all SCORM standards. The SCORM specification can be found at the Advanced Distributed Learning (ADL) website at http://www.adlnet.gov/.

IV.E.2. SCORM Run Time Environment (RTE)

IV.E.2.a. The SCORM Application Programming Interface (API)

IV.E.2.a.i. The API Instance

The API Instance is a component provided by any SCORM-conformant Learning Management System (LMS). The developer may assume that whatever LMS is being used provides an API Instance that is conformant with the SCORM 2004

standard, and provides support for those SCORM API calls that are defined as mandatory by SCORM 2004.

IV.E.2.a.ii. SCORM API Calls

The API Instance provides a standard set of functions to which the course can make calls, in order to communicate with the LMS. The SCORM 2004 API calls include (but are not limited to) the following:

Initialize() – required by SCORM, as well as by SOBT, in order to establish a communication session with the LMS. The first page of a SCO shall initialize communications, immediately on load of the page. SOBT prohibits the use of an intermediate page which does not initialize communications ("dead page") and which requires additional student interaction to navigate to a page that does initialize communications.

Terminate() – required by SCORM, as well as by SOBT, in order to end the communication session with the LMS. Since the student can exit on any page (not just on the last page of the course) terminate must be called on exit of the SCO, not from the last page. All data (score, success_status, completion_status, bookmark, etc.) must be saved to the LMS before the SCO terminates communication with the LMS. Crucial data (score and statuses) should be saved as soon as it is known. Terminate must be called from the onUnload event handler of the SCO's "lms_start.htm" page (called via doTerminate() in the API wrapper).

SetValue() – once a communication session has been established, this function is used to set values into various data model elements of the LMS. See section IV.E.2.a.iv. for details on specific data model elements that SOBT requires.

GetValue() – once a communication session has been established, this function is used to retrieve values that had been previously set to the LMS. See section IV.E.2.a.iv. for details on specific data model elements that SOBT requires.

Digital Video Products are only required to call Initialize(), Terminate(), and SetValue() to set a value of "completed" for completion_status, and a value of "passed" for success_status. They are not required to retrieve any data from the LMS. The digital video product shall set "completed" and "passed" immediately after a successful call to Initialize().

IV.E.2.a.iii. The API Wrapper

The SCORM API calls shall be "wrapped" in an API wrapper which shall be implemented as a separate JavaScript file ("apiwrapper.js"). SOBT requires the use of a SCORM 2004 API wrapper that is provided on the SOBT website at https://www.netc.navy.mil/sobt/web/developers/devmain.htm. Each of the SCORM API calls is wrapped by another function – for example, the GetValue() call is wrapped by a function named doGetValue(). All of the wrapper functions are contained in this JavaScript file. This JavaScript file shall be linked to each HTML page as needed by a <script> tag within the <head> section of the HTML page.

Any calls to the LMS shall be made via the above API wrapper. There shall not be other calls to functions of the LMS's API instance that bypass the API wrapper.

IV.E.2.a.iv. SCORM Data Model Elements

The SetValue() and GetValue() calls are used with a data model element to set or retrieve a value for that element. For example, a call to GetValue("cmi.location") retrieves the value that had been previously set for the bookmark into the "cmi.location" element. The developer shall not exceed any smallest permitted maximum (SPM) as specified in the SCORM documentation. For example: for SetValue() calls, the character length of the value shall not exceed the SPM specified by SCORM for that value; for elements using arrays with indexes (e.g., cmi.objectives.n, where "n" is the index) the number of indexed items shall not exceed the SPM specified by SCORM for that array. Following is information about specific SOBT requirements for data model element usage. In cases not listed below, the exact combination of data model elements used will be determined by the behavior that is described in the IMDP for the course.
The standard SCO communication behavior (described below) is shown in Table 9, and shall be used unless otherwise specified in the IMDP.

	SCO with no learning content, only assessment	**SCO with learning content and no assessment**	**SCO with both learning content and assessment**
cmi.completion_status	if < 100%* of exam pages visited, "incomplete" if 100%* of exam pages visited, "completed"	if < 100%* of pages visited, "incomplete" if 100%* of pages visited, "completed"	if < 100%* of all pages (including exam pages) visited, "incomplete" if 100%* of all pages (including exam pages) visited, "completed"
cmi.exit	"suspend"	"suspend"	"suspend"
cmi.location	Must not set	Set to last visited content page	Set to last visited content page (If in exam, set to exam's start page)
cmi.score.raw	Set to highest score	Must not set	Set to highest score
cmi.score.scaled	Set to highest scoreRaw / 100┼	Must not set	Set to highest scoreRaw / 100┼
cmi.success_status	if exam not taken, "unknown" if exam score < 80**, "failed" if exam score >= 80**, "passed"	"unknown"	if exam not taken, "unknown" if exam score < 80**, "failed" if exam score >= 80**, "passed"

* The default of 100% pages visited is required for completion unless otherwise specified in IMDP.
** The default of 80% is the passing score unless otherwise stated in IMDP.
┼ The default of scoreRaw / 100 is the score.scaled unless otherwise stated in IMDP.

Table 9: SOBT Standard Behavior for SCO Communication

Exit condition ("cmi.exit") – SOBT requires that the data model element "cmi.exit" be set to "suspend" before termination of the SCO.

Bookmark ("cmi.location") – all SCOs containing learning content (as opposed to assessment-only SCOs) shall set a bookmark, and retrieve the bookmark when the student enters the SCO on subsequent attempts. When a previously-saved bookmark has been retrieved, the SCO shall ask the student if he wants to return to his previous bookmark, provide him with "Yes" and "No" options, and return him to the bookmarked page if he chooses "Yes". An Exam SCO that contains only an assessment, and no learning content, shall not provide a bookmarking feature, since if the student leaves the SCO without finishing the exam, then he is required to retake the whole exam.

Completion status ("cmi.completion_status") – completion status shall be used to mean that the student has experienced all of the learning content and all of the assessments, except for SCOs that are considered optional as defined in the IMDP. All SCOs, both assessed and non-assessed, shall pass back a completion status. Completion shall not be set early – i.e., the SCO shall not be set to "completed" before the student has been through all the required content and the assessments. The percentage of pages required for completion must also be documented in the IMDP. The percentage of pages required for completion shall be 100%, unless otherwise defined in the IMDP. Completion status shall be determined as follows:

- if the student has viewed all the learning content/assessments: completion_status="completed"

- if he did not view all the learning content/assessments: completion_status="incomplete"

  Note: Visiting 100% of the pages would apply for a purely linear SCO. A lower percentage of visited pages could apply for a SCO with branching. For example, visiting 80% of the total pages of learning content could be considered satisfactory to achieve a "completed" status for a SCO with branching. Note that completion does not necessarily have to be based on a static percentage of pages viewed. See Appendix I: "Optional Branching" for an example of how to calculate the required percentage of pages viewed when the course includes branches of varying sizes. Completion strategy must be defined in the IMDP. In all cases, the assessment must be completed before the SCO can be considered completed, if an assessment is included.

Success status ("cmi.success_status") – Success status shall be used to indicate whether or not the student has achieved a score of 80% or higher, or other criteria as established in the IMDP. All assessed SCOs shall pass back a success status as described below. Non-assessed SCOs shall pass back a success status of "unknown." When the student takes an exam, a success_status of either "passed" or "failed" shall be sent back to the LMS; with the exception that if the student has previously taken the exam, a success_status of "failed" shall not overwrite a success_status of "passed". Once a SCO has passed back a success status, the LMS can use that success status to determine satisfaction for the activity associated with that SCO. Do not confuse success status with satisfaction – success status is a value set by the SCO, whereas satisfaction is what is used by the LMS for rollup. For more information

about how satisfaction is to be rolled up by the LMS, see section IV.E.3.a.iv. Success status shall be determined as follows:

- if the student passed the assessment:
  success_status="passed"
- if the student failed the assessment:
  success_status="failed"
- if he did not do the assessment, or didn't finish it:
  success_status="unknown"
- if the SCO does not contain an assessment:
  success_status="unknown"

Score ("cmi.score.raw", "cmi.score.scaled") – only SCOs that contain assessments shall pass back a score. When the student takes an exam, his score shall be sent back to the LMS, regardless of whether he passes or fails; with the exception that if the student has previously taken the exam, a lower score shall not overwrite a previously-attained higher score. Once a SCO has passed back a score, it becomes the score that the LMS stores for the activity associated with that SCO. This activity and its score may, or may not, be included in rollup. For more information about how scores are to be rolled up by the LMS, see section IV.E.3.a.iv. and Appendix E.

IV.E.2.b. Determining if Student has Taken Exam

A note on programming techniques: A variable internal to the course may be used to temporarily store the exam score. If such a variable is initialized to zero, it is not adequate to use a check of this variable to determine if the student has taken the exam. He may have taken the exam and missed every question, thus failing with a score of zero. Therefore, a value of zero in the variable does not tell you whether or not the student has taken the exam.

In the case where he has taken the exam and missed every question, he should receive a success_status of "failed"; whereas, if he had not taken the exam, his success_status would be "unknown".

Thus some other, more sophisticated programming technique (such as using a second, boolean variable to indicate whether or not the student has taken the exam) must be used to ensure accurate reporting of the student's actual experience in the course.

IV.E.3. SCORM XML Files

IV.E.3.a. IMS Manifest

XML documents must not include any characters that fall outside the character range defined in the W3C's XML standard. When in doubt, try opening the XML file in Internet Explorer for verification.

An IMS Manifest file in XML format shall be included at the root level of the course. The IMS Manifest must meet the standards defined by SCORM 2004. The name of the IMS Manifest file is always "imsmanifest.xml".

When the courseware is packaged, the IMS Manifest serves as a "packing list" for the course. With the exceptions of the No LMS Application (provided by SOBT) and the schema files, every file in the course package shall be referenced in the IMS Manifest. Note that the SCORM 2004 XSD and DTD schema files are not referenced as resources, but some of them are referenced by the namespace attributes of the <manifest> element.

IV.E.3.a.i. Organizations

Within the <organizations> section of the IMS Manifest, there shall be a single <organization> element containing the <item> elements for all SCOs in the package.

Simplified Example:

```
<organizations default="DODUSNSLCSOBT_04199_ORG">
  <organization identifier="DODUSNSLCSOBT_04199_ORG"
                                    adlseq:objectivesGlobalToSystem="false">
    <title>(U) SSGN COW</title>
    <item …
                …
    </item>
    <item …
                …
    </item>
    <item …
                …
    </item>
    <item …
                …
    </item>
  </organization>
</organizations>
```

Although SCORM provides the capability to include multiple <organization> elements within the <organizations> element, this feature is used for a different purpose – that is, for a situation where additional logic is included to deliver to the student a particular <organization> of SCOs. SOBT is not currently using this feature, and therefore SOBT requires that there be only one <organization>.

Note: You will not be able to verify the above structure by using the SCORM Conformance Test Suite, since the Test Suite tests all the SCOs that are found in the package, regardless of how they are grouped into organizations.

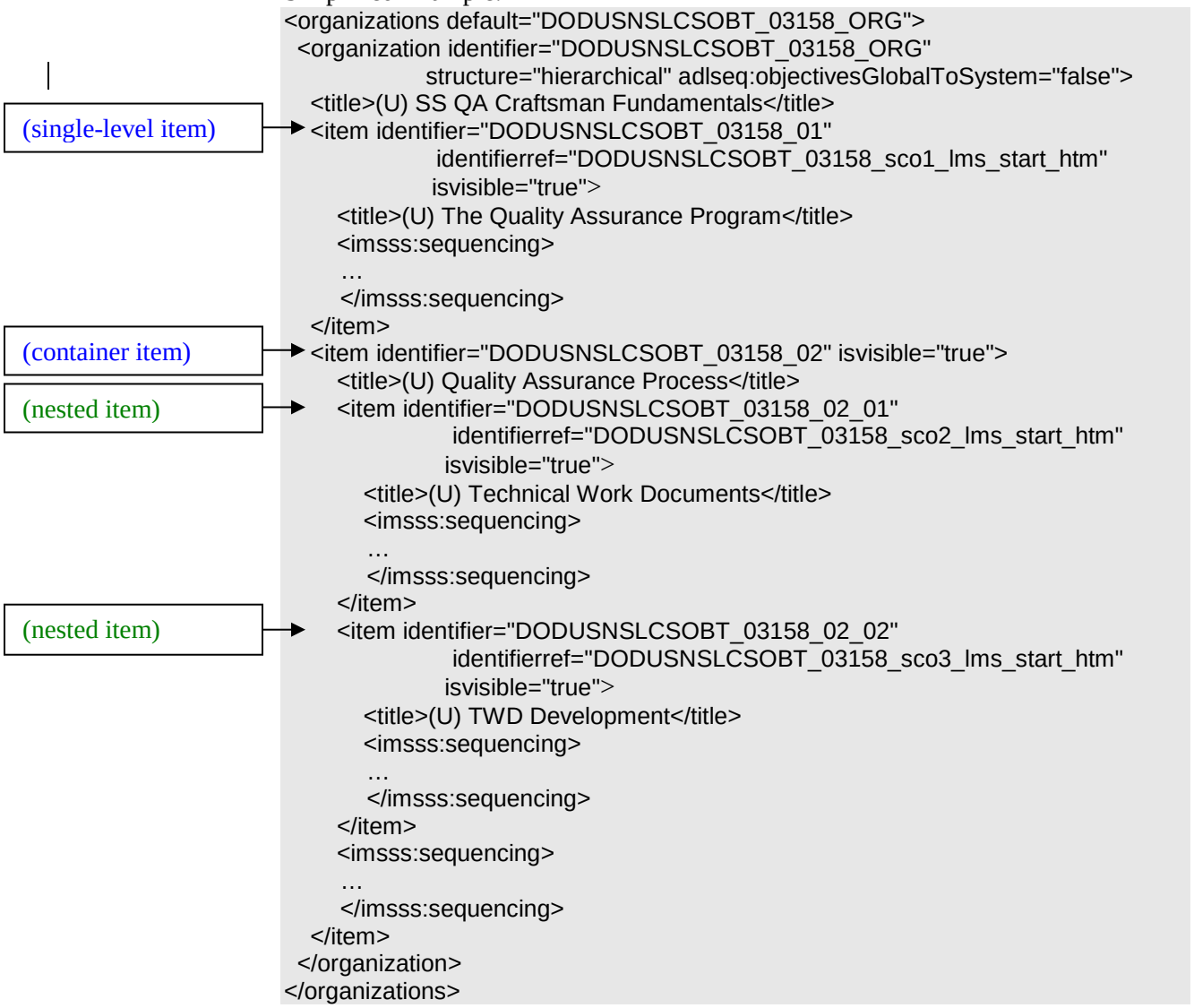
The <organization> element must include the objectivesGlobalToSystem attribute, set to "false" as shown in the example above. Although SOBT courses do not use global objectives, it is an ILE requirement that this attribute be explicitly included.

IV.E.3.a.ii. Items

An <item> element within the <organization> element may point to a learning resource (i.e., a SCO resource), or it may be a container element for other <item> elements. While it is possible to have all items at the same level, it is also possible to create a content hierarchy by grouping items at different levels, which is done by using an <item> element as a container to hold other <item> elements. Such a structure could be used to create a menu in the LMS that corresponds to modules, lessons, topics, subtopics, etc. A group consisting of one parent item and its immediate children is referred to as a SCO aggregation or a cluster.

In a case where an <item> element acts only as a container for other <item> elements, and does not point to any resource of its own, do not include the identifierref attribute in the tag for that container <item>. In other words, do not use identifierref="" since this can create a broken link in the LMS's menu, or in some LMSs, can cause the import to fail.

Simplified Example:




```
<organizations default="DODUSNSLCSOBT_03158_ORG">
  <organization identifier="DODUSNSLCSOBT_03158_ORG"
                structure="hierarchical" adlseq:objectivesGlobalToSystem="false">
    <title>(U) SS QA Craftsman Fundamentals</title>
    <item identifier="DODUSNSLCSOBT_03158_01"
                identifierref="DODUSNSLCSOBT_03158_sco1_lms_start_htm"
                isvisible="true">
      <title>(U) The Quality Assurance Program</title>
      <imsss:sequencing>
      …
      </imsss:sequencing>
    </item>
    <item identifier="DODUSNSLCSOBT_03158_02" isvisible="true">
      <title>(U) Quality Assurance Process</title>
      <item identifier="DODUSNSLCSOBT_03158_02_01"
                identifierref="DODUSNSLCSOBT_03158_sco2_lms_start_htm"
                isvisible="true">
        <title>(U) Technical Work Documents</title>
        <imsss:sequencing>
        …
        </imsss:sequencing>
      </item>
      <item identifier="DODUSNSLCSOBT_03158_02_02"
                identifierref="DODUSNSLCSOBT_03158_sco3_lms_start_htm"
                isvisible="true">
        <title>(U) TWD Development</title>
        <imsss:sequencing>
        …
        </imsss:sequencing>
      </item>
      <imsss:sequencing>
      …
      </imsss:sequencing>
    </item>
  </organization>
</organizations>
```

IV.E.3.a.iii. Delivery Controls

For each <item> element that references a SCO (leaf activity), its <sequencing> element shall contain the <deliveryControls> element with the attributes completionSetByContent and objectiveSetByContent both set to "true".

```
<imsss:sequencing>
  <imsss:deliveryControls completionSetByContent="true"
                objectiveSetByContent="true" tracked="true" />
  …
</imsss:sequencing>
```

This is to ensure the LMS does not, by default, mark the SCO as completed (completionSetByContent) or as satisfied (objectiveSetByContent) if the SCO fails to communicate with the LMS.

IV.E.3.a.iv. Rollup

In rollup, the term "activity" is used to correspond to an <item> in the IMS Manifest. A rollup control is an attribute that restricts, at a broad level, if an activity contributes to its parent's rollup. SOBT requires that rollup controls be explicitly implemented in the IMS Manifest. A rollup rule is an if-then statement that includes a condition and an action. Beginning with Developer's Guide 6.3.1, SOBT now requires that rollup rule statements be explicitly implemented in the IMS Manifest for the four conditions of: completed, incomplete, satisfied, and notSatisfied. Therefore, the <imsss:rollupRules> element must be implemented for each <item>; and for those <item> elements that are not leaf activities, it will contain four instances of the <imsss:rollupRule> element.

Nested within each <item> element, there shall be an <imsss:sequencing> element containing the <imsss:rollupRules> element which shall explicitly state the values for the following attributes: rollupObjectiveSatisfied, rollupProgressCompletion, and objectiveMeasureWeight. The values to use for each of these attributes shall be based on the desired course behavior as described in the IMDP. Although in some cases, the values may be the same as the defaults, SOBT requires that these attributes/values be explicitly stated rather than relying on the defaults.

For courses in which one or more assessed SCOs contribute to rollup, any non-assessed SCOs shall have the objectiveMeasureWeight set to "0.0000" and shall have the rollupObjectiveSatisfied set to "false". See Example 2 in Appendix E.

A generic implementation of rollup controls is shown in Table 10. This table applies to all activities except the root activity. Activities include SCOs (leaf activities) and SCO aggregations (cluster activities). (For further explanation of this terminology, see section III.C.2. and ADL's SCORM documentation.) Any activity that has a parent shall have rollup controls explicitly implemented. In all cases, the developer's exact structure and implementation must be provided in their IMDP for the course.

	If the parent activity has an exam in any of its child activities…			**If the parent activity has no exam in any child activity**
	child with no learning content, only exam	**child with learning content and no exam**	**child with both learning content and exam**	
rollupProgressCompletion	"true"	"true"	"true"	"true"
rollupObjectiveSatisfied	"true"	"false"	"true"	"true"
objectiveMeasureWeight	"1.0000"	"0.0000"	"1.0000"	"0.0000"

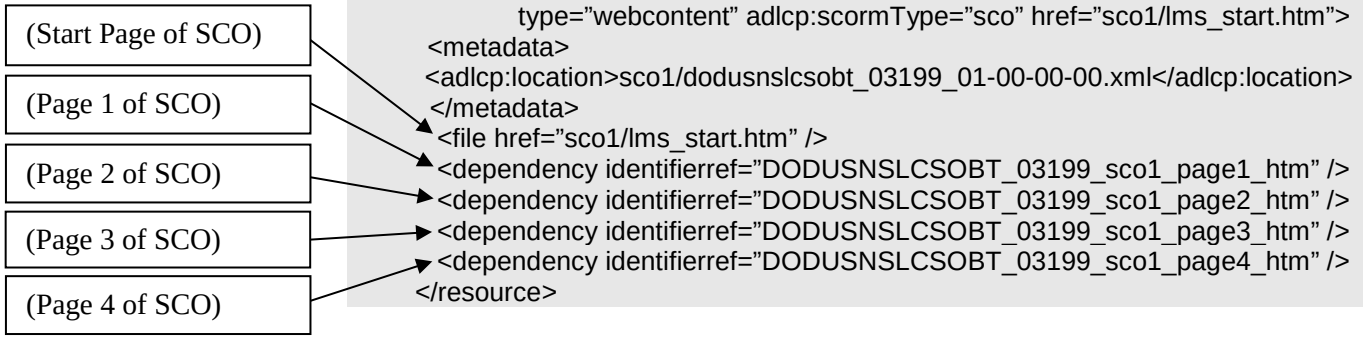
Table 10: SOBT Standard Behavior for Rollup

Aggregations that do not contain any exams are a special situation. If at least one SCO in an aggregation contains an exam, the settings in the first three columns apply. However, for an aggregation in which none of its child activities contains an exam, the developer must ensure that the LMS does not immediately mark the whole aggregation as satisfied when the student views the first page of any of its children. In this case, the value for the rollup control rollupObjectiveSatisfied must be set to "true", and a rollup rule must be explicitly implemented to set the satisfaction based on completion. See Example 4 in Appendix E for a detailed description of this implementation.

IV.E.3.a.v. Dependencies

SCORM provides a method to indicate that one resource is dependent on another resource by using the <dependency> element. Although SCORM does not require dependencies, beginning with Version 5.3 of the SOBT Developer's Guide, SOBT requires the use of dependencies in the IMS Manifest. A resource defined to be a SCO (adlcp:scormType="sco") is referenced by an <item> in the organization section. The SCO resource then contains dependencies that reference the resources which are HTML pages (adlcp:scormType="asset") within that SCO. In turn, the HTML page resources contain dependencies that reference raw media assets (adlcp:scormType="asset") such as graphics and audio files. Every resource must either be a SCO or a dependency of another resource, thereby creating a hierarchical chain with everything connected, i.e., no "dangling resources". The manifest must be free of disconnected ("dangling") resources, and unsupported dependencies (where the referenced resource does not exist).

Example:




```
<resources>
      <resource identifier="DODUSNSLCSOBT_03199_sco1_lms_start_htm"
                type="webcontent" adlcp:scormType="sco" href="sco1/lms_start.htm">
       <metadata>
       <adlcp:location>sco1/dodusnslcsobt_03199_01-00-00-00.xml</adlcp:location>
       </metadata>
       <file href="sco1/lms_start.htm" />
       <dependency identifierref="DODUSNSLCSOBT_03199_sco1_page1_htm" />
       <dependency identifierref="DODUSNSLCSOBT_03199_sco1_page2_htm" />
       <dependency identifierref="DODUSNSLCSOBT_03199_sco1_page3_htm" />
       <dependency identifierref="DODUSNSLCSOBT_03199_sco1_page4_htm" />
      </resource>
```

… the page resource:

```
<resource identifier="DODUSNSLCSOBT_03199_sco1_page1_htm"
                type="webcontent" adlcp:scormType="asset" href="sco1/page1.htm">
<file href="sco1/page1.htm" />
<dependency
      identifierref="DODUSNSLCSOBT_03199_sco1_graphics_switchboard_jpg" />
<dependency
      identifierref="DODUSNSLCSOBT_03199_sco1_audio_a1_005_mp3" />
<dependency
      identifierref="DODUSNSLCSOBT_03199_sco1_Common_Files" />
</resource>
```

… the graphic resource:

```
<resource identifier="DODUSNSLCSOBT_03199_sco1_graphics_switchboard_jpg"
                  type="webcontent" adlcp:scormType="asset"
                  href="sco1/graphics/switchboard.jpg">
```

```
    <metadata>
        <adlcp:location>sco1/graphics/switchboard_jpg.xml</adlcp:location>
    </metadata>
    <file href="sco1/graphics/switchboard.jpg" />
</resource>
```

IV.E.3.a.vi. No Circular References

Circular references are not allowed in the manifest. The term circular reference refers to the situation whereby the dependency of one resource points to a second resource, and that second resource has a dependency pointing back to the first resource. A circular reference could also consist of a group of several resources, each pointing to the next, and then the last one in the group points back to the first one. Circular references in the manifest have been shown to cause problems in several LMSs, including in some cases, inability to import the course. Therefore, when creating the dependency hierarchy in the manifest, the developer must ensure that no circular references exist.

IV.E.3.a.vii. Common Files

Another use of the <dependency> element is to point to a resource that references a group of common files (or dependencies to other resources). If a SCO contains files that are used multiple times by many pages within the SCO, the developer may create a "Common_Files" resource for that SCO. In the common files resource, put <file> elements referencing those files that are used multiple times, or <dependency> elements referencing the resources for media assets. Then each page resource that needs those common files can use a <dependency> to point to the common files resource, rather than listing each of the files over again in each page resource.

```
<resource identifier="DODUSNSLCSOBT_03199_sco1_Common_Files"
                type="webcontent" adlcp:scormType="asset">
    <file href="sco1/graphics/background1.gif" />
    <file href="sco1/script/pagefunctions.js" />
    <file href="sco1/script/apiwrapper.js" />
    <file href="sco1/script/finddom.js" />
    <dependency
            identifierref="DODUSNSLCSOBT_03199_sco1_movies_signals_swf" />
</resource>
```

IV.E.3.a.viii. Identifiers

The required naming to be used for the identifier attribute of the <manifest>, <organization>, <item>, and <resource> elements shall be as follows:

- A prefix shall be established consisting of "DODUSNSLCSOBT_" followed by the 5-digit number of the course. (Example: "DODUSNSLCSOBT_03171")

- Identifier for <manifest>: Use the prefix, followed by a lower case "v", the version whole number, followed by a lower case "p", then the decimal portion of the version number. (Applies only to <manifest> identifier, not to other identifiers.) (Example: version 2.10 is "DODUSNSLCSOBT_03171v2p10")

- Identifier for <organization>: Use the prefix followed by "_ORG". (Example: "DODUSNSLCSOBT_03171_ORG")

- Identifier for <item>: Use the prefix followed by a sequential number for each item, starting with "01". (Example: "DODUSNSLCSOBT_03171_01")

- Identifier for nested <item>: Use the prefix followed by the parent item number, underscore, and then the sequential item number within the child aggregation, starting with "01".
(For example: "DODUSNSLCSOBT_03171_01_01", "DODUSNSLCSOBT_03171_01_02", …)

- Identifier for <resource>: Use the prefix followed by the file path and file name with all "/", "\", and "." characters converted to underscores.
(Example: "DODUSNSLCSOBT_03171_sco1_general_lms_start_htm")

- Identifier for common files: When a special resource is created for the purpose of grouping, such as common files, the identifier shall use the prefix, followed by the SCO folder name, and must include "_Common_Files" within the identifier.
(Example: "DODUSNSLCSOBT_03171_sco1_general_Common_Files")

Digital Video Products: The identifier for the <manifest> element must follow SOBT's naming conventions as given above. The rest of the identifiers for other elements in the manifest are not required to follow SOBT's naming conventions. The relaxing of this requirement will allow developers to quickly create a manifest using Reload Editor (available free from ADL).

Following is a partial example showing the use of the identifier naming convention:

```
. . .
  <organizations default="DODUSNSLCSOBT_03171_ORG">
    <organization identifier="DODUSNSLCSOBT_03171_ORG"
                                  adlseq:objectivesGlobalToSystem="false">
      <title>(U) SS Rules of the Nautical Road</title>
      <item identifier="DODUSNSLCSOBT_03171_01"
              identifierref="DODUSNSLCSOBT_03171_sco1_general_lms_start_htm"
              isvisible="true">
        <title>(U) General Rules</title>
       <imsss:sequencing>
         <imsss:deliveryControls completionSetByContent="true"
                objectiveSetByContent="true" />
          <imsss:rollupRules rollupObjectiveSatisfied="true"
                rollupProgressCompletion="true" objectiveMeasureWeight="1.0000" />
       </imsss:sequencing>
      </item>
      <item identifier="DODUSNSLCSOBT_03171_02"
              identifierref="DODUSNSLCSOBT_03171_sco2_steering_lms_start_htm"
              isvisible="true">
        <title>(U) Steering and Sailing Rules</title>
        <imsss:sequencing>
          <imsss:deliveryControls completionSetByContent="true"
                objectiveSetByContent="true" />
           <imsss:rollupRules rollupObjectiveSatisfied="true"
                rollupProgressCompletion="true" objectiveMeasureWeight="1.0000" />
        </imsss:sequencing>
      </item>
      <item identifier="DODUSNSLCSOBT_03171_03"
              identifierref="DODUSNSLCSOBT_03171_sco3_lights_lms_start_htm"
```

```
            isvisible="true">
      <title>(U) Lights and Shapes</title>
      <imsss:sequencing>
        <imsss:deliveryControls completionSetByContent=”true”
              objectiveSetByContent=”true” />
          <imsss:rollupRules rollupObjectiveSatisfied="true"
              rollupProgressCompletion="true" objectiveMeasureWeight="1.0000" />
      </imsss:sequencing>
    </item>
    <item identifier="DODUSNSLCSOBT_03171_04"
            identifierref="DODUSNSLCSOBT_03171_sco4_sound_lms_start_htm"
            isvisible="true">
      <title>(U) Sound and Light Signals</title>
     <imsss:sequencing>
        <imsss:deliveryControls completionSetByContent=”true”
              objectiveSetByContent=”true” />
         <imsss:rollupRules rollupObjectiveSatisfied="true"
              rollupProgressCompletion="true" objectiveMeasureWeight="1.0000" />
      </imsss:sequencing>
    </item>
    <item identifier="DODUSNSLCSOBT_03171_05"
        identifierref="DODUSNSLCSOBT_03171_sco5_exemptions_lms_start_htm"
            isvisible="true">
      <title>(U) Exemptions and Annexes</title>
      <imsss:sequencing>
        <imsss:deliveryControls completionSetByContent=”true”
              objectiveSetByContent=”true” />
          <imsss:rollupRules rollupObjectiveSatisfied="true"
              rollupProgressCompletion="true" objectiveMeasureWeight="1.0000" />
      </imsss:sequencing>
    </item>
    <imsss:sequencing>
        <imsss:rollupRules>
            <imsss:rollupRule childActivitySet="all">
                <imsss:rollupConditions>
                    <imsss:rollupCondition operator="noOp" condition="completed" />
                </imsss:rollupConditions>
                <imsss:rollupAction action="completed" />
            </imsss:rollupRule>
            <imsss:rollupRule childActivitySet="any">
                <imsss:rollupConditions>
                    <imsss:rollupCondition operator="not" condition="completed" />
                </imsss:rollupConditions>
                <imsss:rollupAction action="incomplete" />
            </imsss:rollupRule>
            <imsss:rollupRule childActivitySet="all">
                <imsss:rollupConditions>
                    <imsss:rollupCondition operator="noOp" condition="satisfied" />
                </imsss:rollupConditions>
                <imsss:rollupAction action="satisfied" />
            </imsss:rollupRule>
            <imsss:rollupRule childActivitySet="any">
                <imsss:rollupConditions>
                    <imsss:rollupCondition operator="not" condition="satisfied" />
                </imsss:rollupConditions>
                <imsss:rollupAction action="notSatisfied" />
            </imsss:rollupRule>
        </imsss:rollupRules>
```

```
      </imsss:sequencing>
    </organization>
  </organizations>
  <resources>
    <resource identifier="DODUSNSLCSOBT_03171_sco1_general_lms_start_htm"
                type="webcontent" adlcp:scormType="sco"
                href="sco1_general/lms_start.htm">
     <metadata>
       <adlcp:location>sco1/dodusnslcsobt_03171_01-00-00-00.xml</adlcp:location>
      </metadata>
       <file href="sco1_general/lms_start.htm" />
       <file href="sco1_general/dataset.js" />
       <dependency
           identifierref="DODUSNSLCSOBT_03171_sco1_general_Common_Files" />
       <dependency
              identifierref="DODUSNSLCSOBT_03171_sco1_general_title_htm" />
. . .
```

IV.E.3.b. Metadata

See Appendix F: "SOBT Mandatory Metadata Elements" for detailed information about which metadata elements are required in each of the following types of metadata files.

IV.E.3.b.i. Content Aggregation Metadata File

A metadata file in XML format shall be included for the course as a whole (content aggregation, which is an aggregation of the individual SCOs). This file must be named "course_metadata.xml". The content aggregation metadata file shall reside at the root level of the course.

There is a different naming convention for the <identifier><entry> element within the content aggregation metadata file. This naming convention is "SLC-SOBT-XXXXX-N.NN", where X is the 5-digit product number, and N is the product version number. (The use of the "DODUSNSLCSOBT_" prefix remains as before in all other locations, including other metadata files.) Following is an example:

```
<?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 lomCustom.xsd">
    <general>
        <identifier>
             <catalog>SOBT Course Catalog</catalog>
             <entry>SLC-SOBT-54321-1.00</entry>
        </identifier>
…
```

The content aggregation metadata file shall be referenced in the manifest using a <metadata> element nested directly in the <manifest> element, as shown in the following example:

```
<manifest ...
  <metadata>
     <schema>ADL SCORM</schema>
     <schemaversion>2004 3rd Edition</schemaversion>
     <adlcp:location>course_metadata.xml</adlcp:location>
  </metadata>
…
```

IV.E.3.b.ii. SCO Metadata Files

A metadata file in XML format shall be included for each SCO, and shall be located at the root of the folder for that SCO. The naming convention for these metadata files shall be "dodusnslcsobt_" followed by the 5-digit course identifier number, and then followed by an identifier for the individual SCO. For example, if the course number for a particular course is "03063", then the metadata file for the first one of the individual SCOs shall be named "dodusnslcsobt_03063_01-00-00-00.xml". The four two-digit positions following the course number are as follows: These numbers are intended to represent module (section), lesson, topic, and subtopic respectively.

The SCO metadata file shall be referenced in the manifest using a <metadata> element within the <resource> element for that SCO. The <metadata> element contains the <adlcp:location> element which references the metadata file for the SCO. (Note that the <schema> and <schemaversion> elements are no longer allowed in this context.)

Example:

```
<resource identifier="DODUSNSLCSOBT_03063_sco1_lms_start_htm"
      type="webcontent" adlcp:scormType="sco" href="sco1/lms_start.htm">
  <metadata>
      <adlcp:location>sco1/dodusnslcsobt_03063_01-00-00-00.xml</adlcp:location>
  </metadata>
  <file href="sco1/lms_start.htm" />
</resource>
```

IV.E.3.b.iii. Asset Metadata Files

Do not include asset metadata.

IV.E.3.c. Schema Files

SCORM 2004 requires a larger set of schema files (.XSD and .DTD files) than was used by SCORM 1.2. There is a total of 37 schema files, which are arranged in a directory structure including several subfolders. There is one additional required schema file – ScormEnginePackageProperties.xsd – which is not a standard SCORM schema, but rather an extension to SCORM that is required by ILE. The developer shall include this entire structure of schema files in the courseware, with the root schema files and folders located at the root of the course structure.

SOBT provides the set of required schema files as a downloadable package on the SOBT website. The developer shall use this package, due to the fact that SOBT has made modifications to the files 1) to prevent an xml:base error when testing on a non-Internet connected computer, and 2) to enable validation in the ADL Test Suite while still supporting additional ILE-required elements and vocabulary tokens.

IV.F. No LMS Application

Even though SOBT courseware is intended to be launched from within a Learning Management System (LMS), it is also necessary to provide the ability to view the course without an LMS. Therefore, SOBT provides a standardized "No LMS Application" package for all developers to use, which can be downloaded from the SOBT website at:

https://www.netc.navy.mil/sobt/web/developers/devmain.htm.

The developer must use the newest version of the No LMS Application (currently version 4.3). This is important in order to keep abreast of updates for compatibility with current browser versions.

In versions 4.0 and higher, the No LMS Application has been redesigned to remove the use of <frameset> and <frame> elements. These elements are obsolete in HTML5. Although SOBT is not yet moving to the HTML5 standard, it is expected that SOBT will move up to HTML5 at some time in the future. The <iframe> element is still allowed in HTML5 and is still used in the No LMS Application.

IV.F.1. Description

The "No LMS Application" (hereafter referred to as "the Application") is a standardized set of files that is intended to be included in its entirety with a SCORM 2004 courseware product. The Application will parse the "imsmanifest.xml" file and display the courseware SCO hierarchical structure, in a manner similar to what would be displayed by an LMS. Thus the menu is the hierarchical display of the SCOs as defined in the manifest file <organization> tag.

The student will launch the courseware by browsing to the file "no_lms_start.htm". After prompting the student for identification, a menu is displayed with the courseware SCO structure on the left side of the screen and a welcome page on the right. The student clicks on a SCO link and the associated launch page is displayed in the right-side content area. In order to simulate an LMS, the Application will intercept SCORM API calls and perform most API processing. Currently Sequencing, Navigation, and Global Objectives are not supported.

IV.F.2. Usage

The Application provided by SOBT shall be included in its entirety in each course. The developer is required to use the current version of the Application "as is" without changing any files or code. No modifications or additions to the Application files shall be made by the developer. Since new files have been added and some file names have been changed, the developer shall ensure that any previous versions of the Application have been removed before inserting the current Application into the course. A course shall not include any older files from previous versions of the Application which are no longer used by the Application. Refer to Table 11 for a listing of the Application's files as per version 4.3.

The Application is posted on the SOBT website for developers to download. As well as the final version, sometimes beta versions of the Application may be made available for developer testing. The most recent final version (currently version 4.3) of the Application is the version that must be used in product deliveries.

IV.F.3. Files

The Application includes the "no_lms_start.htm" file, 4 additional HTML files located in a folder named "nolms2004", and 3 subfolders. The start file "no_lms_start.htm" and the folder "nolms2004" must be placed at the root level of the course folder, in the same location as the "imsmanifest.xml" file. Note that these files shall also be included in the courseware zipped file, but are not to be referenced in the manifest file. Refer to Table 11 for a complete listing of the Application's files.

IV.F.4. SCORM RTE Support

Beginning with version 4.0, the Application provides support for the full SCORM Run-Time Environment (RTE) Data Model. The Application supports all SCORM 2004 3rd Edition

API function calls and data model elements. Some, but not all, API error conditions and error codes have been implemented. In multi-SCO courses, the Application allows data to be persisted between SCO sessions. For example, if a student starts one SCO, then leaves it by choosing another SCO, and then returns to the first SCO, his bookmark will be retrieved. However, the Application does not persist data between browser sessions.

Although the Application may be useful for testing the behavior of SCORM calls, use of the No LMS Application does not relieve developers from the responsibility of testing in a SCORM-compliant LMS. Some API error conditions/codes have not yet been implemented in the Application, so different behavior is likely in cases where a course is programmed incorrectly. In the case of any differences in behavior, the SCORM-compliant LMS will be considered to be the authoritative source.

Any errors or problems with the Application should be reported to the SOBT office. In addition, developers may submit any other recommendations that they have, which SOBT will consider for possible inclusion in the next version of the Application.

Path relative to imsmanifest.xml
./no_lms_start.htm
./nolms2004/nolms2004failconfig.htm
./nolms2004/nolms2004sco.htm
./nolms2004/nolms2004topbar.htm
./nolms2004/nolms2004userlogin.htm
./nolms2004/css/nolms2004mktree.css
./nolms2004/images/nolms2004_sobtlogo1.gif
./nolms2004/images/nolms2004completed.gif
./nolms2004/images/nolms2004failed.gif
./nolms2004/images/nolms2004incomplete.gif
./nolms2004/images/nolms2004minus.gif
./nolms2004/images/nolms2004notattempted.gif
./nolms2004/images/nolms2004passed.gif
./nolms2004/images/nolms2004plus.gif
./nolms2004/images/nolms2004unknown.gif
./nolms2004/script/jquery-1.9.1.min.js
./nolms2004/script/nolms2004_version_history.txt
./nolms2004/script/nolms2004apiobject.js
./nolms2004/script/nolms2004class.js
./nolms2004/script/nolms2004datastore.js
./nolms2004/script/nolms2004display.js

Table 11: List of "No LMS Application" files

IV.G. Detection Requirements

IV.G.1. Browser Detection

When the SCO first opens, JavaScript code shall check for the browser type and version being used. The browser type should be Internet Explorer. If the browser type is Internet Explorer and the version number is one of the target browser versions listed in section IV.A.1., then this is considered adequate to run the course and no message shall be displayed.

If the browser type and version currently in use do not meet the above requirements, a warning message shall be displayed to the user. The warning message shall state that the computer is not currently running one of the target browser versions and shall advise the user to contact his system administrator. If the version detected is lower than the target browser versions, the user shall not be allowed to continue on into the course. An example of a warning message to be shown when IE 6 is detected, is as follows:

> "This courseware is designed to run in Internet Explorer 8, 10, or 11. Your current browser is Internet Explorer 6. Therefore, you cannot run this course. Contact your system administrator to have him install Internet Explorer 8, 10, or 11."

If the version detected is higher than the target browser versions, the user shall be shown a warning message, but not prevented from continuing into the course at his own risk.

IV.G.2. Plug-in Detection

In each SCO, the developer shall include the necessary programming to check for the presence of any plug-ins that are required by that SCO, or by any SCO in the course. (For a list of allowable plug-ins, see section IV.A.2. "Plug-ins".) This programming shall run when the SCO first opens. Each SCO that uses a plug-in shall do this check again, even though it may have already been done by a previous SCO of the course. In cases where some SCOs in the course use the plug-in and others do not, the plug-in detection must be done in each SCO of the course, in order to provide students with an appropriately-worded message informing them that they may not be able to complete the entire course since some other SCOs in the course require the missing plug-in. For more examples of wording, see section IV.B.3.

If a required plug-in is determined to be missing, users shall be shown a message informing them of this fact and referring them to their system administrator. Do not include a link to the Internet. For SCOs that use the plug-in, the student shall not be allowed to continue into the SCO. If a SCO does not use the plug-in but other SCOs in the course do, the student shall be shown the warning message but be allowed to continue in the current SCO. For example, if a SCO requires Flash and the Flash Player is missing, the student is shown the following message:

> "This lesson requires Adobe Flash plug-in version 10 or higher. It does not appear that you have any version of the Flash Player installed. Please contact your system administrator for installation. If you continue to experience issues after the installation, please contact your system administrator to review the current group policies and the security settings for your browser. Contact Distance Support at 401-832-2113, or the SOBT office at NWLN_SLC_SOBT@navy.mil."

If the required plug-in(s) are determined to be present, no message shall be displayed.

In order to prevent Internet-enabled PCs from automatically downloading the latest Flash plug-in, the codebase attribute of the <object> tag(s) for all plug-in instances shall be set to an empty string:

```
codebase=""
```

IV.H. Completion Certificate

Since exam scores are not stored when a course is being run without an LMS, provisions must be made for the student to print out a completion certificate for a student who scores 80% or greater on any exam. This functionality shall also be provided as a courtesy even if the course is executed from within an LMS.

SOBT provides a standardized completion certificate. The developer shall use the completion certificate provided on the SOBT website. The standardized completion certificate shall be built into each SCO that is, or contains, an exam. The standardized completion certificate provides for display of the student's name, the current date, the course title, the course product number, the lesson (SCO) title, and the student's passing score. The developer shall ensure that the course title, the course product number, and the lesson title (if a multi-SCO course) are filled in, within the customizable area of the file provided by SOBT. The developer shall ensure that the student's passing score is being correctly passed to the certificate per the instructions provided on the SOBT website. The current version of the certificate asks the student to enter his own name if the course is not being run in an LMS.

The completion certificate shall be built into the SCO in such a way that if the student passes the exam, then the completion certificate is displayed. If the student does not obtain a passing score, then the SCO shall not display the completion certificate.

IV.I. CD Packaging Requirements

IV.I.1. CD Package Structure

The developer shall deliver 2 copies of the course on CD or DVD. (Hereafter, the term "CD" is understood to mean either CD or DVD.) Each CD shall contain one, and only one, content aggregation package. However, the same course material shall exist on the CD in two formats: compressed and uncompressed. The compressed version (the content aggregation package) shall be in the form of a zipped file (.zip). The uncompressed version shall be a folder containing the exact same material, but not zipped. (In the case of encrypted CDs, the following is how the structure should appear after decryption.)

The CD package shall contain all of the following:

1) at the root of the CD:
   a) readme.txt
   b) sobt_feedback.doc
   c) dodusnslcsobt_XXXXXvXpXX.zip (PIF file – zipped)
   d) dodusnslcsobt_XXXXXvXpXX (course directory – unzipped)
2) both in the PIF file and in the course directory:
   a) imsmanifest.xml
   b) no_lms_start.htm
   c) course_metadata.xml
   d) all schema files

If the size of the course prohibits placing the compressed and uncompressed version on one CD, they may be delivered on two CDs, in which case the "readme.txt" file (see below) must appear on both CDs. The two CDs shall be labeled "CD 1 of 2: Zipped Format Only" and "CD 2 of 2: Unzipped Format Only".

IV.I.1.a. The "readme.txt" File

The "readme.txt" file shall contain the following information:

- A list of browsers, plug-ins with version numbers, and operating systems on which the course has been tested; and which of the above are required by the course.

- The purpose of both the compressed and uncompressed versions.
- How to launch the uncompressed version from the CD.
- How to copy the course to a local or network drive.
- A general explanation of how to import the compressed file into an LMS.

SOBT supplies a sample "readme.txt" file; however, the developer is required to customize this sample file to update the information as it pertains to the specific course, in particular the list of browsers, plug-ins with version numbers, and operating systems on which the course has been tested.

IV.I.1.b. SOBT Feedback Form

A SOBT Feedback Form in the form of a Word document shall be included at the root level of the CD. The feedback form to use for this purpose is available for download on the SOBT website. The file is named "sobt_feedback.doc".

IV.I.1.c. Zipped File in SCORM's PIF Format

A SCORM Package Interchange File (PIF) in zipped format shall reside at the root level of the CD. The IMS manifest ("imsmanifest.xml") must be at the root of this PIF file. The IMS manifest contains a list of the files and assets contained in the package, in order that an LMS can use the IMS manifest to import the course. The IMS manifest shall conform to the SCORM 2004 standard. The ADL schema files, which can be found on the SOBT website, shall be included at the root level of the PIF file (see Appendix D, item # 3, for more details). The name of the PIF file shall be "dodusnslcsobt_" (in lower case), followed by the five digit product number, followed by a lower case "v", the version whole number, followed by a lower case "p", then the decimal portion of the version number.
(example: course 08123 version 2.10 would be "dodusnslcsobt_08123v2p10.zip")

IV.I.1.d. Course Folder

The course folder shall contain the uncompressed version of the course. The "no_lms_start.htm" file, which is used to launch the course without an LMS, shall be at the root of this course folder. The name of the course folder shall be "dodusnslcsobt_" (in lower case), followed by the five digit product number, followed by a lower case "v", the version whole number, followed by a lower case "p", then the decimal portion of the version number. This folder name shall not contain spaces, special characters, or capital letters.
(example: course 08123 version 2.10 would be "dodusnslcsobt_08123v2p10")

IV.I.2. Directory Structure and Naming Conventions

The following naming and directory structure conventions apply to both the compressed and uncompressed versions of the course:

IV.I.2.a. Directory Structure

Within the main course folder, there shall be a subfolder for each SCO. A SCO folder may contain additional subfolders of its own, such as folders for graphics, scripts, audio, etc. Everything that is used by the SCO must be contained within the SCO folder or one of its subfolders. In other words, nothing in the SCO can point to something that resides outside or above the folder for that SCO. Within the SCO, HTML pages may reference other files and media that are at the same level or below. Developers are discouraged

from using "../" to go back up a level, but in some cases it is appropriate to do so (see section IV.I.2.c.), as long as the reference does not go outside the SCO. A reference is never allowed to go up levels to a point that would take it outside the SCO.

Due to the fact that nothing in the SCO can point to something that resides outside or above the SCO, it is not possible to use a single common folder that holds common files used by multiple SCOs. Files that are used by multiple SCOs must be duplicated within each SCO. Although this practice may appear to be redundant, experience has shown that it is best to repeat files and media as necessary within each SCO.

IV.I.2.b. File and Folder Names

The following naming conventions apply to all files on the CD deliverable – including the course folder, the zipped file, and all files contained within them. With the following two exceptions, file names and folder names shall not contain capital letters, spaces, or special characters. The exceptions are: 1) the SCORM 2004 supporting schema files and one schema extension file, and 2) prefixes used for file names in NNPI courses – both of which may contain capital letters as appropriate. In addition, links to these file names that appear within the code (HTML, JavaScript, etc.) must match in case (i.e., lower case except as noted above), on the assumption that case-sensitivity could be an issue on some systems.

The underscore (_) and dash (-) are the only special characters that may be used in a file or folder name (and a single period before the file extension). Do not use characters such as #, %, +, @, ?, !, etc. Do not use parentheses in file names. If in doubt, use the underscore. If the effect of spaces is desired to achieve readability, use the underscore in place of a space.

While there is no required naming for each of the course subfolders, the name of "bin" is prohibited as a folder name. This is due to the fact that some versions of Internet Information Services (IIS) use this as a reserved name for a folder containing compiled code and will not load any pages/scripts/images, etc. residing in a folder with the name of "bin".

IV.I.2.c. Media Assets (Graphics, Audios, Videos)

Media assets shall be located in a subfolder (or subfolders) underneath the folder for the SCO that uses them. In regard to media files handled by Windows Media Player (i.e., audio and video files), the files must be at, or below, the level of the file containing the reference to them. In other words, "../" cannot be used in a relative path name to go back up a level and then point to a different folder. This path structure is required for files to play in Windows Media Player 9 and above. For other types of media assets, such as still graphics, this type of directory structure (that does not use "../") is still recommended, but not required as long as the reference does not go outside of the SCO. SOBT recognizes that there are specific instances where it makes sense to use "../" – for example, when making reference to a background graphic from within an external style sheet.

IV.I.3. Cleanup of Unused Files

All unused files shall be removed from both the compressed and uncompressed copies of the course before delivery to SOBT. (However, certain files shall be delivered to SOBT on a separate CD – see below.) For example, if files were used for reference during the building of the course and reside within any of the course folders but are not required for the course to run, those files must be removed. Any files which were created during the development of the course but are no longer used due to changes in either the content or the behavior of the

course shall be removed (such as Thumbs.db, myaudio.mp3.SFK, myswf.fla, mygraphic, etc.). Unused files must be removed rather than adding references to them to the IMS Manifest in order to make it pass the Army Resource Validator. After removing unused files, ensure that none of these unused files are referenced in the IMS Manifest, since this would cause an error when validating the IMS Manifest, if the file itself does not exist in the package. There shall be no hidden files existing on the course CD (i.e., Thumbs.db). In general, to avoid ambiguous file names, different files must have different names. Thus, within a course folder, two files sharing the same name must be avoided unless they are exactly the same file.

IV.I.4. Supporting Materials

IV.I.4.a. Supporting Materials CD Requirements

The following items shall be submitted with the prototype and beta deliverables (as indicated below), on a separate "Supporting Materials" CD or DVD (2 copies). These items shall be on a separate CD (or DVD) from the course CD. This separate CD shall be labeled "Supporting Materials". Documentation in Microsoft Word format shall be submitted in Word 2007 or 2010 format.

	"SUPPORTING MATERIALS" CD REQUIREMENTS	PROTO-TYPE	BETA
1)	A complete list of upcoming courses which this prototype supports.	X	
2)	A copy of at least one final approved IMDP for a course covered by this prototype.	X	
3)	A copy of the IMDP that pertains to this course.		X
4)	Exam key(s) for all exams contained in the prototype (see section II.A.5.a.iv. for the requirements for an exam key).	X	
5)	Exam key(s) for all exams contained in the course (see section II.A.5.a.iv. for the requirements for an exam key).		X
6)	A completed SOBT Programmer's Checklist.	X	X
7)	The test logs resulting from testing the zipped package in the SCORM Conformance Test Suite. After running the Test Suite, the test log files can be found on your hard drive in the location where the Test Suite is installed. The path is typically: C:\ADL\TestSuite_2004_3ED\SCORM_2004_3rd_Ed_CTS_ V1.0_ST\TestSuite\Logs but it may vary depending on where your Test Suite is installed, and which version you have installed.	X	X
8)	A representative sample of HTML validation results.	X	X
9)	Original still photographs in .jpg or .gif format, without overlaying text or other alterations. See section IV.I.4.b. below, for more details.		X
10)	All source code and/or source files for compiled components of the programming, such as .fla files for Flash components. See section IV.I.4.c. below, for more details.		X
11)	A list of all tools, with version numbers, that were used in developing the course. For example, "Adobe Flash CS6", etc.	X	X

Table 12: "Supporting Materials" CD Requirements

IV.I.4.b. Raw Media

Images captured during development of the training (original still photographs) shall be delivered at the time of delivery of the beta courseware, on the "Supporting Materials" CD. The original photographs shall be delivered in .jpg or .gif format, without overlaying text or other alterations. (SOBT does not require delivery of video footage at this time.)

IV.I.4.c. Source Code

In the case of SCORM courses, if additional programming languages (other than HTML/JavaScript) and/or programmed components (such as Flash) are included, the developer shall provide all source code and source files with the beta deliverable, on the "Supporting Materials" CD. In the case of compiled languages, the source code shall be delivered, as well as the compiled program. The CD containing the source code shall be labeled exactly the same as the course CD, with the additional label of "Supporting Materials". The source files shall not be "locked" or "protected" to prevent SOBT office staff from viewing the code.

The source CD shall provide all components and supporting files (FLA, AS, etc.) to reconstruct all SWFs in the course. Note that this includes the source files for all menus, navigation, loaders, help, etc. – in other words, anything that would be necessary to re-create the course. The source files delivered shall be the final source that was used to generate the component used in the course. Do not include multiple iterations and backup copies of the same file, only the final version of it. In other words, do not just write the whole development folder onto the source CD, if it includes multiple iterations and backup copies of the same source code.

The developer is required to use one of the following two options for organizing the source files on the source CD. The developer must choose one or the other of the following options, not a mixture of both.

Option 1: The filenames, folder names, and directory structure of the source files shall mirror the names of the final product exactly. For example: the source file for "intro/3a.swf" must be "intro/3a.fla"; or

Option 2: The source CD shall contain a "source_readme.txt" which lists all SWFs (with path) in the course and their respective supporting files (with path).

For example, "source_readme.txt" would contain:

1) sco1/flash/yellow_submarine.swf
   sco1/yellow/subs.fla
   source/development/submarine.as

2) sco2/movies/blue_uniform.swf
   sco2/movies/blue_uniform.fla

... etc., for all SWFs in the course package.

Option 2 would need to be used if there are multiple supporting files per one SWF, or if the same source file is used to generate multiple SWFs. Option 2 requires all SWFs to be listed once, but the same SWF (with the same path) must not be listed multiple times.

IV.I.5. CD Marking Requirements

All discs (CDs and DVDs) — including prototypes, betas, and supporting material CDs, both classified and unclassified — shall be labeled with the following information.

IV.I.5.a. Product Title

The developer shall verify the correct product title with the SOBT Project Manager, prior to labeling and delivery of any CDs. Note that SOBT has a shortened title format which all courses must follow. See Appendix A for business rules to be used for titles. If you are unsure of the short title, contact the SOBT Project Manager.

IV.I.5.b. Product Number

The developer shall verify the correct product number with the SOBT Project Manager. The product number is the number that will be used to identify this product in the SOBT catalog – do not confuse it with the SOBT ID number, which is used for project tracking while the product is being considered for funding and under development. If you are unsure of the product number, do not use a bogus number or the SOBT ID number as a placeholder. Instead, contact the SOBT Project Manager to obtain a valid product number. See Appendix B for business rules to be used for product numbers. The product number is a number beginning with "DODUSNSLCSOBT_" and ending in 5 numerical digits.

IV.I.5.c. Version Number

The version number will be used to identify this version of the product in the SOBT catalog. Therefore, it is assigned by SOBT and does not change during the development and testing process. The developer shall verify the correct version number with the SOBT Project Manager. The version number is formatted with a decimal point and two digits (hundredth's place) after the decimal. See Appendix B for business rules on assigning and incrementing version numbers.

Example of version number: **Version 1.00**

IV.I.5.d. Mod Number

The mod number represents the SOBT Developer's Guide version with which this course complies. For example: "Mod 6.3.1" shall be used for courseware complying with this version of the Guide.

IV.I.5.e. Delivery Number

All CDs shall clearly state "Prototype" or "Beta" on the CD label (not "Final"). The delivery number (not to be confused with the version number) is a whole number and shall not contain decimals. Delivery numbers shall be used for both prototypes and betas for tracking multiple deliveries which may be necessary during the acceptance testing process. SOBT will conduct acceptance testing and provide feedback to developers about any deficiencies. The developer shall correct these deficiencies prior to resubmission of the prototype or beta. For example, the first beta submitted shall be labeled as Beta Delivery 1, the second resubmission as Beta Delivery 2, etc. (Note: The word "Final" shall never appear on a CD label.)

Example of beta delivery number: **Beta Delivery 1**

IV.I.5.f. Plug-in Version Number

If the product requires any plug-ins (Flash, Windows Media Player, etc.), the CD label shall state the name of the required plug-in, and which version of the plug-in is required.

IV.I.5.g. Classification

All CDs shall be labeled with 1) security classification, and 2) warning notices, if applicable. The CD label warning notices shall match those used in the course. See Appendix C for detailed instructions on classification markings and warning notices.

IV.I.5.h. Distribution Statement

All CDs shall be labeled with a distribution statement. See Appendix C for detailed instructions on distribution statements.

IV.I.5.i. Encryption Notice

All encrypted CDs shall be clearly marked with the phrase "Encrypted using XXX" where XXX is the name of the encryption software used. See section II.A.5.a. for detailed instructions on encryption requirements.

IV.I.5.j. Date Created

All CDs shall be labeled with the date that the CD was created. Files on the CD shall not have file creation/modification dates that are newer than the date printed on the CD label.

IV.I.5.k. Virus Check Statement

All material shall contain a statement that the CD-ROM has been virus checked, including the name and version of the virus-checking tool used, the virus signatures date (first), and then the CD scan date. (See section IV.I.6.)

IV.I.5.l. Conformance Statement

All courseware CDs shall be labeled with the statement "SCORM 2004 Conformant".

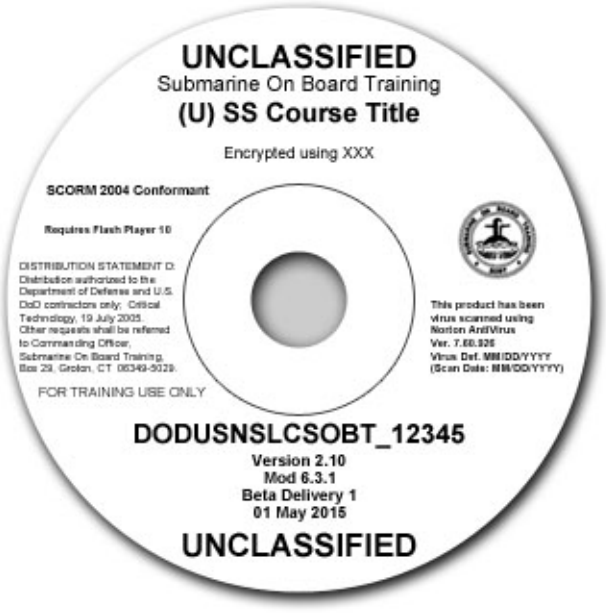


Figure 8: Example of Unclassified CD Labeling
(refer to Appendix C, page 79 for an example of classified CD labeling)

Note: CDs containing supporting materials separate from the course (documentation, raw media, source code, exam key) must also be labeled with all identifying items described in this section (exactly the same as the course CD) and with the additional marking of "Supporting Materials", in order to indicate to which course these materials pertain.

IV.I.6. Virus Scanning

SOBT CD-ROMs shall be virus checked and a statement to that effect included on the label. Example: "Virus scanned using Norton AntiVirus Version X.XX, virus def. MM/DD/YYYY (Scan Date: MM/DD/YYYY)."

The entire hard drive should be scanned prior to creating the International Standards Organization (ISO) image. After creating the CD-ROM, the pre-master to be reproduced must be scanned to ensure it is virus free going into the reproduction process.

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Appendix A: Business Rules for Course and SCO Titles

I. Purpose

In the process of working with the several different systems involved with development and deployment of SOBT Courseware in the ILE/AILE environment, it became apparent that a set of business rules needed to be established for creating courseware titles.

Two factors have driven the decision to standardize courseware titles:

1) Some of the systems do not wrap title text, making it necessary to limit title length. Some systems have hard limits on title length.

2) In most cases the normal mode of access to courseware is through an alphabetized list, generating a need to develop standard title conventions so related courses are grouped together in long lists of courses.

II. General Rules

These general rules apply to both course titles and SCO titles:

1) The entire title shall not exceed 64 characters including spaces.

2) Do not over-abbreviate, thereby making the title unintelligible.

3) If acronyms are used in titles, the acronym shall be in all caps. For the correct way to write an acronym, refer to the Written Abbreviation shown in the Submarine Interior Communications Manual.

4) Most special characters are not allowed.

5) The ampersand (&), double quote ("), percent sign (%), and pound sign (#) characters shall not be used.

6) The underscore (_), dash (-), slash (/), and comma (,) characters may be used. A single quote (') character may be used as an apostrophe. Parentheses may be used in titles.

7) If in doubt about a special character, don't use it.

III. Course Titles

All deliverables shall use the designated course title. This applies to the title printed on the CD, the title of the <organization> in the IMS Manifest, and the title in the Content Aggregation Metadata. More descriptive/readable titles may be used in the course content but should be alignable with the designated course title. The course title is made up of three elements, as follows:

III.A. Ship Class

The first element in the course title is the ship class. Table 1 is a breakdown of the rules for assigning ship class. For the purposes of this discussion, submarine type refers to SSBN, SSGN, or SSN. The following rules apply:

ShipClass	Description
SS	All Submarines, or Multiple Classes and Types
SSBN	Fleet Ballistic Missile Submarines
SSGN	Fleet Guided Missile Submarines
SSBN/SSGN	All 726 Class Submarines
SSN	All Fast Attack Submarines, or Multiple SSN Classes
SSN 21	Seawolf Class Submarines
SSN 23	Jimmy Carter ONLY
SSN 688	Los Angeles Class Submarines, or 688 and 688I
SSN 688I	Los Angeles Class Submarines (Improved) (688I ONLY)
SSN 774	Virginia Class Submarines

Table 1: Ship Class

III.A.1. At a minimum all SOBT course titles shall begin with SS. SS applies to courseware that is applicable to more than one class and type of submarine or applies to all submarines. Only one class designator shall be included in the title (e.g., do not put "SSN 688" and "SSN 21" use "SSN").

III.A.2. The class designator for special submarines or breakouts of a parent class shall be used only for the courseware that is unique to that submarine or submarine group (e.g., a course that applies to 688 and 688I class would begin "SSN 688" and a course that applies to only 688I would begin "SSN 688I".) SSN 23 is another example of where this rule would apply.

III.B. Watch Qualification

The second element in the course title is the related watch qualification. Table 2 provides a breakdown of watch qualifications and abbreviations. Table 2 is taken, in part, from the IC Manual. For any watch qualifications not listed, talk to the SOBT Project Manager. In general, the abbreviation shall be used in the course title. Where there is no abbreviation, use the watch title (e.g., Contact Coordinator). The following rules apply:

III.B.1. Avoid redundancy. Use FTOW Qualifications vice FTOW Watch Qualifications.

III.B.2. If a watch qualification does not apply, leave it out.

III.C. Descriptor

The last element in the course title is the descriptor. The descriptor shall avoid redundancy and use approved abbreviations where available. The ruling assumption is: the person that needs the course is expected to know the abbreviated version of the system title (e.g., Vertical Launch System is "VLS", or Time Frequency Distribution System is "TFDS"). The following rules apply:

III.C.1. Use the full system identifier (e.g., "AN/BQQ-10" vice "BQQ-10" or "Q-10").

III.C.2. Avoid redundancy of the first and second elements (e.g., "SSN 688 Los Angeles Class AN/BQQ-10 Sonar Operator Training" should be "SSN 688 AN/BQQ-10 Operator Training").

Table 2: Qualifications

WatchDescr	WatchAbbrv
ADVANCED ET ESM	ADV_ET_ESM
ADVANCED FT	ADV_FT
ADVANCED MM AUXILIARY	ADV_MM_AUX
ADVANCED MM WEAPONS	ADV_MM_WEPS
ADVANCED MT	ADV_MT
ADVANCED OFFICER	ADV_OFFICER
ADVANCED SONAR	ADV_ST
AMMUNITION HANDLER INDIVIDUAL/TEAM LEADER	
AN/BQN-17 FATHOMETER OPERATOR	FATHOMETER
AN/BQQ-9 OPERATOR	
AN/BRD-7 OPERATOR	
AN/BSY-1 BOTTOM SOUNDER	FATHOMETER
ANCHOR OPERATOR	ANCHOR
ASSISTANT NAVIGATOR	ANAV
AUXILIARY ELECTRICIAN AFT	AEA
AUXILIARY ELECTRICIAN FORWARD	AEF
AUXILIARY MACHINERY ROOM	AMR
AUXILIARYMAN OF THE WATCH	AOW
BASIC FT	BASIC_FT
BASIC ELECTRONICS	BASIC_ET
BASIC ENGINEERING QUALIFICATIONS	BEQ
BASIC ENLISTED SUBMARINE QUALIFICATIONS	BSQ
BASIC ET COMMS	BASIC_ET_COMMS
BASIC ET ESM	BASIC_ET_ESM
BASIC ET NAV	BASIC_ET_NAV
BASIC MM AUXILIARY	BASIC_MM_AUX
BASIC MM WEAPONS	BASIC_MM_WEPS
BASIC MT	BASIC_MT
BASIC NAVIGATION	BASIC_NAV
BASIC OFFICER	BASIC_OFF
BASIC SEAMANSHIP	BASIC_SEAMANSHIP
BASIC SONAR OPERATOR	BASIC_ST
BATTERY CHARGING LINEUP OFFICER	BCLU_OFF
BELOW DECKS WATCH	BDW
CHIEF OF THE WATCH	COW
COMMAND AND CONTROL SYSTEM WATCH	CCSW
CONTACT COORDINATOR	
CONTROL AND MONITORING PANEL WATCH	CAMP
CONVENTIONAL WEAPONS HANDLING SUPERVISOR	

WatchDescr	WatchAbbrv
DDS OPERATOR	DDS
DIESEL OPERATOR	DIESEL
DIVING OFFICER OF THE WATCH	DOOW
DUTY NAVIGATION ELECTRONICS TECHNICIAN	
DUTY OFFICER	SDO
DUTY SK	
ELECTRICAL OPERATOR	EO
ENGINE ROOM FORWARD	ERF
ENGINEERING LABORATORY TECHNICIAN	ELT
ESM OPERATOR (WLR 8) V5	ESM
ESM OPERATOR (WLR-8) V2	ESM
FATHOMETER OPERATOR	FATHOMETER
FEED STATION	
FIRE CONTROL SUPERVISOR	
FIRE CONTROL TECHNICIAN OF THE WATCH (AN/BSY-1)	FTOW
FIRE CONTROL TECHNICIAN OF THE WATCH (CCS MK-2 MOD-0/MOD1)	FTOW
FIRE CONTROL TECHNICIAN OF THE WATCH (MK 117/CCS MK-1)	FTOW
HELMSMAN PLANESMAN	HELM_PLANES
INDEPENDENT DUTY CORPSMAN	IDC
LAUNCHER SUPERVISOR	LAUNCHER_SUP
LOOKOUT	LOOKOUT
MANEUVERING BOARD OPERATOR	
MISSILE CONTROL CENTER WATCH	MCC
MISSILE COMPARTMENT ROVING PATROL	MCRP
MISSILE CONTROL CENTER SUPERVISOR	MCC_SUP
NAVIGATION SUPERVISOR	NAV_SUP
NAVIGATION WATCH	NAV_WATCH
NUCLEAR WEAPONS HANDLING SUPERVISOR	
NUCLEAR WEAPONS HANDLING TEAM MEMBER	
NULEAR WEAPONS SECURITY GUARD	
OFFICER OF THE DECK	OOD
OVER-THE-HORIZON TARGETING (OTH-T) OPERATOR	OTH
PETTY OFFICER OF THE DECK	POOD
PYROTECHNIC HANDLER INDIVIDUAL/TEAM LEADER	
QUARTERMASTER OF THE WATCH	QMOW
RADAR/IFF OPERATOR	
RADIO OPERATOR	
RADIO SUPERVISOR	
RADIOMAN OF THE WATCH/DUTY RADIOMAN	RMOW
REACTION FORCE MEMBER	
REACTOR OPERATOR	RO
REACTOR TECHNICIAN	RT
REPAIR PARTS PETTY OFFICER	RPPO
SCHOOL OF THE BOAT	SOB
SECURITY FORCE SUPERVISOR	
SHIP'S DIVER	DIVER
SMALL ARMS MAINTENANCE INDIVIDUAL	SMALL_ARMS

WatchDescr	WatchAbbrv
SONAR OPERATOR	SONAR_OPERATOR
SONAR SUPERVISOR	SONAR_SUP
STRATEGIC WEAPONS DUTY OFFICER	SWDO
STRATEGIC WEAPONS SYSTEM TECHNICIAN	SWST
THREE-INCH LAUNCHER/SIGNAL EJECTOR/MASE OPERATOR	LAUNCHER
THROTTLEMAN	THROTTLEMAN
TORPEDO ROOM WATCH	TRW
TOWED ARRAY HANDLING SYSTEM OPERATOR	
TOWED ARRAY HANDLING SYSTEM SUPERVISOR	
VERTICAL LAUNCH HANDLING INDIVIDUAL/TEAM LEADER	
VERTICAL LAUNCH HANDLING TEAM MEMBER	
VERTICAL LAUNCH SYSTEM OPERATOR	VLS
WEAPONS HANDLING INDIVIDUAL	
WEAPONS HANDLING TEAM LEADER	
WEAPONS HANDLING TEAM MEMBER	

Table 2: Qualifications

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Appendix B: Product Numbers, Versions, Modifications, Delivery Numbers

I. Purpose

In order to adapt to the concept of global learning objects and, as much as possible, maintain common learning content identifiers and version control, the following rules apply for all SOBT courses.

For the purposes of this discussion a Content Update is a modification to the learning content. A Format Upgrade is a modification to the presentation format, such as changing from SCORM 1.2 to SCORM 2004. All Content Updates shall also include a Format Upgrade to comply with the SOBT Developer's Guide published at the time the product is contracted, unless specifically exempted in the Statement of Work (SOW).

II. Product Numbers

II.A. The prefix for all SOBT courses shall be "DODUSNSLCSOBT_". The previous prefix (e.g., "WBT-GT-" or "ICW-S-", etc.) is obsolete and shall no longer be used.

II.B. The five digit suffix for new courses will be assigned by the SOBT Project Manager and provided to the developer for use when creating the courseware.

II.B.1. The first two digits of the suffix for new development will be the fiscal year the product was funded or initially funded for multi-year projects (e.g., "05" for FY 2005).

II.B.2. The last three digits will be a sequential number based on when the number is assigned (e.g., 05011 would be the eleventh product number assigned in FY 2005).

II.C. Content Updates and Format Upgrades shall retain the product number assigned the course being updated (e.g., "97035" shall remain "97035"). For products that currently have four digit numbers, the product number shall be extended to five digits by adding a zero between the first and last two digits (e.g., "9735" shall become "97035"). The SOBT Project Manager is responsible for ensuring the new five digit number is not duplicated in the SOBT Catalog. Content Updates and Format Upgrades with the old style prefix, "ICW-GT-" etc., shall be changed to the common "DODUSNSLCSOBT_" prefix.

II.D. The product number shall be formatted DODUSNSLCSOBT_12345.

III. Version Numbers

III.A. Version numbers shall always be formatted to the one-hundredth's digit – for example, Version 1.00, not Version 1.0.

III.B. The initial version of all new courses shall be 1.00.

III.C. Subsequent content updates and format upgrades shall be assigned a new version and modification (Mod) number. The Version and Mod shall be included on all courseware deliverables. As a general rule of thumb, sequencing of new versions shall be based on:

III.C.1. SOBT in-house fixes – one-hundredth's digit is incremented by 1 (2.01 goes to 2.02, or 2.19 goes to 2.20.) Use of the one-hundredth's digit for versioning is reserved for in-house corrections and updates done by SOBT programmers.

III.C.2. 0 to 25% of course content modified – one-tenth's digit is incremented by 1 and one-hundredth's digit is re-zeroed. (2.01 goes to 2.10, or 2.95 goes to 3.00) This would include all format only upgrades with 25% or less content modification (e.g., SCORM 1.2 to SCORM 2004 conversion)

III.C.3. Greater than 25% of course content modified – whole digit incremented by 1 and one-hundredth's and one-tenth's digits re-zeroed. (2.01 goes to 3.00, or 2.95 goes to 3.00)

IV. Modification (Mod) Numbers

IV.A. The modification number shall always be the SOBT Developer's Guide version number to which that course is developed – i.e., courses developed to SOBT Developer's Guide Version 6.3.1 would have a course Mod of 6.3.1.

V. Delivery Numbers

V.A. For the purposes of the development process, developers shall use "Delivery" numbers to differentiate between different drafts of a course – i.e., the first prototype delivered for course DODUSNSLCSOBT_05123 Version 3.20 Mod 6.3.1 shall be Prototype Delivery 1, the second prototype delivery of the same course shall be Prototype Delivery 2 (with the same version and mod), etc. The first beta of course DODUSNSLCSOBT_05123 Version 3.20 Mod 6.3.1 shall be Beta Delivery 1, the second beta delivery of the same course shall be Beta Delivery 2 (with the same version and mod), etc.

V.B. Delivery numbers shall be whole numbers – i.e., Beta Delivery 1, <u>not</u> Beta Delivery 1.00.

Appendix C: Classification Markings

I. References

(a) Department of the Navy Information Security Program SECNAV M-5510.36, dated 30 June 2006
(b) Department of Defense Manual (DoDM) 5200.01-V2, February 24, 2012, Change 2, March 19, 2013
(c) DoD Directive 5230.24 Distribution Statements on Technical Documents
(d) DoD 5230.25 – PH Control of Unclassified Technical Data with Military or Space Application
(e) OPNAVINST N9210.3 Safeguarding of Naval Nuclear Propulsion Information (NNPI), dated 7 June 2010
(f) CNSS (Committee on National Security Systems) Policy, CNSSP No. 26, National Policy on Reducing the Risk of Removable Media, November 2010
(g) Chairman of the Joint Chiefs of Staff Instruction, CJCSI 6510.01F, Information Assurance (IA) and Support to Computer Network Defense (CND)
(h) DoD memo for "Encryption of Sensitive Unclassified Data at Rest on Mobile Computing Devices and Removable Storage Media"

Reference (a) requires all computer media be portion marked and provides some guidance on this requirement. Per reference (a) paragraph 6-11.2.d.(2) and reference (e), NNPI material does not require portion marking. The following are the SOBT guidelines for classification marking and portion marking of IMI.

II. Requirements

II.A. General

II.A.1. The SOBT requirements in no way override requirements from higher authority but are intended as an interpretation of existing guidelines. Lack of coverage in this document in no way exempts the requirements of references (a) through (h). All questions should be referred to the Submarine On Board Training office for resolution.

II.A.2. Every effort shall be made to keep the course, and all constituent parts, at the lowest classification possible without impacting learning effectiveness.

II.A.3. Each separable piece of the course containing content (SCO, HTML page, graphic, photo, narration text, etc.) shall be clearly marked, such that, when viewed in normal display modes, it clearly indicates the classification and short form of warning notices as described by reference (a). All separable objects have the potential for re-use.

II.A.4. For all Naval Nuclear Propulsion Information (NNPI) material, refer to reference (e) for marking requirements. Since the marking of NNPI material differs from that for other material, this appendix includes some details and examples specific to NNPI material. The information in this appendix is not intended to be all-inclusive and does not override any requirements in reference (e). Refer to

reference (e) for the complete requirements for marking NNPI material.

II.A.5. All media (CD, DVD) containing classified information, or controlled unclassified information (FOUO, PII, NOFORN) shall be encrypted according to references (e) through (h). OPNAVINST N9210.3 contains additional requirements for electronic data containing NNPI.

II.B. Course

II.B.1. All CDs and DVDs shall be marked with a distribution statement per references (a) through (e). The distribution statement shall be the most restrictive of the distribution statements derived from the source/reference materials used to create the courseware. See Figure 1. The distribution statement for U-NNPI materials is also shown; for other NNPI materials, see reference (e). For those unclassified courses that do not meet the requirements for a distribution statement, justification/reasoning must be documented in the IMDP.

Distribution Statement Examples:

DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited.

DISTRIBUTION STATEMENT D: Distribution authorized to DoD and U.S. DoD contractors only; Critical Technology, 29 June 2010. Other requests shall be referred to Submarine On Board Training.

DISTRIBUTION STATEMENT F: Further dissemination only as directed by Submarine On Board Training, 29 June 2010, or higher DoD authority.

Distribution Statement for U-NNPI:

NOFORN: This document is subject to special export controls, and each transmittal to foreign governments or foreign nationals may be made only with the approval of Naval Sea Systems Command.

Figure 1: Distribution Statement Examples

II.B.2. All CDs and DVDs shall be marked with the highest overall classification of the content, the abbreviated warning notices, and/or distribution statements, as applicable. The requirement to include the classification applies to unclassified materials, as well as to classified, with the exception of unclassified NNPI (U-NNPI). Materials that are U-NNPI need not include the marking "UNCLASSIFIED", but rather may simply have the marking "NOFORN" per reference (e). See Figure 2.

II.B.3. All classified CDs and DVDs shall also be labeled with all items identified in section IV.I.5. of this Guide, as well as "Derived from", and "Declassify on" instructions. Where multiple CDs or DVDs comprise a total package, each individual CD or DVD shall be marked with its own level of classification regardless of the classification of other items from the same training package. This prevents needless over-classification and the inherent problems with handling and destruction of classified material. A sample CD with required markings is illustrated in Figure 3.

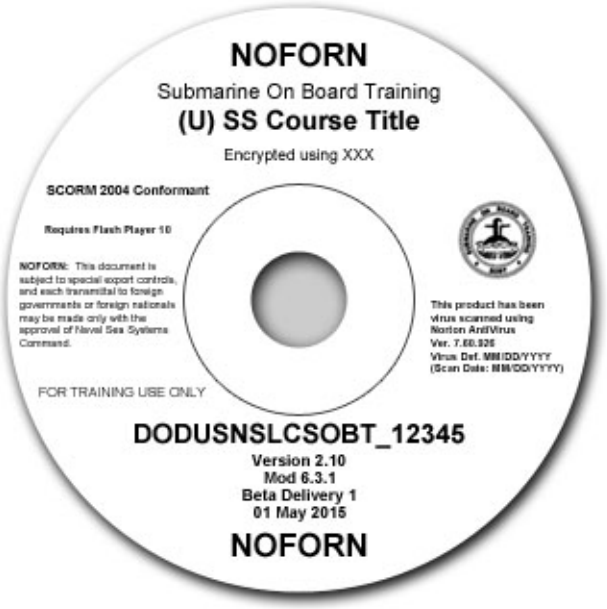


Figure 2: Example of CD Labeling for U-NNPI Course

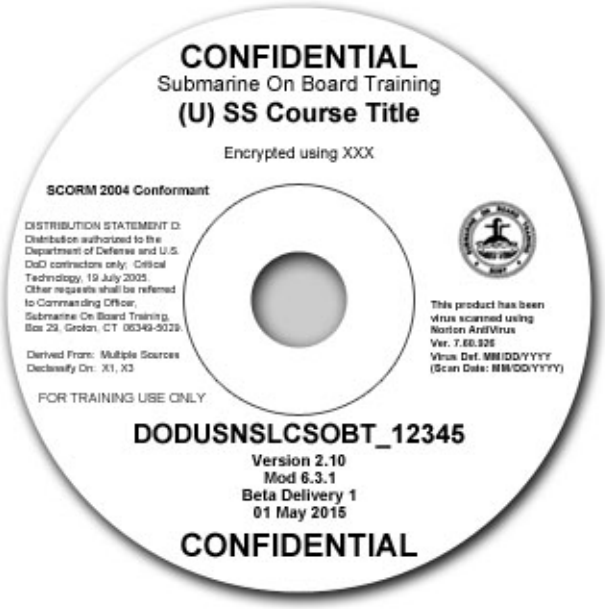


Figure 3: Example of Classified CD Labeling
(refer to Section IV.I.5., page 66 for an example of unclassified CD labeling

II.C. SCO

II.C.1. All pages/screens shall have the highest classification and warning notices of any part of the SCO displayed in the top navigation bar.

II.C.2. The first page of each SCO shall include all information to meet the requirements of the "face of the document" as described by reference (a). The marking of each SCO is intended to meet the requirement of paragraph 6-22 of reference (a) "Marking Classified Documents with Component Parts". Additionally, there shall be a notice informing personnel to refer to the audio text for classification information on each individual audio narration. At a minimum this page shall include all items listed in Table 1.

Face Page Requirements		
Requirement	**Notes**	**Reference**
Originating command	"Submarine On Board Training"	Reference (a) para 6-2
Originating date	expected final date per POA&M	Reference (a) para 6-2
Overall Classification	including "Unclassified" if applicable	Reference (a) para 6-3
"Derived from" line	if applicable	Reference (a) para 6-9
"Downgrade to" and "Declassify on"	if applicable	Reference (a) para 6-10
Full Warning Notice	if applicable	Reference (a) para 6-11
Distribution Statement	if applicable "A" only as authorized by SOBT "D" normal NNPI as shown in reference (d)	Reference (a) Exhibit 8A and References (b), (c), and (d)
Narration classification notice	"The Audio Text is portion marked for security purposes and shall be used to determine the classification of all or portions of the corresponding audio narration."	Submarine On Board Training

Table 1: Face Page Requirements

II.C.3. A disclaimer indicating that the course material is "For Training Use Only" shall be included on the first page of each SCO if space permits, or may be placed on a second introductory page if space does not permit it to fit on the first page. Figure 4 shows an example of such a disclaimer statement:

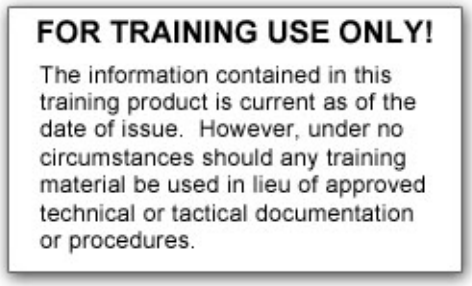


Figure 4: Disclaimer

Other than the above requirements for introductory information, the number of introductory pages shall be kept to a minimum; it is not expected that more than two introductory pages should be necessary at the start of a SCO.

II.D. HTML Pages

II.D.1. HTML pages shall be clearly marked in a manner that displays the classification markings and short form warning notice in both browser and text editor views. The page shall be marked with the highest classification of the content on the page. Reference (a) paragraph 6-4. See Figures 5 and 6.

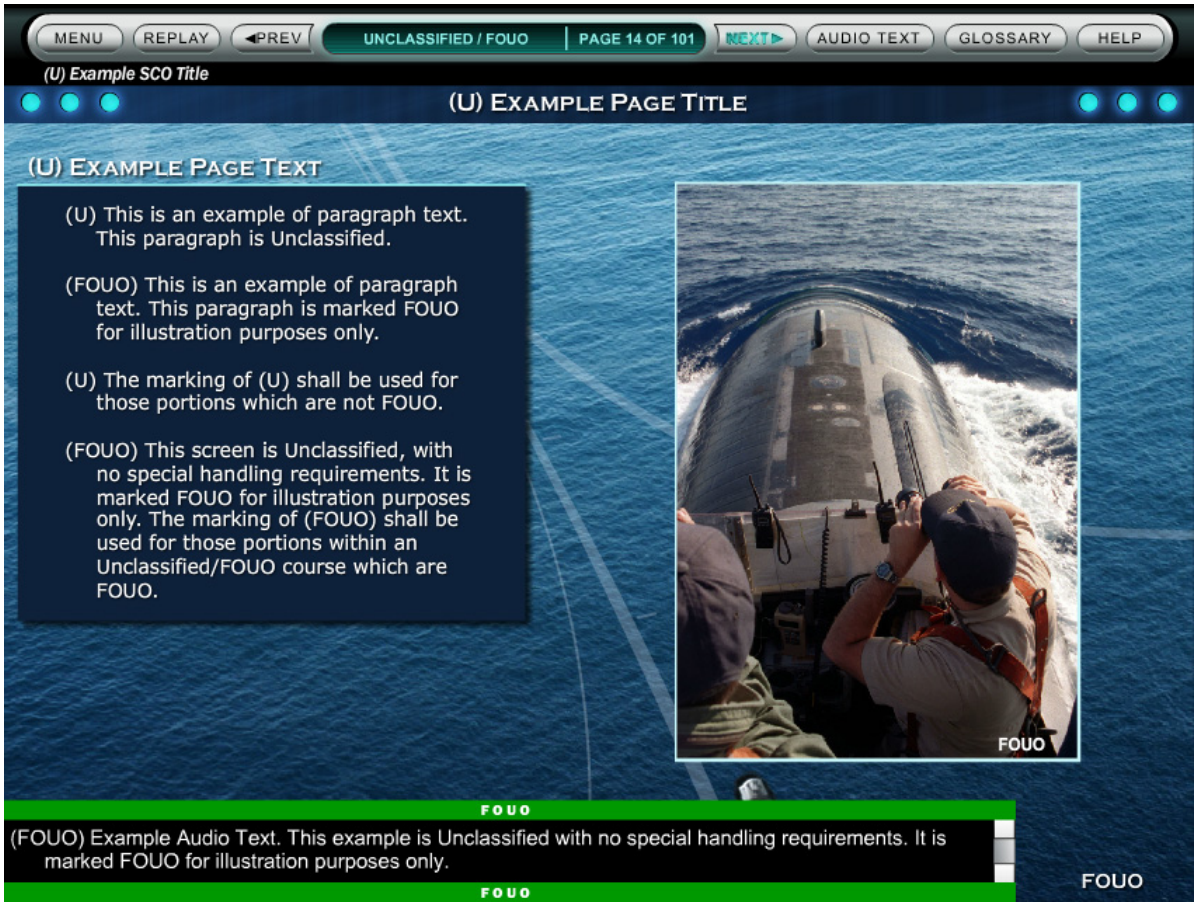


Figure 5: Classification Marking of HTML Page for Display in Browser

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN"
"http://www.w3.org/TR/html4/loose.dtd">
<html>

<!-- ******************  CONFIDENTIAL  ******************** -->

<head>
  <title>(U) Rules of the Nautical Road</title>
  <link rel="stylesheet" href="nauticalrules.css">
  <meta http-equiv="Content-Type" content="text/html; charset=ISO-8859-1">
  <script type="text/javascript" src="script/finddom.js"></script>
  <script type="text/javascript" src="script/pagefunctions.js"></script>
</head>

<body onUnload="parent.stopToggle();">
<table width="100%" border="0" cellpadding="0" cellspacing="0">
  <tr>
    <td colspan="2"><h1 align="center">(U) Objective for Steering and Sailing Rules Section</h1></td>
  </tr>
  <tr>
    <td width="342" valign="top">
      <ul style="list-style-type:circle">
      <li>(U) The required conduct of vessels in any condition of visibility including maintaining a proper
          lookout, the requirement to proceed at a safe speed, and the factors for determining safe
          speed.</li>
      <li>(U) That all available means appropriate to the prevailing circumstances and conditions must be
          used to determine if there is a risk of collision. If there is any doubt, such risk is deemed to
          exist.</li>
      <li>(U) That proper use of radar equipment, if fitted, and a compass bearing of an approaching
          vessel shall be used to determine if risk of collision exists.</li>
      <li>(U) The actions to avoid collision including the requirement that actions be positive, made in
          ample time, and with due regard to the observance of good seamanship.</li>
      <li>(U) The rules for vessels proceeding in narrow channels, and when within traffic separation
          schemes.</li>
      <li>(U) The specific rules that apply to vessels in sight of one another including sailing vessels,
          overtaking situations, head-on, and crossing situations.</li>
      <li>(U) The hierarchy of responsibilities between vessels.</li>
      <li>(U) The conduct of vessels in restricted visibility.</li>
      </ul>
    </td>
    <td width="450" valign="top">
      <img src="graphics/g023_040_01.jpg" alt="(U) Coast Guard Navigation Rules booklet" width="430"
                height="350" border="0">
    </td>
  </tr>
</table>
<script type="text/javascript">parent.writeScoMenu();</script>
</body>

<!-- ******************  CONFIDENTIAL  ******************** -->

</html>
```

Figure 6: Classification Marking of HTML Page for Display in Code Editor

II.E. Text Elements

II.E.1. Mark subjects or titles with the appropriate abbreviated classification level, before the subject or title. Reference (b) – Overview, paragraph 1.c.(3) and Marking Principles, paragraph 6.a-b. – requires all titles be marked with the appropriate abbreviated classification level – (S), (C), or (U) – before the subject or title. This includes all titles, such as screen/page titles, topic titles, section titles, etc.

II.E.2. Course and SCO titles shall always be unclassified, and therefore marked with a (U), such that the titles can be listed in the SOBT catalog on both the unclassified and classified websites.

II.E.3. Mark each portion (paragraph, bullet item) to show its classification level. Place the appropriate abbreviation – "(S)" for Secret, "(C)" for Confidential, "(U)" for Unclassified – immediately before each paragraph, or immediately after the bullet or portion number and before the paragraph. Within Unclassified-FOUO courses, those portions which are FOUO shall be marked "(FOUO)"; the marking of "(U)" shall only be used for those portions which are not FOUO. Within classified courses, portions that contain both FOUO and classified information shall be marked with the appropriate abbreviated classification designation – "(S)" or "(C)" ; and unclassified portions containing FOUO shall be marked with "(FOUO"). Reference (a) paragraphs 6-5.1., 6-11.3.a.(2), and exhibit 6A-3.

II.E.4. The text of each exam question shall be portion marked with the appropriate markings. Also, the text of each answer shall be portion marked with the appropriate markings. The portion markings shall appear when viewed in the browser and when viewed in a text editor.

II.E.5. The Audio Text shall be marked per the requirements of reference (a) for paragraph 6-4 "Interior Page Markings". At a minimum this shall include classification and required short form warning notices at the top and bottom center and portion marking for each paragraph per reference (a). See Figure 7.

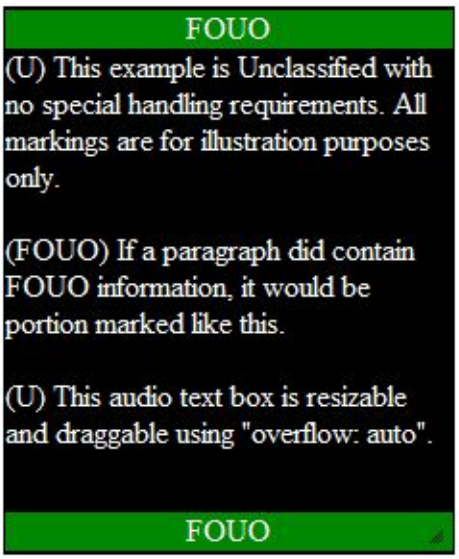


Figure 7: Classification Marking of Narration Text

II.F. Graphical Elements

II.F.1. Still graphics shall be portion marked in a location where it is clearly readable on the graphic. For classified graphics, this marking shall include the security level classification and any applicable warning notices (example: "SECRET/NOFORN"). For unclassified graphics with no applicable warning notices, it shall state "UNCLASSIFIED". For unclassified graphics with applicable warning notices, the warning notice is sufficient (examples: "FOUO", "NOFORN"). Navigation buttons (Next, Previous, Replay, etc.) do not have to be portion marked. See Figure 8.

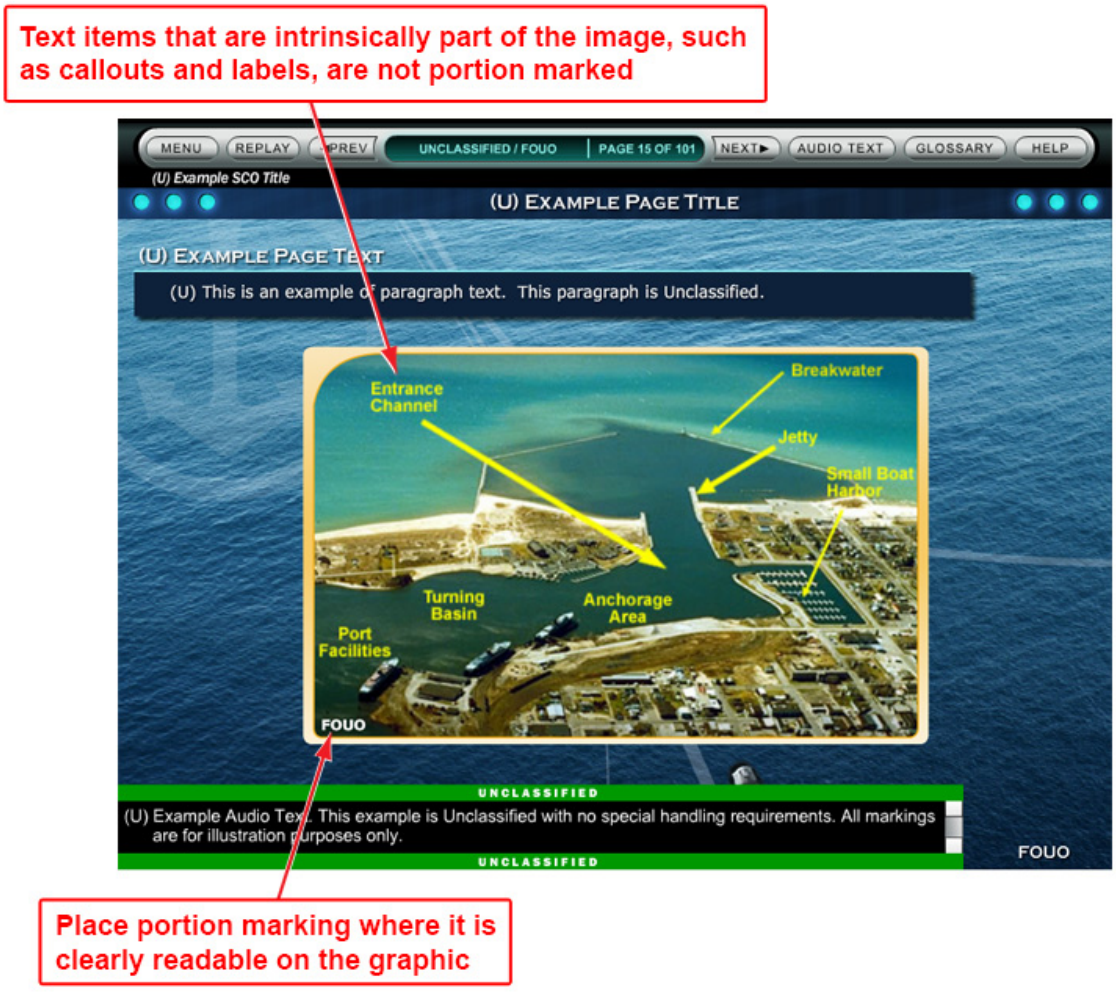


Figure 8: Classification Marking of Graphic on HTML Page

II.F.2. Regarding text that is embedded in a still graphic, if the text gives the appearance of being superimposed over the image, it shall be portion marked per the rules for portion marking of text in section II.E. "Text Elements" of this Appendix. Text that is intrinsically part of the image (such as component labels on a schematic, or city names on a map) shall not be portion marked.

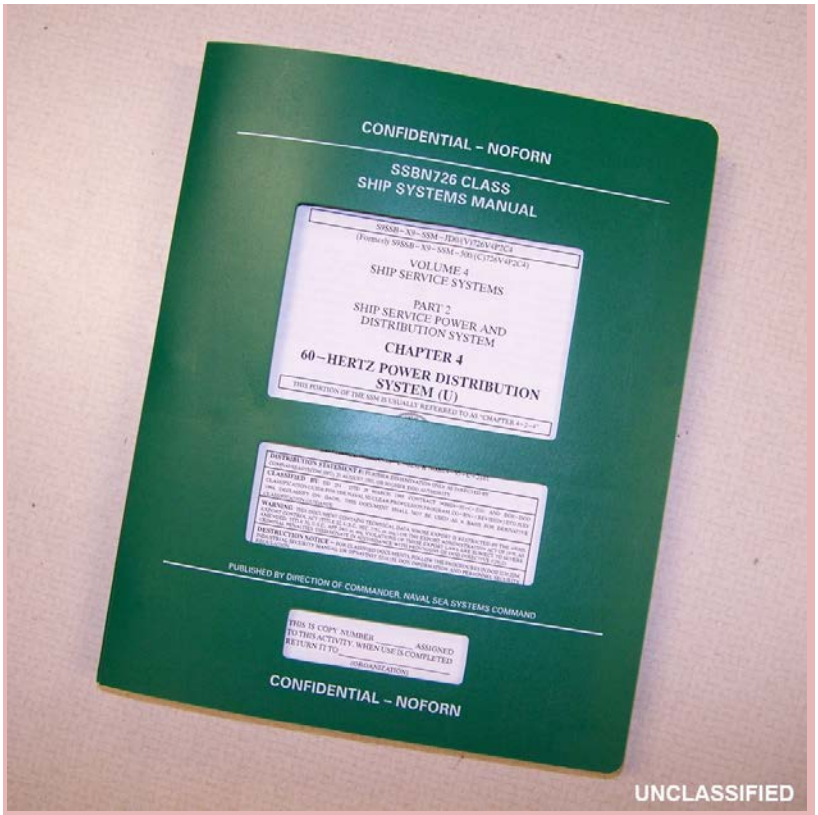
II.F.3. For the purposes of this document, a video is defined as video footage that was shot with a video recording device; and an animation is defined as a drawing that was created by a graphic artist and animated programmatically.

II.F.4. Each video shall include the security level classification and any applicable warning notices at the beginning of the video. The classification shall remain displayed long enough to be readable but does not have to remain on the screen throughout the whole video. This applies to unclassified as well as classified videos.

II.F.5. Animations include Flash objects, animated .GIFs, 3-D animations, and possibly other animation techniques. Each animation shall include the security level classification and any applicable warning notices in a location where they are clearly readable and do not obscure learning content. Instructional text embedded in the animation, such as titles, paragraph text, bullet items, etc., shall be marked in accordance with the requirements in section II.E. of this Appendix. Drawing components which are created within Flash do not require separate portion marking.

II.F.6. On all graphical elements, the classification shall be clearly readable while not affecting the learning intent of the content. The classification markings shall be part of the object and not layered text via an HTML layer positioned over the top of the graphic or video. In short, the classification marking shall display when the file is opened in any display or editing tool.

II.F.7. If an unclassified graphic contains words such as "Confidential" or "Secret" but is actually an unclassified graphic used for example only, it shall be accompanied by the following disclaimer: "This graphic is unclassified. All classification markings are for training purposes only." See Figure 9.



This graphic is unclassified. All classification markings are for training purposes only.

Figure 9: Unclassified Graphic with Example-Only Markings

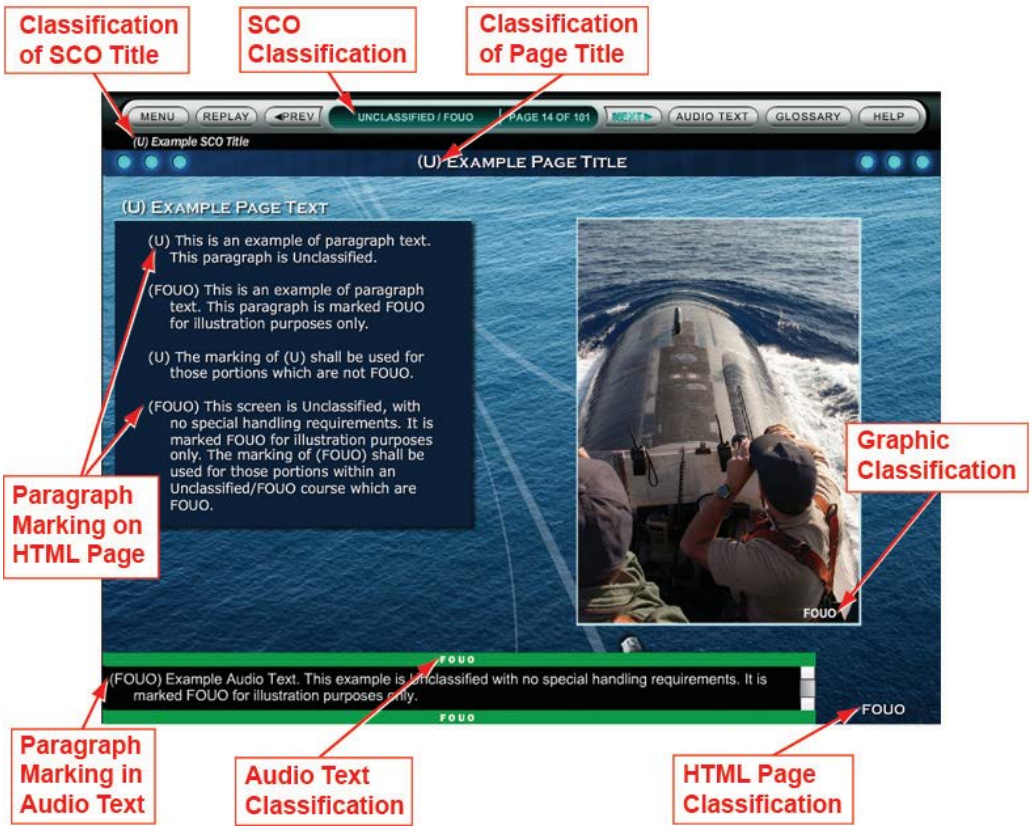


Figure 10: Summary of Portion Marking Placement

II.G. Metadata

II.G.1. All objects for which metadata is required (Content Aggregation, SCO) shall include a classification element for security level, and one for distribution restrictions. (See Figures 11 and 12.)

```
<classification>
    <purpose>
        <source>LOMv1.0</source>
        <value>security level</value>
    </purpose>
    <taxonPath>
        <source>
            <string language="en" />
        </source>
        <taxon>
            <entry>
                <string language="en">Unclassified</string>
            </entry>
        </taxon>
    </taxonPath>
</classification>
```

Figure 11: Example of Classification Element for Security Level

```
<classification>
    <purpose>
        <source>ADL-Rv1.0</source>
        <value>distribution restrictions</value>
    </purpose>
    <taxonPath>
        <source>
            <string language="en">ADL/DOD Distribution Taxonomy</string>
        </source>
        <taxon>
            <entry>
                <string language="en">DISTRIBUTION STATEMENT D.</string>
            </entry>
        </taxon>
    </taxonPath>
</classification>
```

Figure 12: Example of Classification Element for Distribution Restrictions

II.G.2. SOBT has determined that the fifth <classification> element for "accessibility restrictions" shall always be used. This means that, at a minimum, there must be a total of at least five <classification> elements in the course metadata file, and a total of at least two <classification> elements in each SCO metadata file.

This additional element shall have its <purpose><value> element set to "accessibility restrictions". The element for <taxonPath><taxon><entry> shall be set as shown in the first column of Table 2. For Confidential and Secret courses, the <taxonPath><taxon><entry> element shall be set to "CD". Note that two of the conditions listed may apply – for example: "Confidential – Restricted Data" in which case both the "CD" value and the "RD" value are applicable. In such a case, there shall be two <classification> nodes for "accessibility restrictions" (in this example, one set to "CD" and one set to "RD").

The allowable options provided by ILE are:

Entry in Metadata:	Description:	When to Use:
CD	Cleared for DoD distribution only	Confidential, Secret
RD	Restrictions to DoD distribution	Restricted Data
NF	NOFORN (i.e., not available for foreign nationals)	NOFORN
LR	Legal restrictions to public distribution	FOUO
NR	No legal restrictions to public distribution	Distribution Statement A

Table 2: ILE Options for Accessibility Restrictions Element

```
<classification>
    <purpose>
        <source>LOMv1.0</source>
        <value>accessibility restrictions</value>
    </purpose>
    <taxonPath>
        <source>
            <string language="en" />
        </source>
        <taxon>
            <entry>
                <string language="en">CD</string>
            </entry>
        </taxon>
    </taxonPath>
</classification>
```

Figure 13: Example of Classification Element for Accessibility Restrictions

Appendix D: Testing Tools and Procedures

I. References

(a) Advanced Distributed Learning (ADL) Sharable Content Object Reference Model (SCORM) 2004 3rd Edition, dated 20 October 2006 – http://www.adlnet.gov/

(b) World Wide Web Consortium (W3C) HTML 4.01 Specification – http://www.w3.org/TR/html4/

(c) World Wide Web Consortium (W3C) Markup Validation Service – http://validator.w3.org/

(d) Submarine On Board Training (SOBT) website, Developer's section – https://www.netc.navy.mil/sobt/web/developers/devmain.htm

II. Overview

This appendix gives a description of acceptance testing which will be performed by SOBT staff. Courseware acceptance testing is performed by SOBT programmers and by SOBT project managers. Both the SOBT Programmer Checklist and the SOBT Project Manager Checklist are available for download from the SOBT website at https://www.netc.navy.mil/sobt/web/developers/devmain.htm. SOBT staff will check every line item as listed on the checklists.

SOBT uses a variety of tools to check the line items listed on the checklists. Prior to delivery of any prototype or beta courseware, the developer shall check the course in the ADL SCORM Conformance Test Suite. Regarding other tools, the specific tool used is left up to the developer's discretion. The following table lists SOBT's most commonly used testing tools.

	Testing Tool	What Does the Tool Test?
1)	ADL SCORM 2004 3rd Edition Conformance Test Suite v.1.1.2	Manifest, metadata, packaging, some SCORM calls (initialize, terminate, score, status).
2)	ADL SCORM 2004 3rd Edition Sample Run-Time Environment	LMS Testing: Import of package, SCORM calls, Sequencing and Navigation (including Rollup).
3)	Rustici Test Track online version: NeL Test Track (unclass)	LMS Testing: Import of package, SCORM calls, Sequencing and Navigation (including Rollup).
4)	Seaware	LMS Testing: SCORM calls (does not support Sequencing and Navigation; limited support for Rollup).
5)	SOBT Course Checker Tool (available on request)	Checks most items on the SOBT Programmer Checklist, with the exceptions of LMS testing and SCORM Test Suite. Includes HTML validation.
6)	SOBT Metadata Validator (available on the SOBT website)	Checks course metadata and SCO metadata for SOBT-required elements.
7)	TextPad	Inspection of manifest, metadata, programming code. Regular expression searches across multiple files.
8)	W3C Markup Validation Service	HTML Validation : Verifies HTML 4.01 Standard.
9)	HTML Tidy	HTML Validation: Verifies HTML 4.01 Standard.
10)	HTML Lint	HTML Validation: Verifies HTML 4.01 Standard.

Table 1: Overview of Testing Tools

III. SCORM 2004 3rd Edition Conformance Test Suite v.1.1.2

SOBT will test prototype and beta courseware using ADL's SCORM 2004 3rd Edition Conformance Test Suite, Version 1.1.2. The SCORM 2004 Conformance Test Suite provides the ability to perform self-testing on Learning Management Systems, Sharable Content Objects, and Content Packages. The "Content Package Conformance Test" is the primary test that will be used by SOBT. This option tests the complete course package, including the ability to launch and step through the SCO to test all the calls that the SCO makes.

The Test Suite can be downloaded at: http://www.adlnet.gov. Go to the "Resources/Downloads" section, select the tab for "Software", and scroll down in the list to find "SCORM 2004 3rd Edition Conformance Test Suite". The new version 1.1.2 supports Windows 7.

On the opening page of the SCORM 2004 Conformance Test Suite, there are 2 groups of links near the bottom of the page. The "Content Package Conformance Test" (second option under Conformance Tests group) is the primary test that is required by SOBT.
To perform the Content Package Conformance Test, do the following:

a.) Click the "Content Package Conformance Test" link.
b.) Click the "Continue" button.
c.) Select "Content Package (PIF)", then click "Continue".
d.) Select "Content Aggregation Content Package", then click "Continue".
e.) Enter the zip file (with imsmanifest.xml at the root), then click "Begin Test", then click "OK".
f.) After all metadata testing has finished running, do the following:
g.) For the Initialize Timeout Period, enter 20, click "Continue", "Continue".
h.) Click the "Launch SCO" button.
i.) Take the assessments as outlined in the IMDP and view the "SCO test log" to see the outcome of your SCORM calls. Pay close attention to the bookmark, score and status lines.
j.) Select the "Complete Test" button to launch the next SCO.
k.) Repeat Steps i and j until all SCOs have been tested.

If, after completing the Content Package Conformance Test, you have not been able to test and validate every possible combination of completion, success, and scores that could occur (based on the design outlined in the IMDP), you can use the individual SCO test – "Sharable Content Object (SCO) Run-Time Environment (RTE) Conformance Utility Test" – to go through any of the SCOs again in order to test other combinations of completion, success, scores, etc.

SOBT will test every course to ensure each SCO is setting values for completion_status, success_status, score.raw, and score.scaled to achieve the results described in the IMDP. SOBT will test against the standard SCO communication behavior for setting the values of data model elements that is given in section IV.E.2.a.iv. and Table 9, unless otherwise specified in the IMDP. If any approved exemptions from the standard communication behavior are described in the IMDP, SOBT will test against what is described in the IMDP.

IV. LMS Testing

The developer is required to test prototype and beta courseware in a SCORM-compliant LMS. This is necessary in order to verify the results of rollup behavior and GetValue calls, which cannot be tested in the ADL SCORM Conformance Test Suite (CTS). A full test of the behavior of SCO communication with the LMS cannot be done using the CTS alone, since data cannot be persisted between sessions. Using an LMS (such as Rustici Test Track, or ADL's Sample RTE), data can be persisted between sessions, and thus, GetValue() calls can be tested to see if they retrieve the

expected values from the LMS. All variations of completion status, success status, score, and corresponding rollup results should be tested. Instead of performing the testing in a single session, break the testing into two sessions. By doing this, you are testing not only the SetValue calls, but also the GetValue calls.

SOBT will test prototype and beta courseware in Rustici Test Track and in Seaware. SOBT will also test courseware in ADL's Sample RTE as necessary when a problem or suspect behavior requires further investigation. This includes testing of all behavior involving communication between the SCO and the LMS.

The SCORM 2004 Sample Run-Time Environment (Sample RTE, or SRTE) is a free tool available from ADL which can be used to perform the LMS testing described above. Since the Sample RTE is case-sensitive, it is also a useful tool for verifying there are no problems due to case-sensitive mismatches. The Sample RTE can be downloaded at: http://www.adlnet.gov. Go to the "Resources/Downloads" section, select the tab for "Software", scroll down in the list to find the latest version of the SCORM 2004 3rd Edition ADL Sample RTE, and follow the readme.txt instructions.

When using the Sample RTE, verify that the course imports error-free. To do this, select "YES" to enable the validate option in the Sample RTE Course Import window as shown in the following screenshot:

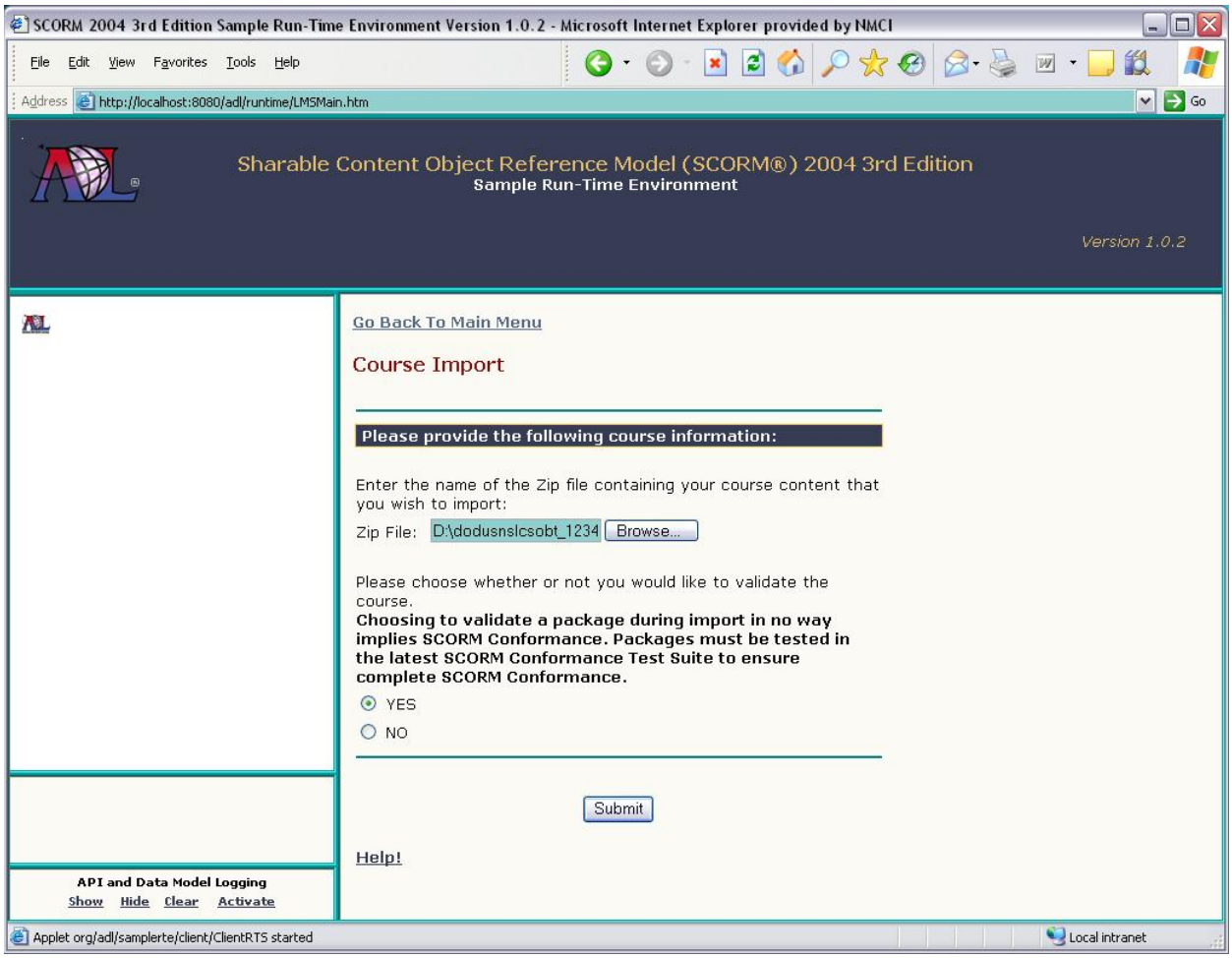


Figure 1: Course Import in Sample RTE

V. SOBT In-House Tools

SOBT currently has two in-house tools that are in use for checking courseware. They are: the SOBT Course Checker Tool, and the SOBT Metadata Validator.

The SOBT Course Checker Tool encompasses the features of several separate tools that SOBT previously used. It programmatically checks most of the items on the SOBT Programmer Checklist (with the exceptions of the LMS Testing and the SCORM Conformance Test Suite). The SOBT Course Checker Tool has built-in HTML validation. The SOBT Course Checker Tool has built-in metadata validation; the metadata validation is also available as a separate tool, described below. The SOBT Course Checker Tool is available on request.

The SOBT Metadata Validator tests all the elements that SOBT requires. It does not test optional elements. The SOBT Metadata Validator can be downloaded from the SOBT website at: https://www.netc.navy.mil/sobt/web/developers/devmain.htm

When using either of the SOBT in-house tools, it is important to understand that the purpose of the tools is to alert the tester to potential problems that warrant a closer look. Any errors reported by the tool require further investigation, in order to determine if there is an actual problem. Visual validation of all reported errors is necessary. In other words, the tool does not provide an actual pass/fail status – it just alerts the tester to items that need further investigation.

VI. HTML Validation

Many tools are available for performing HTML validation. Some examples are: the W3C Markup Validation Service, HTML Tidy, HTML Lint, and Dreamweaver. Unfortunately, not all HTML validation tools give the same results. The W3C Markup Validation Service will be used as the authoritative standard in cases of uncertainty.

The SOBT Course Checker Tool utilizes a Perl module called HTML::Lint to perform HTML validation as a part of the overall checking process done by the tool.

VII. Browser Settings

During the development and testing process, developers and testers must ensure that their browsers are configured to display JavaScript errors. Errors may go unnoticed during the programming process if you do not have your browser configured to display a notification of each error. You can verify that no JavaScript errors exist by <u>always</u> turning on the following Internet Explorer option:

"Display a notification about every script error"

To configure Internet Explorer 8, 10, or 11 to display JavaScript error notifications, do the following:

1) From the "Tools" menu, choose "Internet Options".
2) Click on the "Advanced" Tab.
3) Check the box next to "Display a notification about every script error."

SOBT courses must behave and display properly, regardless of whether Compatibility View is turned on or turned off. Developers shall test courseware both with Compatibility View turned on and with it turned off. The submarines are currently set up to run SOBT courses on the SubLAN with Compatibility View turned on; this is important for the many legacy courses still in use. However, for greater forward compatibility and longer shelf-life of courseware, newly developed courses need

to function properly in the standard Internet Explorer 8, 10, and 11 environments (Compatibility View off).

To change the Compatibility View setting in Internet Explorer 8 and 10, do the following:

1) From the "Tools" menu, choose "Compatibility View Settings".
2) Check or uncheck the box next to "Display all websites in Compatibility View".

Internet Explorer 11 does not have a setting for "Display all websites in Compatibility View". In Internet Explorer 11, you can view intranet sites in compatibility view by doing the following:

1) From the "Tools" menu, choose "Compatibility View Settings".
2) Check or uncheck the box next to "Display intranet sites in Compatibility View".

Or, you can add specific locations to the list of "Websites you've added to Compatibility View."

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Appendix E: Rollup Examples

This appendix illustrates four example scenarios, in order to show how to plan a course's rollup behavior, and how to describe it in the IMDP. It also shows the resulting XML code that will be implemented by the programmer, based on each design plan.

Each example includes the following information:

1) Description in paragraph form.

2) Course Structure Block Diagram – a block diagram showing the basic course structure. Titles have been added in order to make it easier to compare the block diagram with the information in the IMDP and manifest examples. However, please note that these are examples only, and are not the same as the precise structure of any actual courses. (Note: this is not intended to replace the course flow diagram. The IMDP is required to contain a course flow diagram – see section III.H.5. The diagrams in this Appendix are **not** course flow diagrams and are **not** required in the IMDP – they are shown here only for illustrative purposes to help explain rollup concepts.)

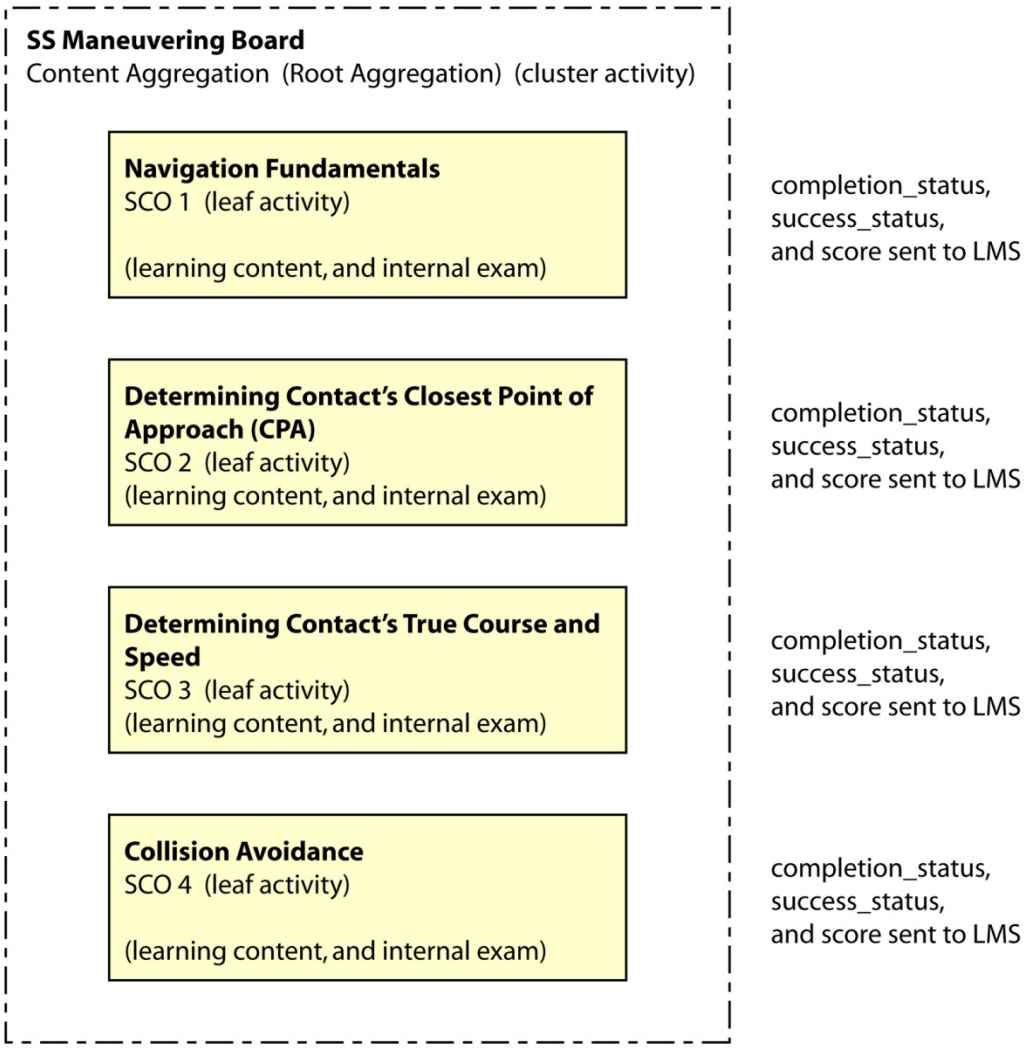
3) Information for IMDP – the rollup information to be included in the IMDP for the given course structure. Rollup controls (the fields "contributes to completion," "contributes to satisfaction," and "contributes to score") are used to indicate whether or not this activity contributes to its parent. Therefore, they are not defined at the top (root) level, since it has no parent level above it. Conversely, rollup rules are used on every activity that has children. Thus, they are defined for the root aggregation and the SCO aggregations, but not for leaf SCOs.

4) XML Code for Manifest – the XML code that must be programmed in the manifest file, in order to implement the design given by the corresponding block diagram. The information in the manifest section of each example is primarily of interest only to the programmer. If the code for rollup rules were to be omitted, the LMS would use its default settings. However, SOBT has found that not all LMSs behave consistently in this regard; therefore, SOBT requires that a rollup rule (the <rollupRule> element) for each of four conditions (completed, incomplete, satisfied, and notSatisfied) be explicitly implemented.

Example 1

This example shows a course structure that consists of four SCOs. Each of the four SCOs contains learning content, and an internal exam. Since each SCO contains an exam, they each pass back a score and success status to the LMS. The four scores will be rolled up by the LMS to obtain the overall course score. Since the four scores are weighted equally, each will contribute 25% to the overall course score. The success status that is set by each SCO determines if its associated activity is marked "satisfied" by the LMS. The rollup rule for rolling up satisfaction will be: If all my children are satisfied, then I am satisfied.

Example 1 - Course Structure Block Diagram



Example 1 - Information for IMDP

Course Title: SS Maneuvering Board
Content Aggregation (root cluster activity)

Rollup rules:
If all my children are completed, then I am completed.
If any of my children are not completed, then I am incomplete.
If all my children are satisfied, then I am satisfied.
If any of my children are not satisfied, then I am not satisfied.

Title: Navigation Fundamentals
SCO 1 (leaf activity)
Rollup controls:

Contributes to completion: yes	Percent of page views for completion: 100%
Contributes to satisfaction: yes	
Contributes to score: yes	Percent of contribution to score: 25%

Title: Determining Contact's Closest Point of Approach (CPA)
SCO 2 (leaf activity)
Rollup controls:

Contributes to completion: yes	Percent of page views for completion: 100%
Contributes to satisfaction: yes	
Contributes to score: yes	Percent of contribution to score: 25%

Title: Determining Contact's True Course and Speed
SCO 3 (leaf activity)
Rollup controls:

Contributes to completion: yes	Percent of page views for completion: 100%
Contributes to satisfaction: yes	
Contributes to score: yes	Percent of contribution to score: 25%

Title: Collision Avoidance
SCO 4 (leaf activity)
Rollup controls:

Contributes to completion: yes	Percent of page views for completion: 100%
Contributes to satisfaction: yes	
Contributes to score: yes	Percent of contribution to score: 25%

Example 1 - XML Code for Manifest

```
<organizations default="DODUSNSLCSOBT_00041_ORG">
    <organization identifier="DODUSNSLCSOBT_00041_ORG"
                                                adlseq:objectivesGlobalToSystem="false">
      <title>(U) SS Maneuvering Board</title>
      <item identifier="DODUSNSLCSOBT_00041_01"
                identifierref="DODUSNSLCSOBT_00041_sco1_lms_start_htm">
        <title>(U) Navigation Fundamentals</title>
        <imsss:sequencing>
          <imsss:deliveryControls completionSetByContent=”true”
              objectiveSetByContent=”true” />
          <imsss:rollupRules rollupObjectiveSatisfied="true"
              rollupProgressCompletion="true" objectiveMeasureWeight="1.0000" />
        </imsss:sequencing>
      </item>
      <item identifier="DODUSNSLCSOBT_00041_02"
                identifierref="DODUSNSLCSOBT_00041_sco2_lms_start_htm">
        <title>(U) Determining Contact's Closest Point of Approach (CPA)</title>
        <imsss:sequencing>
          <imsss:deliveryControls completionSetByContent=”true”
              objectiveSetByContent=”true” />
          <imsss:rollupRules rollupObjectiveSatisfied="true"
              rollupProgressCompletion="true" objectiveMeasureWeight="1.0000" />
        </imsss:sequencing>
      </item>
      <item identifier="DODUSNSLCSOBT_00041_03"
                identifierref="DODUSNSLCSOBT_00041_sco3_lms_start_htm">
        <title>(U) Determining Contact's True Course and Speed</title>
        <imsss:sequencing>
          <imsss:deliveryControls completionSetByContent=”true”
              objectiveSetByContent=”true” />
          <imsss:rollupRules rollupObjectiveSatisfied="true"
              rollupProgressCompletion="true" objectiveMeasureWeight="1.0000" />
        </imsss:sequencing>
      </item>
      <item identifier="DODUSNSLCSOBT_00041_04"
                identifierref="DODUSNSLCSOBT_00041_sco4_lms_start_htm">
        <title>(U) Collision Avoidance</title>
        <imsss:sequencing>
          <imsss:deliveryControls completionSetByContent=”true”
              objectiveSetByContent=”true” />
          <imsss:rollupRules rollupObjectiveSatisfied="true"
              rollupProgressCompletion="true" objectiveMeasureWeight="1.0000" />
        </imsss:sequencing>
      </item>
       <imsss:sequencing>
            <imsss:rollupRules>
                <imsss:rollupRule childActivitySet="all">
                    <imsss:rollupConditions>
                        <imsss:rollupCondition operator="noOp" condition="completed" />
                    </imsss:rollupConditions>
                    <imsss:rollupAction action="completed" />
                </imsss:rollupRule>
                <imsss:rollupRule childActivitySet="any">
                    <imsss:rollupConditions>
                        <imsss:rollupCondition operator="not" condition="completed" />
                    </imsss:rollupConditions>
```

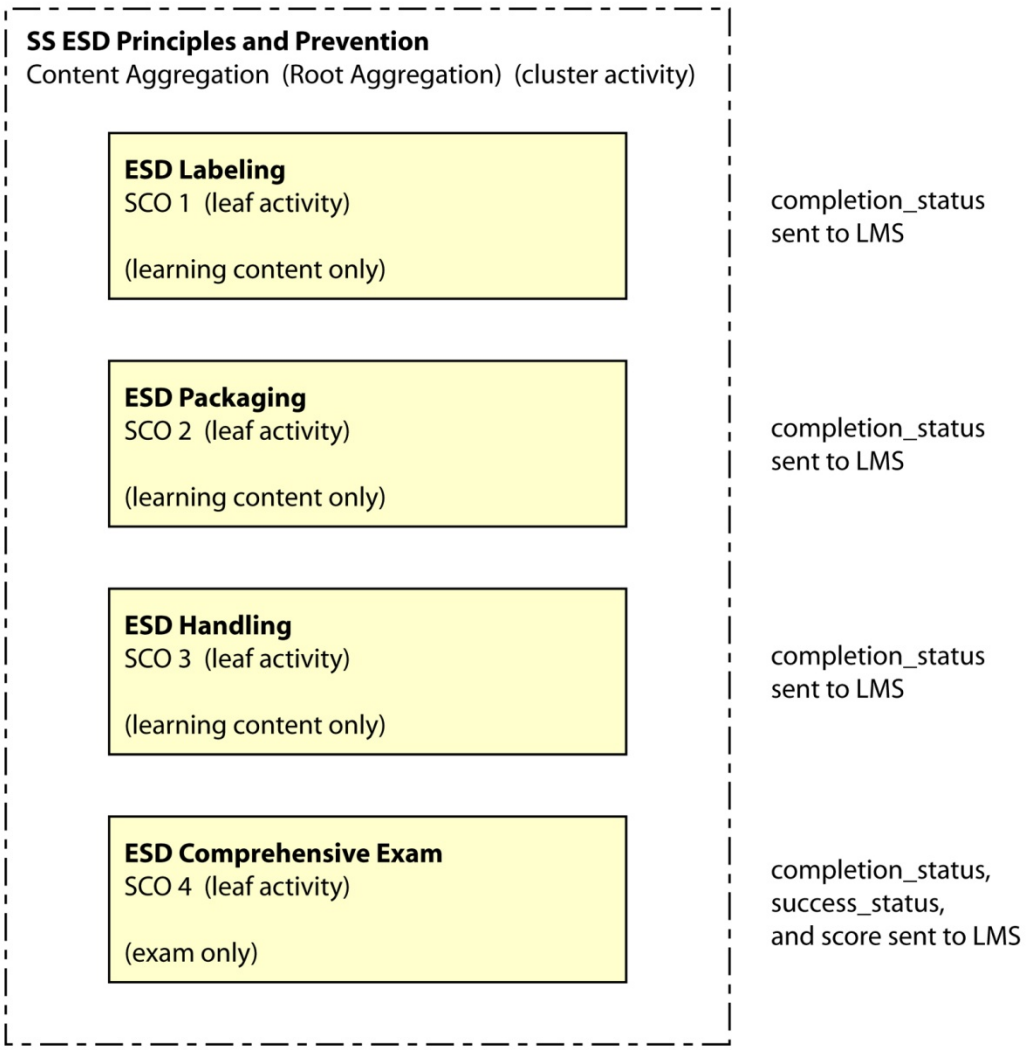
```
                    <imsss:rollupAction action="incomplete" />
                </imsss:rollupRule>
                <imsss:rollupRule childActivitySet="all">
                    <imsss:rollupConditions>
                        <imsss:rollupCondition operator="noOp" condition="satisfied" />
                    </imsss:rollupConditions>
                    <imsss:rollupAction action="satisfied" />
                </imsss:rollupRule>
                <imsss:rollupRule childActivitySet="any">
                    <imsss:rollupConditions>
                        <imsss:rollupCondition operator="not" condition="satisfied" />
                    </imsss:rollupConditions>
                    <imsss:rollupAction action="notSatisfied" />
                </imsss:rollupRule>
            </imsss:rollupRules>
        </imsss:sequencing>
    </organization>
</organizations>
```

Programmer's Note: Beginning with Developer's Guide 6.3.1, SOBT now requires that rollup rules be set explicitly for the four conditions of: completed, incomplete, satisfied, and notSatisfied. The four rollup rules are shown in the example above.

Example 2

This example shows a course structure that consists of four SCOs. Three of the SCOs contain only learning content (no internal exams). The fourth SCO is an assessment-only SCO that contains a comprehensive exam on the material covered in the other three SCOs. Since only the fourth SCO contains an assessment, it is the only one that passes back a score and success status to the LMS. The score from this fourth SCO rolls up to become the overall score for the course. The success status that is set by the fourth SCO determines if its associated activity is marked "satisfied" by the LMS. The satisfaction of the course is determined by rolling up the satisfaction of the fourth SCO. (The other three SCOs do not contribute to rollup of satisfaction.)

Example 2 - Course Structure Block Diagram



Example 2 - Information for IMDP

Course Title: SS ESD Principles and Prevention
Content Aggregation (root cluster activity)

Rollup rules:
If all my children are completed, then I am completed.
If any of my children are not completed, then I am incomplete.
If SCO 4 is satisfied, then I am satisfied.
If SCO 4 is not satisfied, then I am not satisfied.

Title: ESD Labeling
SCO 1 (leaf activity)
Rollup controls:

Contributes to completion: yes	Percent of page views for completion: 100%
Contributes to satisfaction: no	
Contributes to score: no	Percent of contribution to score: 0%

Title: ESD Packaging
SCO 2 (leaf activity)
Rollup controls:

Contributes to completion: yes	Percent of page views for completion: 100%
Contributes to satisfaction: no	
Contributes to score: no	Percent of contribution to score: 0%

Title: ESD Handling
SCO 3 (leaf activity)
Rollup controls:

Contributes to completion: yes	Percent of page views for completion: 100%
Contributes to satisfaction: no	
Contributes to score: no	Percent of contribution to score: 0%

Title: ESD Comprehensive Exam
SCO 4 (leaf activity)
Rollup controls:

Contributes to completion: yes	Percent of page views for completion: 100%
Contributes to satisfaction: yes	
Contributes to score: yes	Percent of contribution to score: 100%

Example 2 - XML Code for Manifest

```
<organizations default="DODUSNSLCSOBT_00103_ORG">
    <organization identifier="DODUSNSLCSOBT_00103_ORG"
                                                adlseq:objectivesGlobalToSystem="false">
        <title>(U) SS ESD Principles and Prevention</title>
        <item identifier="DODUSNSLCSOBT_00103_01"
                    identifierref="DODUSNSLCSOBT_00103_sco1_lms_start_htm">
          <title>(U) ESD Labeling</title>
          <imsss:sequencing>
            <imsss:deliveryControls completionSetByContent=”true”
                 objectiveSetByContent=”true” />
            <imsss:rollupRules rollupObjectiveSatisfied="false"
                 rollupProgressCompletion="true" objectiveMeasureWeight="0.0000" />
          </imsss:sequencing>
        </item>
        <item identifier="DODUSNSLCSOBT_00103_02"
                    identifierref="DODUSNSLCSOBT_00103_sco2_lms_start_htm">
          <title>(U) ESD Packaging</title>
          <imsss:sequencing>
            <imsss:deliveryControls completionSetByContent=”true”
                 objectiveSetByContent=”true” />
            <imsss:rollupRules rollupObjectiveSatisfied="false"
                 rollupProgressCompletion="true" objectiveMeasureWeight="0.0000" />
          </imsss:sequencing>
        </item>
        <item identifier="DODUSNSLCSOBT_00103_03"
                    identifierref="DODUSNSLCSOBT_00103_sco3_lms_start_htm">
          <title>(U) ESD Handling</title>
          <imsss:sequencing>
            <imsss:deliveryControls completionSetByContent=”true”
                 objectiveSetByContent=”true” />
            <imsss:rollupRules rollupObjectiveSatisfied="false"
                 rollupProgressCompletion="true" objectiveMeasureWeight="0.0000" />
          </imsss:sequencing>
        </item>
        <item identifier="DODUSNSLCSOBT_00103_04"
                    identifierref="DODUSNSLCSOBT_00103_sco4_lms_start_htm">
          <title>(U) ESD Comprehensive Exam</title>
          <imsss:sequencing>
            <imsss:deliveryControls completionSetByContent=”true”
                 objectiveSetByContent=”true” />
            <imsss:rollupRules rollupObjectiveSatisfied="true"
                 rollupProgressCompletion="true" objectiveMeasureWeight="1.0000" />
          </imsss:sequencing>
        </item>
         <imsss:sequencing>
                <imsss:rollupRules>
                      <imsss:rollupRule childActivitySet="all">
                            <imsss:rollupConditions>
                                  <imsss:rollupCondition operator="noOp" condition="completed" />
                            </imsss:rollupConditions>
                            <imsss:rollupAction action="completed" />
                      </imsss:rollupRule>
                      <imsss:rollupRule childActivitySet="any">
                            <imsss:rollupConditions>
                                  <imsss:rollupCondition operator="not" condition="completed" />
                            </imsss:rollupConditions>
```

```
                    <imsss:rollupAction action="incomplete" />
                </imsss:rollupRule>
                <imsss:rollupRule childActivitySet="all">
                    <imsss:rollupConditions>
                        <imsss:rollupCondition operator="noOp" condition="satisfied" />
                    </imsss:rollupConditions>
                    <imsss:rollupAction action="satisfied" />
                </imsss:rollupRule>
                <imsss:rollupRule childActivitySet="any">
                    <imsss:rollupConditions>
                        <imsss:rollupCondition operator="not" condition="satisfied" />
                    </imsss:rollupConditions>
                    <imsss:rollupAction action="notSatisfied" />
                </imsss:rollupRule>
            </imsss:rollupRules>
        </imsss:sequencing>
    </organization>
</organizations>
```

Programmer's Note:

Note that the rollup rules for satisfaction ("satisfied" or "notSatisfied") shown in Example 2 are the same as shown in Example 1. Rather, the difference is in the rollup controls. For consideration of satisfaction in Example 1, the rollup controls are set to indicate that all SCOs are included in the child activity set of the parent. For consideration of satisfaction in Example 2, the rollup controls indicate that only SCO 4 is to be included in the child activity set of its parent.

Therefore, in Example 2 when the child activity set is "all" for satisfaction, this still only takes into consideration SCO 4, since it is the only SCO in the child activity set. Similarly, when the child activity set is "any" for satisfaction, SCO 4 is the only one being considered.

Example 3

This example shows a course structure that consists of two SCO aggregations and two additional SCOs (designated SCO 3 and SCO 4) at the first level below the root level. Each of the SCO aggregations contains two SCOs. Thus, the course consists of six SCOs in all. Each of the six SCOs contains learning content, and an internal exam. Since each SCO contains an exam, they each pass back a score and success status to the LMS. Each SCO aggregation is a cluster – a parent that contains two child activities. The score and satisfaction of the two child activities roll up to the parent level, i.e., the cluster activity. Then the score and satisfaction of the two cluster activities, of SCO 3, and of SCO 4, all roll up to the root level.

Thus, in SCO Aggregation 1, its two children each contribute 50% to the score for SCO Aggregation 1. The same is true for SCO Aggregation 2. Moving one level up, all four activities (SCO Aggregation 1, SCO Aggregation 2, SCO 3, and SCO 4) all roll up to provide the score for the overall course – since they are all weighted equally, then each contributes 25% to the overall course score.

For each of the SCO aggregations, it derives its satisfaction by rolling up its children using the following rollup rule:

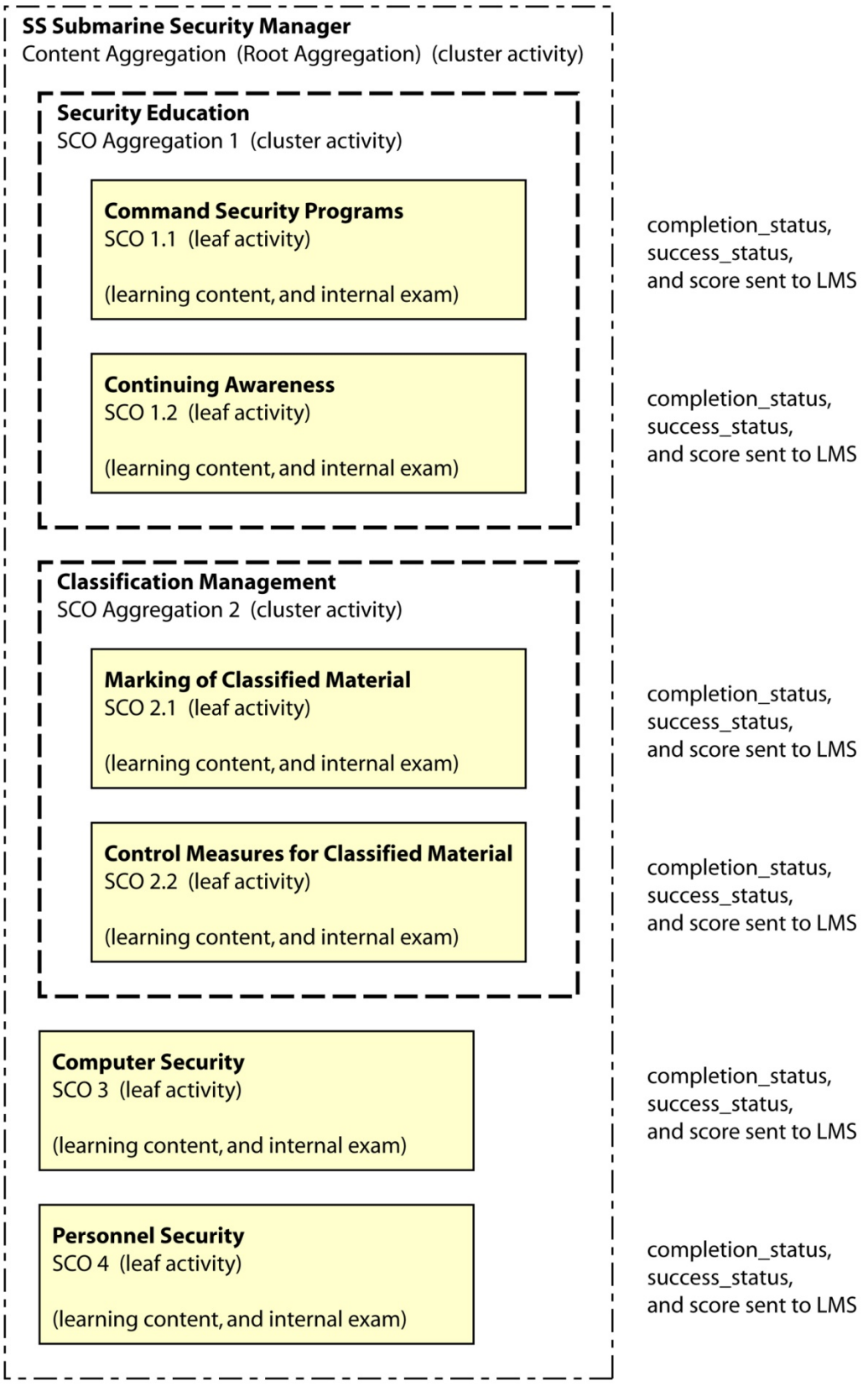
"If all my children are satisfied, then I am satisfied."

The root aggregation derives it satisfaction by rolling up all its immediate children (not grandchildren) by using the following rollup rule:

"If all my children are satisfied, then I am satisfied."

Even though, in this case, the rollup rule is the same, it is important to note that the rollup happens at two levels. It would be possible to implement different rollup conditions and actions at the different levels, if so desired.

Example 3 - Course Structure Block Diagram



Example 3 - Information for IMDP

Course Title: SS Submarine Security Manager
Content Aggregation (root cluster activity)

Rollup rules:
If all my children are completed, then I am completed.
If any of my children are not completed, then I am incomplete.
If all my children are satisfied, then I am satisfied.
If any of my children are not satisfied, then I am not satisfied.

Title: Security Education
SCO Aggregation 1 (cluster activity)
Rollup controls:

Contributes to completion: yes	
Contributes to satisfaction: yes	
Contributes to score: yes	Percent of contribution to score: 25%

Rollup rules:
If all my children are completed, then I am completed.
If any of my children are not completed, then I am incomplete.
If all my children are satisfied, then I am satisfied.
If any of my children are not satisfied, then I am not satisfied.

Title: Command Security Programs
SCO 1.1 (leaf activity)
Rollup controls:

Contributes to completion: yes	Percent of page views for completion: 100%
Contributes to satisfaction: yes	
Contributes to score: yes	Percent of contribution to score: 50%

Title: Continuing Awareness
SCO 1.2 (leaf activity)
Rollup controls:

Contributes to completion: yes	Percent of page views for completion: 100%
Contributes to satisfaction: yes	
Contributes to score: yes	Percent of contribution to score: 50%

Title: Classification Management
SCO Aggregation 2 (cluster activity)
Rollup controls:

Contributes to completion: yes	
Contributes to satisfaction: yes	
Contributes to score: yes	Percent of contribution to score: 25%

Rollup rules:

If all my children are completed, then I am completed.
If any of my children are not completed, then I am incomplete.
If all my children are satisfied, then I am satisfied.
If any of my children are not satisfied, then I am not satisfied.

Title: Marking of Classified Material
SCO 2.1 (leaf activity)
Rollup controls:

Contributes to completion: yes	Percent of page views for completion: 100%
Contributes to satisfaction: yes	
Contributes to score: yes	Percent of contribution to score: 50%

Title: Control Measures for Classified Material
SCO 2.2 (leaf activity)
Rollup controls:

Contributes to completion: yes	Percent of page views for completion: 100%
Contributes to satisfaction: yes	
Contributes to score: yes	Percent of contribution to score: 50%

Title: Computer Security
SCO 3 (leaf activity)
Rollup controls:

Contributes to completion: yes	Percent of page views for completion: 100%
Contributes to satisfaction: yes	
Contributes to score: yes	Percent of contribution to score: 25%

Title: Personnel Security
SCO 4 (leaf activity)
Rollup controls:

Contributes to completion: yes	Percent of page views for completion: 100%
Contributes to satisfaction: yes	
Contributes to score: yes	Percent of contribution to score: 25%

Example 3 - XML Code for Manifest

```
<organizations default="DODUSNSLCSOBT_00023_ORG">
    <organization identifier="DODUSNSLCSOBT_00023_ORG"
                                                adlseq:objectivesGlobalToSystem="false">
      <title>(U) SS Submarine Security Manager</title>
      <item identifier="DODUSNSLCSOBT_00023_01">
        <title>(U) Security Education</title>
        <item identifier="DODUSNSLCSOBT_00023_01_01"
                identifierref="DODUSNSLCSOBT_00023_sco1_lms_start_htm">
          <title>(U) Command Security Programs</title>
          <imsss:sequencing>
            <imsss:deliveryControls completionSetByContent=”true”
                objectiveSetByContent=”true” />
            <imsss:rollupRules rollupObjectiveSatisfied="true"
                    rollupProgressCompletion="true" objectiveMeasureWeight="1.0000" />
          </imsss:sequencing>
        </item>
        <item identifier="DODUSNSLCSOBT_00023_01_02"
                identifierref="DODUSNSLCSOBT_00023_sco2_lms_start_htm">
          <title>(U) Continuing Awareness</title>
          <imsss:sequencing>
            <imsss:deliveryControls completionSetByContent=”true”
                objectiveSetByContent=”true” />
            <imsss:rollupRules rollupObjectiveSatisfied="true"
                    rollupProgressCompletion="true" objectiveMeasureWeight="1.0000" />
          </imsss:sequencing>
        </item>
        <imsss:sequencing>
          <imsss:rollupRules rollupObjectiveSatisfied="true"
              rollupProgressCompletion="true" objectiveMeasureWeight="1.0000">
            <imsss:rollupRule childActivitySet="all">
              <imsss:rollupConditions>
                <imsss:rollupCondition operator="noOp" condition="completed" />
              </imsss:rollupConditions>
              <imsss:rollupAction action="completed" />
            </imsss:rollupRule>
            <imsss:rollupRule childActivitySet="any">
              <imsss:rollupConditions>
                <imsss:rollupCondition operator="not" condition="completed" />
              </imsss:rollupConditions>
              <imsss:rollupAction action="incomplete" />
            </imsss:rollupRule>
              <imsss:rollupRule childActivitySet="all">
                <imsss:rollupConditions>
                  <imsss:rollupCondition operator="noOp" condition="satisfied" />
                </imsss:rollupConditions>
                <imsss:rollupAction action="satisfied" />
              </imsss:rollupRule>
            <imsss:rollupRule childActivitySet="any">
              <imsss:rollupConditions>
                <imsss:rollupCondition operator="not" condition="satisfied" />
              </imsss:rollupConditions>
              <imsss:rollupAction action="notSatisfied" />
            </imsss:rollupRule>
          </imsss:rollupRules>
        </imsss:sequencing>
      </item>
```

```
<item identifier="DODUSNSLCSOBT_00023_02">
    <title>(U) Classification Management</title>
    <item identifier="DODUSNSLCSOBT_00023_02_01"
          identifierref="DODUSNSLCSOBT_00023_sco3_lms_start_htm">
      <title>(U) Marking of Classified Material</title>
      <imsss:sequencing>
        <imsss:deliveryControls completionSetByContent="true"
            objectiveSetByContent="true" />
        <imsss:rollupRules rollupObjectiveSatisfied="true"
            rollupProgressCompletion="true" objectiveMeasureWeight="1.0000" />
      </imsss:sequencing>
    </item>
    <item identifier="DODUSNSLCSOBT_00023_02_02"
          identifierref="DODUSNSLCSOBT_00023_sco4_lms_start_htm">
      <title>(U) Control Measures for Classified Material</title>
      <imsss:sequencing>
        <imsss:deliveryControls completionSetByContent="true"
            objectiveSetByContent="true" />
        <imsss:rollupRules rollupObjectiveSatisfied="true"
            rollupProgressCompletion="true" objectiveMeasureWeight="1.0000" />
      </imsss:sequencing>
    </item>
    <imsss:sequencing>
      <imsss:rollupRules rollupObjectiveSatisfied="true"
          rollupProgressCompletion="true" objectiveMeasureWeight="1.0000">
        <imsss:rollupRule childActivitySet="all">
          <imsss:rollupConditions>
            <imsss:rollupCondition operator="noOp" condition="completed" />
          </imsss:rollupConditions>
          <imsss:rollupAction action="completed" />
        </imsss:rollupRule>
        <imsss:rollupRule childActivitySet="any">
          <imsss:rollupConditions>
            <imsss:rollupCondition operator="not" condition="completed" />
          </imsss:rollupConditions>
          <imsss:rollupAction action="incomplete" />
        </imsss:rollupRule>
        <imsss:rollupRule childActivitySet="all">
          <imsss:rollupConditions>
            <imsss:rollupCondition operator="noOp" condition="satisfied" />
          </imsss:rollupConditions>
          <imsss:rollupAction action="satisfied" />
        </imsss:rollupRule>
        <imsss:rollupRule childActivitySet="any">
          <imsss:rollupConditions>
            <imsss:rollupCondition operator="not" condition="satisfied" />
          </imsss:rollupConditions>
          <imsss:rollupAction action="notSatisfied" />
        </imsss:rollupRule>
      </imsss:rollupRules>
    </imsss:sequencing>
  </item>
  <item identifier="DODUSNSLCSOBT_00023_03"
        identifierref="DODUSNSLCSOBT_00023_sco5_lms_start_htm">
    <title>(U) Computer Security</title>
    <imsss:sequencing>
      <imsss:deliveryControls completionSetByContent="true"
          objectiveSetByContent="true" />
```

```
            <imsss:rollupRules rollupObjectiveSatisfied="true"
                rollupProgressCompletion="true" objectiveMeasureWeight="1.0000" />
          </imsss:sequencing>
        </item>
        <item identifier="DODUSNSLCSOBT_00023_04"
                identifierref="DODUSNSLCSOBT_00023_sco6_lms_start_htm">
          <title>(U) Personnel Security</title>
          <imsss:sequencing>
            <imsss:deliveryControls completionSetByContent=”true”
                objectiveSetByContent=”true” />
            <imsss:rollupRules rollupObjectiveSatisfied="true"
                rollupProgressCompletion="true" objectiveMeasureWeight="1.0000" />
          </imsss:sequencing>
        </item>
         <imsss:sequencing>
                <imsss:rollupRules>
                        <imsss:rollupRule childActivitySet="all">
                                <imsss:rollupConditions>
                                        <imsss:rollupCondition operator="noOp" condition="completed" />
                                </imsss:rollupConditions>
                                <imsss:rollupAction action="completed" />
                        </imsss:rollupRule>
                        <imsss:rollupRule childActivitySet="any">
                                <imsss:rollupConditions>
                                        <imsss:rollupCondition operator="not" condition="completed" />
                                </imsss:rollupConditions>
                                <imsss:rollupAction action="incomplete" />
                        </imsss:rollupRule>
                        <imsss:rollupRule childActivitySet="all">
                                <imsss:rollupConditions>
                                        <imsss:rollupCondition operator="noOp" condition="satisfied" />
                                </imsss:rollupConditions>
                                <imsss:rollupAction action="satisfied" />
                        </imsss:rollupRule>
                        <imsss:rollupRule childActivitySet="any">
                                <imsss:rollupConditions>
                                        <imsss:rollupCondition operator="not" condition="satisfied" />
                                </imsss:rollupConditions>
                                <imsss:rollupAction action="notSatisfied" />
                        </imsss:rollupRule>
                </imsss:rollupRules>
        </imsss:sequencing>
  </organization>
</organizations>
```

Example 4

This example shows a course that does not contain any exams. A Piloting Brief was chosen for this example, since Piloting Briefs typically do not contain exams. Each of the SCOs contains learning content only, with no exam. Each of the SCOs passes back its completion status to the LMS. Since none of the SCOs contain an exam, none of them will be passing back a score to the LMS, and they will pass back a success status of "unknown".

This is a special situation, and it could result in undesirable behavior if the designer does not consider how the rollup of satisfaction (based on success status) is to be handled. Certain combinations of settings can cause the LMS to mark the course as satisfied after the user has only visited the first page of any SCO. This would be undesirable, since the student has not gone through the rest of the course and the LMS already shows it as "satisfied" or as "passed". Other combinations of settings would not allow the LMS to ever show the course as "satisfied" or "passed" even though the student had completed the course.

This example shows SOBT's desired approach for marking such a course as "satisfied" once the student has completed the course. The desired behavior is to base satisfaction – not on success status (as would be done in courses that have exams) – but rather on completion status. To do this, we create two rollup rules to set satisfaction, based on completion status.

The rollup rules are: If all my children are completed, then I am satisfied.
If any of my children are not completed, then I am not satisfied.

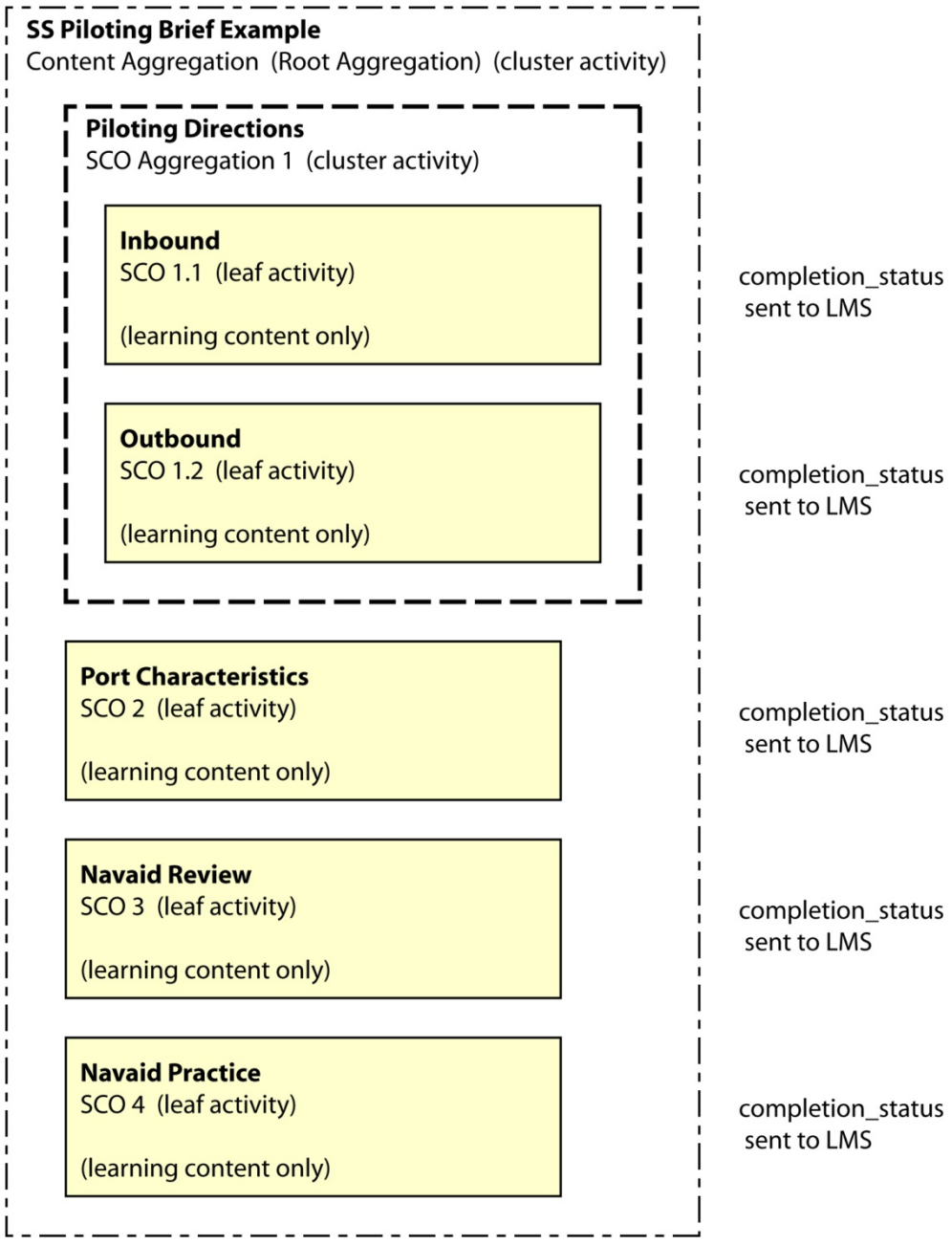
Note that this is different than the typical rollup behavior seen in the previous three examples (and different than the default). It is necessary to explicitly code these rules into the manifest, as shown in the third part of this example, "XML Code for the Manifest". Within the larger example, you will see code like the following. This is the actual rollup rule that implements "If all my children are completed, then I am satisfied." A corresponding rule is implemented for "notSatisfied".

```
<imsss:rollupRule childActivitySet="all">                    <!-- include all its children -->
    <imsss:rollupConditions>
        <imsss:rollupCondition condition="completed" />       <!-- they must be completed -->
    </imsss:rollupConditions>
    <imsss:rollupAction action="satisfied" />                <!-- if so, then it is satisfied. -->
</imsss:rollupRule>
```

Since the course contains a SCO aggregation, the above rollup rule is applied at the SCO aggregation level, and then again at the course level. Applying this logic at the SCO aggregation level, as well as at the course level, ensures that the SCO aggregation will be marked "satisfied" when its two children are completed.

Applying the same rule at the root level ensures that the course will be marked "satisfied" when, and only when, the SCO aggregation and the three individual SCOs are all completed.

Example 4 - Course Structure Block Diagram



Example 4 - Information for IMDP

Course Title: SS Piloting Brief Example
Content Aggregation (root cluster activity)

Rollup rules:
If all my children are completed, then I am completed.
If any of my children are not completed, then I am incomplete.
If all my children are completed, then I am satisfied.
If any of my children are not completed, then I am not satisfied.

Title: Piloting Directions
SCO Aggregation 1 (cluster activity)
Rollup controls:

Contributes to completion: yes	
Contributes to satisfaction: yes	
Contributes to score: no	

Rollup rules:
If all my children are completed, then I am completed.
If any of my children are not completed, then I am incomplete.
If all my children are completed, then I am satisfied.
If any of my children are not completed, then I am not satisfied.

Title: Inbound
SCO 1.1 (leaf activity)
Rollup controls:

Contributes to completion: yes	Percent of page views for completion: 100%
Contributes to satisfaction: yes	
Contributes to score: no	

Title: Outbound
SCO 1.2 (leaf activity)
Rollup controls:

Contributes to completion: yes	Percent of page views for completion: 100%
Contributes to satisfaction: yes	
Contributes to score: no	

(continued on next page)

Title: Port Characteristics
SCO 2 (leaf activity)
Rollup controls:

Contributes to completion: yes	Percent of page views for completion: 100%
Contributes to satisfaction: yes	
Contributes to score: no	

Title: Navaid Review
SCO 3 (leaf activity)
Rollup controls:

Contributes to completion: yes	Percent of page views for completion: 100%
Contributes to satisfaction: yes	
Contributes to score: no	

Title: Navaid Practice
SCO 4 (leaf activity)
Rollup controls:

Contributes to completion: yes	Percent of page views for completion: 100%
Contributes to satisfaction: yes	
Contributes to score: no	

Example 4 - XML Code for Manifest

```
<organizations default="DODUSNSLCSOBT_12345_ORG">
   <organization identifier="DODUSNSLCSOBT_12345_ORG"
                                              adlseq:objectivesGlobalToSystem="false">
      <title>(U) SS Piloting Brief Example</title>
      <item identifier="DODUSNSLCSOBT_12345_01">
           <title>(U) Piloting Directions</title>
           <item identifier="DODUSNSLCSOBT_12345_01_01"
                          identifierref="DODUSNSLCSOBT_12345_sco1_lms_start_htm">
                <title>(U) Inbound</title>
                <imsss:sequencing>
                     <imsss:deliveryControls completionSetByContent=”true”
                                    objectiveSetByContent=”true” />
                     <imsss:rollupRules rollupObjectiveSatisfied="true" rollupProgressCompletion="true"
                                    objectiveMeasureWeight="0.0000" />
                </imsss:sequencing>
           </item>
           <item identifier="DODUSNSLCSOBT_12345_01_02"
                          identifierref="DODUSNSLCSOBT_12345_sco2_lms_start_htm">
                <title>(U) Outbound</title>
                <imsss:sequencing>
                     <imsss:deliveryControls completionSetByContent=”true”
                                    objectiveSetByContent=”true” />
                     <imsss:rollupRules rollupObjectiveSatisfied="true" rollupProgressCompletion="true"
                                    objectiveMeasureWeight="0.0000" />
               </imsss:sequencing>
           </item>
           <imsss:sequencing>
                <imsss:rollupRules rollupObjectiveSatisfied="true" rollupProgressCompletion="true"
                                objectiveMeasureWeight="0.0000">
                   <imsss:rollupRule childActivitySet="all">
                        <imsss:rollupConditions>
                             <imsss:rollupCondition operator="noOp" condition="completed" />
                        </imsss:rollupConditions>
                        <imsss:rollupAction action="completed" />
                   </imsss:rollupRule>
                   <imsss:rollupRule childActivitySet="any">
                        <imsss:rollupConditions>
                             <imsss:rollupCondition operator="not" condition="completed" />
                        </imsss:rollupConditions>
                        <imsss:rollupAction action="incomplete" />
                   </imsss:rollupRule>
                      <imsss:rollupRule childActivitySet="all">
                           <imsss:rollupConditions>
                                <imsss:rollupCondition operator="noOp" condition="completed" />
                           </imsss:rollupConditions>
                           <imsss:rollupAction action="satisfied" />
                     </imsss:rollupRule>
                   <imsss:rollupRule childActivitySet="any">
                        <imsss:rollupConditions>
                             <imsss:rollupCondition operator="not" condition="completed" />
                        </imsss:rollupConditions>
                        <imsss:rollupAction action="notSatisfied" />
                   </imsss:rollupRule>
               </imsss:rollupRules>
            </imsss:sequencing>
         </item>
```

```
<item identifier="DODUSNSLCSOBT_12345_02"
                identifierref="DODUSNSLCSOBT_12345_sco3_lms_start_htm">
    <title>(U) Port Characteristics</title>
    <imsss:sequencing>
        <imsss:deliveryControls completionSetByContent=”true”
                                objectiveSetByContent=”true” />
        <imsss:rollupRules rollupObjectiveSatisfied="true" rollupProgressCompletion="true"
                                objectiveMeasureWeight="0.0000" />
    </imsss:sequencing>
</item>
<item identifier="DODUSNSLCSOBT_12345_03"
                identifierref="DODUSNSLCSOBT_12345_sco4_lms_start_htm">
    <title>(U) Navaid Review</title>
    <imsss:sequencing>
        <imsss:deliveryControls completionSetByContent=”true”
                                objectiveSetByContent=”true” />
        <imsss:rollupRules rollupObjectiveSatisfied="true" rollupProgressCompletion="true"
                               objectiveMeasureWeight="0.0000" />
    </imsss:sequencing>
</item>
<item identifier="DODUSNSLCSOBT_12345_04"
                identifierref="DODUSNSLCSOBT_12345_sco5_lms_start_htm">
    <title>(U) Navaid Practice</title>
    <imsss:sequencing>
        <imsss:deliveryControls completionSetByContent=”true”
                                objectiveSetByContent=”true” />
        <imsss:rollupRules rollupObjectiveSatisfied="true" rollupProgressCompletion="true"
                              objectiveMeasureWeight="0.0000" />
    </imsss:sequencing>
</item>
<imsss:sequencing>
    <imsss:rollupRules>
        <imsss:rollupRule childActivitySet="all">
            <imsss:rollupConditions>
                <imsss:rollupCondition operator="noOp" condition="completed" />
            </imsss:rollupConditions>
            <imsss:rollupAction action="completed" />
        </imsss:rollupRule>
        <imsss:rollupRule childActivitySet="any">
            <imsss:rollupConditions>
                <imsss:rollupCondition operator="not" condition="completed" />
            </imsss:rollupConditions>
            <imsss:rollupAction action="incomplete" />
        </imsss:rollupRule>
        <imsss:rollupRule childActivitySet="all">
            <imsss:rollupConditions>
                <imsss:rollupCondition operator="noOp" condition="completed" />
            </imsss:rollupConditions>
            <imsss:rollupAction action="satisfied" />
        </imsss:rollupRule>
        <imsss:rollupRule childActivitySet="any">
            <imsss:rollupConditions>
                <imsss:rollupCondition operator="not" condition="completed" />
            </imsss:rollupConditions>
            <imsss:rollupAction action="notSatisfied" />
        </imsss:rollupRule>
    </imsss:rollupRules>
</imsss:sequencing>
```

```
    </organization>
</organizations>
```

Programmer's Note:
In this example, note that the value for the rollup control rollupObjectiveSatisfied is set to "true".

```
rollupObjectiveSatisfied="true"
```

If at least one other SCO in the course had an exam, then those SCOs that did not contain an exam would have this value set to "false". However, the case where none of the SCOs in the course contains an exam is a special situation, and the value must be set to "true".

Desired behavior: The desired behavior is that the course will be marked as "notSatisfied" until such time as the student has completed every SCO. Then, at the same time the course is marked as "completed" it will also get marked as "satisfied". It is necessary to explicitly code this rollup rule into the manifest at the course level, and also at the SCO aggregation level, if any are used.

```
<imsss:rollupRule childActivitySet="all">
    <imsss:rollupConditions>
        <imsss:rollupCondition condition="completed" />
    </imsss:rollupConditions>
    <imsss:rollupAction action="satisfied" />
</imsss:rollupRule>
```

Undesirable behavior: Having the rollup control rollupObjectiveSatisfied set to "false" for all SCOs causes the LMS to immediately mark the course as "satisfied" as soon as the student has visited the first page of any SCO. In effect, it is telling the LMS, "Don't expect to get any data from any SCO; therefore, just go ahead and use your own defaults." The default behavior of the LMS in such a case is to mark the entire course as "satisfied".

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Appendix F: SOBT Mandatory Metadata Elements

I. References

(a) Advanced Distributed Learning (ADL) Sharable Content Object Reference Model (SCORM) 2004 3rd Edition, dated 20 October 2006 – http://www.adlnet.gov/

(b) COMSUBLANT/COMSUBPACINST 2305.1(series) Doctrine for Submarine Interior Communications (IC Manual)

II. Content Aggregation Metadata (CAM)

The following tables define the LOM 1.0 metadata elements that are required by SOBT for Content Aggregation Metadata ("course_metadata.xml"). The Multiplicity column designates those elements that SOBT requires in every metadata file. The Value column defines the required value or provides guidance on how the metadata element entry shall be derived.

The <general> element:

No.	Element Name	Multiplicity	Value
1	general	1	**Parent Element**
1.1	identifier	1-n	**Parent Element**
1.1.1	catalog	1	"SOBT Course Catalog"
1.1.2	entry	1	Example: "SLC-SOBT-05050-1.00"
1.2	title	1	**Parent Element**
1.2.1	string	1	Course Title
1.3	language	1-n	<language>en</language>
1.4	description	1-n	**Parent Element**
1.4.1	string	1	A short description of the course and the course learning objective(s) (must be between 30 - 2000 characters)
1.5	keyword	3-n	**Parent Element**
1.5.1	string	1	A separate keyword element for each applicable shipclass, department, division, watchstation, mission, equipment title. (See Keyword guidance, below.) Generic keywords such as "submarine" shall not be used.
1.6	coverage	0-n	**Parent Element**
1.6.1	string	0-1	
1.7	structure	0-1	**Parent Element**
1.7.1	source	0-1	"LOMv1.0"
1.7.2	value	0-1	typically -"hierarchical" (tree structure) or "linear" (fully ordered)
1.8	aggregationLevel	0-1	**Parent Element**
1.8.1	source	0-1	
1.8.2	value	0-1	

The <lifeCycle> element:

No.	Element Name	Multiplicity	Value
2.0	lifeCycle	1	**Parent element**
2.1	version	1	**Parent element**
2.1.1	string	1	Version of the Course
2.2	status	1	**Parent element**
2.2.1	source	1	"LOMv1.0"
2.2.2	value	1	"final" Since beta deliverables are intended as final, this element shall always be "final"
2.3	contribute	1-n	**Parent element**
2.3.1	role	1	**Parent element**
2.3.1.1	source	1	"LOMv1.0"
2.3.1.2	value	1	"content provider"
2.3.2	entity	1-n	"VERSION:2.1", "N:SOBT;Director", "TITLE:SOBT Director", "ORG:Submarine On Board Training (SOBT)"
2.3.3	date	0-1	**Parent element**
2.3.3.1	dateTime	0-1	
2.3.3.2	description	0-1	
2.3.3.2.1	string	0-1	

The <metaMetadata> element:

No.	Element Name	Multiplicity	Value
3.0	metaMetadata	1	**Parent element**
3.1	identifier	0-n	**Parent element**
3.1.1	catalog	0-1	
3.1.2	entry	0-1	
3.2	contribute	0-n	**Parent element**
3.2.1	role	0-1	**Parent element**
3.2.1.1	source	0-1	
3.2.1.2	value	0-1	
3.2.2	entity	0-n	
3.2.3	date	0-1	**Parent element**
3.2.3.1	dateTime	0-1	
3.2.3.2	description	0-1	**Parent element**
3.2.3.2.1	string	0-1	
3.3	metadataSchema	2-n	"LOMv1.0" and "SCORM_CAM_v1.3"
3.4	language	0-1	

The <technical> element:

No.	Element Name	Multiplicity	Value
4.0	technical	1	**Parent element**
4.1	format	2-n	A separate <format> element for each mime type used. For all courses: "text/html", "application/x-javascript". For others, use as needed: "application/x-shockwave-flash", etc.
4.2	size	0-1	
4.3	location	0-n	
4.4	requirement	1-n	**Parent element**
4.4.1	orComposite	1-n	**Parent element**
4.4.1.1	type	1	**Parent element**
4.4.1.1.1	source	1	"LOMv1.0"
4.4.1.1.2	value	1	"browser"
4.4.1.2	name	1	**Parent element**
4.4.1.2.1	source	1	"LOMv1.0"
4.4.1.2.2	value	1	"ms-internet explorer"
4.4.1.3	minimumVersion	1	"8.0"
4.4.1.4	maximumVersion	1	"8.0"
4.5	installationRemarks	1	**Parent element**
4.5.1	string	1	
4.6	otherPlatformRequirements	1	**Parent element**
4.6.1	string	1	List required plug-ins and versions
4.7	duration	1	**Parent element**
4.7.1	duration	1	SCORM CAM Section 4.2.11.5 – hrs and minutes (PT1H30M)
4.7.2	description	1	
4.7.2.1	string	1	derivation of duration "225 instructional screens, 150 screens per instructional hour"
4.X.	ScormEnginePackageProperties	1	**Parent element**
4.X.1	controls	1	**Parent element**
4.X.1.1	showFinishButton	1	"yes"
4.X.1.2	showHelp	1	"no"
4.X.1.3	showProgressBar	1	"no"
4.X.1.4	showCourseStructure	1	"yes"
4.X.1.5	courseStructureStartsOpen	1	"yes"
4.X.1.6	showNavBar	1	"yes"
4.X.1.7	showTitleBar	1	"no"
4.X.1.8	enableFlowNav	1	"no"
4.X.1.9	enableChoiceNav	1	"no"
4.X.1.10	statusDisplay	1	"separate"
4.X.2	appearance	1	**Parent element** (Correct spelling of "appearance" – is now allowed.)
4.X.2.1	courseStructureWidth	1	Optimal width for left menu, in pixels. For example, "224".
4.X.2.2	displayStage	1	**Parent element**
4.X.2.2.1	desired	1	**Parent element**
4.X.2.2.1.1	width	1	"1024"
4.X.2.2.1.2	height	1	"768"

4.X.2.2.1.3	fullscreen	1	"no"
4.X.2.2.2	required	1	**Parent element**
4.X.2.2.2.1	width	1	"0"
4.X.2.2.2.2	height	1	"0"
4.X.2.2.2.3	fullscreen	1	"no"
4.X.3	behavior	1	**Parent element**
4.X.3.1	disableRightClick	1	"no"
4.X.3.2	preventWindowResize	1	"no"
4.X.3.3	scoreRollupMode	1	"fixed average" if numberOfScoringObjects is given; or "score provided by course" if single-SCO course or no exams.
4.X.3.4	numberOfScoringObjects	1	The number of SCOs in the course that contain exams
4.X.3.5	statusRollupMode	0	NO LONGER ALLOWED
4.X.3.6	firstScoIsPretest	1	"no"
4.X.3.7	finishCausesImmediateCommit	1	"yes"
4.X.3.8	invalidMenuItemAction	1	"disable"
4.X.3.9	alwaysFlowToFirstSco	1	"yes"
4.X.3.10	logoutCausesPlayerExit	1	"yes"
4.X.3.11	resetRtTiming	1	"never"
4.X.3.12	communications	1	**Parent element**
4.X.3.12.1	maxFailedSubmissions	1	"2"
4.X.3.12.2	commitFrequency	1	"30000"
4.X.3.13	debug	1	**Parent element**
4.X.3.13.1	controlAudit	1	"false"
4.X.3.13.2	controlDetailed	1	"false"
4.X.3.13.3	runtimeAudit	1	"true"
4.X.3.13.4	runtimeDetailed	1	"true"
4.X.3.13.5	sequencingAudit	1	"true"
4.X.3.13.6	sequencingDetailed	1	"true"
4.X.3.13.7	lookaheadAudit	1	"false"
4.X.3.13.8	lookaheadDetailed	1	"false"
4.X.3.13.9	includeTimestamps	1	"false"
4.X.3.14	launch	1	**Parent element**
4.X.3.14.1	sco	1	"frameset"
4.X.3.14.2	player	1	"new window without browser toolbar"
4.X.3.14.3	wrapScoWindowWithApi	1	"no"
4.X.3.15	exitActions	1	**Parent element**
4.X.3.15.1	intermediateSco	1	**Parent element**
4.X.3.15.1.1	satisfied	1	**Parent element**
4.X.3.15.1.1.1	normal	1	"message page"
4.X.3.15.1.1.2	suspend	1	"message page"
4.X.3.15.1.1.3	timeout	1	"message page"
4.X.3.15.1.1.4	logout	1	"message page"
4.X.3.15.1.2	notSatisfied	1	**Parent element**
4.X.3.15.1.2.1	normal	1	"message page"
4.X.3.15.1.2.2	suspend	1	"message page"
4.X.3.15.1.2.3	timeout	1	"message page"
4.X.3.15.1.2.4	logout	1	"message page"
4.X.3.15.2	finalSco	1	**Parent element**
4.X.3.15.2.1	satisfied	1	**Parent element**
4.X.3.15.2.1.1	normal	1	"message page"
4.X.3.15.2.1.2	suspend	1	"message page"
4.X.3.15.2.1.3	timeout	1	"message page"
4.X.3.15.2.1.4	logout	1	"message page"

4.X.3.15.2.2	notSatisfied	1	**Parent element**
4.X.3.15.2.2.1	normal	1	"message page"
4.X.3.15.2.2.2	suspend	1	"message page"
4.X.3.15.2.2.3	timeout	1	"message page"
4.X.3.15.2.2.4	logout	1	"message page"

The <educational> element:

No.	Element Name	Multiplicity	Value
5.0	educational	1-n	**Parent element**
5.1	interactivityType	1	**Parent element**
5.1.1	source	1	"LOMv1.0"
5.1.2	value	1	"active", "expositive", "mixed"
5.2	learningResourceType	1-n	**Parent element**
5.2.1	source	1	"LOMv1.0"
5.2.2	value	1	"narrative text", "simulation", etc.*
5.3	interactivityLevel	1	**Parent element**
5.3.1	source	1	"LOMv1.0"
5.3.2	value	1	"low", "medium", "high", "very high"
5.4	semanticDensity	0-1	**Parent element**
5.4.1	source	0-1	
5.4.2	value	0-1	
5.5	intendedEndUserRole	0-n	**Parent element**
5.5.1	source	0-1	
5.5.2	value	0-1	
5.6	context	0-n	**Parent element**
5.6.1	source	0-1	
5.6.2	value	0-1	
5.7	typicalAgeRange	1-n	**Parent element**
5.7.1	string	1	"Apprentice", "Journeyman", "Master"
5.8	difficulty	1	**Parent element**
5.8.1	source	1	"LOMv1.0"
5.8.2	value	1	"very easy", "easy", "medium", "difficult", "very difficult"
5.9	typicalLearningTime	0-1	**Parent element**
5.9.1	duration	0-1	
5.9.2	description	0-n	**Parent element**
5.9.2.1	string	0-1	
5.10	description	0-n	**Parent element**
5.10.1	string	0-1	
5.11	language	1-n	"en-US"

* For a complete list of allowable values (vocabulary tokens) for this field, see SCORM 2004 3rd Edition, pages CAM-4-48, CAM-4-49.

The <rights> element:

No.	Element Name	Multiplicity	Value
6.0	rights	1	**Parent element**
6.1	cost	1	**Parent element**
6.1.1	source	1	"LOMv1.0"
6.1.2	value	1	"no"
6.2	copyrightAndOtherRestrictions	1	**Parent element**
6.2.1	source	1	"LOMv1.0"
6.2.2	value	1	"yes"
6.3	description	1	**Parent element**
6.3.1	string	1	see Copyright statement, below

Copyright:
Submarine On Board Training (SOBT) grants you ("Licensee") a non-exclusive, royalty-free license to use this software in source and binary code form, provided that i) this copyright notice and license appear on all copies of the software; and ii) Licensee does not utilize the software in a manner which is disparaging to SOBT. Re-use and re-purposing shall be on a case-by-case basis as specified by the Submarine On Board Training Office. Contact the SOBT Office for details.

The <relation> element:

No.	Element Name	Multiplicity	Value
7.0	relation	0-n	
7.1	kind	0-1	
7.1.1	source	0-1	
7.1.2	value	0-1	
7.2	resource	0-1	
7.2.1	identifier	0-n	
7.2.1.1	catalog	0-1	
7.2.1.2	entry	0-1	
7.2.2	description	0-n	
7.2.2.1	string	0-1	

The <annotation> element:

No.	Element Name	Multiplicity	Value
8.0	annotation	0-n	
8.1	entity	0-1	
8.2	date	0-1	
8.2.1	dateTime	0-1	
8.2.2	description	0-1	
8.2.2.1	string	0-1	
8.3	description	0-1	
8.3.1	string	0-1	

The <classification> element:

No.	Element Name	Multiplicity	Value
9.0	classification	4-n	**Parent element**
9.1	purpose	1	**Parent element**
9.1.1	source	1	"LOMv1.0" for security level and accessibility restrictions nodes, and "ADL-Rv1.0" for the other three.
9.1.2	value	1	"security level", "content type", "distribution restrictions", "conforms to", and "accessibility restrictions".
9.2	taxonPath	1	**Parent element**
9.2.1	source	1	**Parent element**
9.2.1.1	string	1	For security level and accessibility restrictions nodes, not required. For content type: "ADL/DOD Content Type Taxonomy". For distribution restrictions: "ADL/DOD Distribution Taxonomy". For conforms to: "ADL/DOD Conformance Taxonomy".
9.2.2	taxon	1	**Parent element**
9.2.2.1	id	0-1	
9.2.2.2	entry	1	**Parent element**
9.2.2.2.1	string	1	For security level: "Unclassified", "Confidential", or "Secret" (case-sensitive) For content type: "aggregation" For distribution restrictions: "DISTRIBUTION STATEMENT D.", etc. For conforms to: "SCORM 2004 3rd Ed." For accessibility restrictions: "NR", "LR", "NF", "RD", or "CD"
9.3	description	0-1	**Parent element**
9.3.1	string	0-1	
9.4	keyword	0-n	**Parent Element**
9.4.1	string	0-1	

III. Example of Content Aggregation Metadata

```
<?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 lomCustom.xsd">
    <general>
        <identifier>
            <catalog>SOBT Course Catalog</catalog>
            <entry>SLC-SOBT-00014-2.51</entry>
        </identifier>
        <title>
            <string language="en">SSN AN/WLR-8A(V)2 DD-CU Maintenance</string>
        </title>
        <language>en</language>
        <description>
            <string language="en">Provides training on AN/WLR-8A(V)2 DD-CU Maintenance</string>
        </description>
        <keyword>
            <string language="en">AN/WLR-8A(V)2</string>
        </keyword>
        <keyword>
            <string language="en">DD-CU</string>
        </keyword>
        <keyword>
            <string language="en">HPI</string>
        </keyword>
    </general>
    <lifeCycle>
        <version>
            <string language="en">2.51</string>
        </version>
        <status>
            <source>LOMv1.0</source>
            <value>final</value>
        </status>
        <contribute>
            <role>
                <source>LOMv1.0</source>
                <value>content provider</value>
            </role>
            <entity>BEGIN:VCARD\nVERSION:2.1\nN:SOBT;Director\nTITLE:SOBT Director\nORG:Submarine
On Board Training (SOBT)\nEND:VCARD</entity>
        </contribute>
    </lifeCycle>
    <metaMetadata>
        <metadataSchema>LOMv1.0</metadataSchema>
        <metadataSchema>SCORM_CAM_v1.3</metadataSchema>
    </metaMetadata>
    <technical>
        <format>text/html</format>
        <format>application/x-javascript</format>
        <format>application/x-shockwave-flash</format>
        <requirement>
            <orComposite>
                <type>
                    <source>LOMv1.0</source>
                    <value>browser</value>
```

```
                </type>
                <name>
                    <source>LOMv1.0</source>
                    <value>ms-internet explorer</value>
                </name>
                <minimumVersion>8.0</minimumVersion>
                <maximumVersion>8.0</maximumVersion>
            </orComposite>
        </requirement>
        <installationRemarks>
            <string language="en">This content requires the browser to have the following plug-ins installed:
Adobe Flash Player, Windows Media Player.</string>
        </installationRemarks>
        <otherPlatformRequirements>
            <string language="en">This content requires the following: 1024 x 768 or higher.</string>
        </otherPlatformRequirements>
         <duration>
             <duration>PT1H10M</duration>
             <description>
                 <string language="en">run time based on a total of 175 instructional screens with an average of
150 screens per hour</string>
             </description>
         </duration>
        <ScormEnginePackageProperties xmlns="http://www.scorm.com/xsd/ScormEnginePackageProperties">
            <controls>
                <showFinishButton>yes</showFinishButton>
                <showHelp>no</showHelp>
                <showProgressBar>no</showProgressBar>
                <showCourseStructure>yes</showCourseStructure>
                <courseStructureStartsOpen>yes</courseStructureStartsOpen>
                <showNavBar>yes</showNavBar>
                <showTitleBar>no</showTitleBar>
                <enableFlowNav>no</enableFlowNav>
                <enableChoiceNav>no</enableChoiceNav>
                <statusDisplay>separate</statusDisplay>
            </controls>
            <appearance>
                <courseStructureWidth>224</courseStructureWidth>
                <displayStage>
                    <desired>
                        <width>1024</width>
                        <height>768</height>
                        <fullscreen>no</fullscreen>
                    </desired>
                    <required>
                        <width>0</width>
                        <height>0</height>
                        <fullscreen>no</fullscreen>
                    </required>
                </displayStage>
            </appearance>
            <behavior>
                <disableRightClick>no</disableRightClick>
                <preventWindowResize>no</preventWindowResize>
                <scoreRollupMode>fixed average</scoreRollupMode>
                <numberOfScoringObjects>11</numberOfScoringObjects>
                <firstScoIsPretest>no</firstScoIsPretest>
                <finishCausesImmediateCommit>yes</finishCausesImmediateCommit>
```

```
                <invalidMenuItemAction>disable</invalidMenuItemAction>
                <alwaysFlowToFirstSco>yes</alwaysFlowToFirstSco>
                <logoutCausesPlayerExit>yes</logoutCausesPlayerExit>
                <resetRtTiming>never</resetRtTiming>
                <communications>
                    <maxFailedSubmissions>2</maxFailedSubmissions>
                    <commitFrequency>30000</commitFrequency>
                </communications>
                <debug>
                    <controlAudit>false</controlAudit>
                    <controlDetailed>false</controlDetailed>
                    <runtimeAudit>true</runtimeAudit>
                    <runtimeDetailed>true</runtimeDetailed>
                    <sequencingAudit>true</sequencingAudit>
                    <sequencingDetailed>true</sequencingDetailed>
                    <lookaheadAudit>false</lookaheadAudit>
                    <lookaheadDetailed>false</lookaheadDetailed>
                    <includeTimestamps>false</includeTimestamps>
                </debug>
                <launch>
                    <sco>frameset</sco>
                    <player>new window without browser toolbar</player>
                    <wrapScoWindowWithApi>no</wrapScoWindowWithApi>
                </launch>
                <exitActions>
                    <intermediateSco>
                        <satisfied>
                            <normal>message page</normal>
                            <suspend>message page</suspend>
                            <timeout>message page</timeout>
                            <logout>message page</logout>
                        </satisfied>
                        <notSatisfied>
                            <normal>message page</normal>
                            <suspend>message page</suspend>
                            <timeout>message page</timeout>
                            <logout>message page</logout>
                        </notSatisfied>
                    </intermediateSco>
                    <finalSco>
                        <satisfied>
                            <normal>message page</normal>
                            <suspend>message page</suspend>
                            <timeout>message page</timeout>
                            <logout>message page</logout>
                        </satisfied>
                        <notSatisfied>
                            <normal>message page</normal>
                            <suspend>message page</suspend>
                            <timeout>message page</timeout>
                            <logout>message page</logout>
                        </notSatisfied>
                    </finalSco>
                </exitActions>
            </behavior>
        </ScormEnginePackageProperties>
    </technical>
    <educational>
```

```
        <interactivityType>
            <source>LOMv1.0</source>
            <value>mixed</value>
        </interactivityType>
        <learningResourceType>
            <source>LOMv1.0</source>
            <value>narrative text</value>
        </learningResourceType>
        <interactivityLevel>
            <source>LOMv1.0</source>
            <value>medium</value>
        </interactivityLevel>
        <typicalAgeRange>
            <string language="en">Apprentice</string>
        </typicalAgeRange>
        <difficulty>
            <source>LOMv1.0</source>
            <value>medium</value>
        </difficulty>
        <language>en-US</language>
    </educational>
    <rights>
        <cost>
            <source>LOMv1.0</source>
            <value>no</value>
        </cost>
        <copyrightAndOtherRestrictions>
            <source>LOMv1.0</source>
            <value>yes</value>
        </copyrightAndOtherRestrictions>
        <description>
            <string language="en">Copyright:
            Submarine On Board Training (SOBT) grants you ("Licensee") a non-exclusive,
            royalty-free license to use this software in source and binary code form,
            provided that i) this copyright notice and license appear on all copies of
            the software; and ii) Licensee does not utilize the software in a manner
            which is disparaging to SOBT.
            Re-use and re-purposing shall be on a case-by-case basis as specified by the
            Submarine On Board Training Office.  Contact the SOBT Office for details.
            </string>
        </description>
    </rights>
    <classification>
        <purpose>
            <source>LOMv1.0</source>
            <value>security level</value>
        </purpose>
        <taxonPath>
            <source>
                <string language="en" />
            </source>
            <taxon>
                <entry>
                    <string language="en">Unclassified</string>
                </entry>
            </taxon>
        </taxonPath>
    </classification>
```

```
    <classification>
        <purpose>
            <source>ADL-Rv1.0</source>
            <value>content type</value>
        </purpose>
        <taxonPath>
            <source>
                <string language="en">ADL/DOD Content Type Taxonomy</string>
            </source>
            <taxon>
                <entry>
                    <string language="en">aggregation</string>
                </entry>
            </taxon>
        </taxonPath>
    </classification>
    <classification>
        <purpose>
            <source>ADL-Rv1.0</source>
            <value>distribution restrictions</value>
        </purpose>
        <taxonPath>
            <source>
                <string language="en">ADL/DOD Distribution Taxonomy</string>
            </source>
            <taxon>
                <entry>
                    <string language="en">DISTRIBUTION STATEMENT D.</string>
                </entry>
            </taxon>
        </taxonPath>
    </classification>
    <classification>
        <purpose>
            <source>ADL-Rv1.0</source>
            <value>conforms to</value>
        </purpose>
        <taxonPath>
            <source>
                <string language="en">ADL/DOD Conformance Taxonomy</string>
            </source>
            <taxon>
                <entry>
                    <string language="en">SCORM 2004 3rd Ed.</string>
                </entry>
            </taxon>
        </taxonPath>
    </classification>
</lom>
```

IV. SCO Metadata

The following tables define the LOM 1.0 metadata elements that are required by SOBT for SCO Metadata. The Multiplicity column designates those elements that SOBT requires in every metadata file. The Value column defines the required value or provides guidance on how the metadata element entry shall be derived.

The <general> element:

No.	Element Name	Multiplicity	Value
1	general	1	**Parent Element**
1.1	identifier	1-n	**Parent Element**
1.1.1	catalog	1	"SOBT Course Catalog"
1.1.2	entry	1	SCO <item> Identifier, for example: "DODUSNSLCSOBT_05050_01_02"
1.2	title	1	**Parent Element**
1.2.1	string	1	SCO Title
1.3	language	1-n	<language>en</language>
1.4	description	1-n	**Parent Element**
1.4.1	string	1	A short description of the SCO and the SCO learning objective(s) (must be between 30 - 2000 characters)
1.5	keyword	1-n	**Parent Element**
1.5.1	string	1	A separate keyword element for each applicable shipclass, department, division, watchstation, mission, equipment title. (See Keyword guidance, below.) Generic keywords such as "submarine" shall not be used.
1.6	coverage	0-n	**Parent Element**
1.6.1	string	0-1	
1.7	structure	0-1	**Parent Element**
1.7.1	source	0-1	"LOMv1.0"
1.7.2	value	0-1	typically -"hierarchical" (tree structure) or "linear" (fully ordered)
1.8	aggregationLevel	0-1	**Parent Element**
1.8.1	source	0-1	
1.8.2	value	0-1	

The <lifeCycle> element:

No.	Element Name	Multiplicity	Value
2.0	lifeCycle	1	**Parent element**
2.1	version	1	**Parent element**
2.1.1	string	1	Version of the Course (SCO Version same as Course Version)
2.2	status	1	**Parent element**
2.2.1	source	1	"LOMv1.0"
2.2.2	value	1	"final" Since beta deliverables are intended as final, this element shall always be "final"
2.3	contribute	1-n	**Parent element**
2.3.1	role	1	**Parent element**
2.3.1.1	source	1	"LOMv1.0"
2.3.1.2	value	1	"content provider"
2.3.2	entity	1-n	"VERSION:2.1", "N:SOBT;Director", "TITLE:SOBT Director", "ORG:Submarine On Board Training (SOBT)"
2.3.3	date	0-1	**Parent element**
2.3.3.1	dateTime	0-1	
2.3.3.2	description	0-1	
2.3.3.2.1	string	0-1	

The <metaMetadata> element:

No.	Element Name	Multiplicity	Value
3.0	metaMetadata	1	**Parent element**
3.1	identifier	0-n	**Parent element**
3.1.1	catalog	0-1	
3.1.2	entry	0-1	
3.2	contribute	0-n	**Parent element**
3.2.1	role	0-1	**Parent element**
3.2.1.1	source	0-1	
3.2.1.2	value	0-1	
3.2.2	entity	0-n	
3.2.3	date	0-1	**Parent element**
3.2.3.1	dateTime	0-1	
3.2.3.2	description	0-1	**Parent element**
3.2.3.2.1	string	0-1	
3.3	metadataSchema	2-n	"LOMv1.0" and "SCORM_CAM_v1.3"
3.4	language	0-1	

The <technical> element:

No.	Element Name	Multiplicity	Value
4.0	technical	1	**Parent element**
4.1	format	2-n	A separate <format> element for each mime type used. For all courses: "text/html", "application/x-javascript". For others, use as needed: "application/x-shockwave-flash", etc.
4.2	size	0-1	
4.3	location	0-n	
4.4	requirement	1-n	**Parent element**
4.4.1	orComposite	1-n	**Parent element**
4.4.1.1	type	1	**Parent element**
4.4.1.1.1	source	1	"LOMv1.0"
4.4.1.1.2	value	1	"browser"
4.4.1.2	name	1	**Parent element**
4.4.1.2.1	source	1	"LOMv1.0"
4.4.1.2.2	value	1	"ms-internet explorer"
4.4.1.3	minimumVersion	1	"8.0"
4.4.1.4	maximumVersion	1	"8.0"
4.5	installationRemarks	1	**Parent element**
4.5.1	string	1	
4.6	otherPlatformRequirements	1	**Parent element**
4.6.1	string	1	List required plug-ins and versions
4.7	duration	1	**Parent element**
4.7.1	duration	1	SCORM CAM Section 4.2.11.5 – hrs and minutes (PT1H30M)
4.7.2	description	1	
4.7.2.1	string	1	derivation of duration "225 instructional screens, 150 screens per instructional hour"

The <educational> element:

No.	Element Name	Multiplicity	Value
5.0	educational	1-n	**Parent element**
5.1	interactivityType	1	**Parent element**
5.1.1	source	1	"LOMv1.0"
5.1.2	value	1	"active", "expositive", "mixed"
5.2	learningResourceType	1-n	**Parent element**
5.2.1	source	1	"LOMv1.0"
5.2.2	value	1	"narrative text", "simulation", etc.*
5.3	interactivityLevel	1	**Parent element**
5.3.1	source	1	"LOMv1.0"
5.3.2	value	1	"low", "medium", "high", "very high"
5.4	semanticDensity	0-1	**Parent element**
5.4.1	source	0-1	
5.4.2	value	0-1	
5.5	intendedEndUserRole	0-n	**Parent element**
5.5.1	source	0-1	
5.5.2	value	0-1	
5.6	context	0-n	**Parent element**
5.6.1	source	0-1	
5.6.2	value	0-1	
5.7	typicalAgeRange	1-n	**Parent element**
5.7.1	string	1	"Apprentice", "Journeyman", "Master"
5.8	difficulty	1	**Parent element**
5.8.1	source	1	"LOMv1.0"
5.8.2	value	1	"very easy", "easy", "medium", "difficult", "very difficult"
5.9	typicalLearningTime	0-1	**Parent element**
5.9.1	duration	0-1	
5.9.2	description	0-n	**Parent element**
5.9.2.1	string	0-1	
5.10	description	0-n	**Parent element**
5.10.1	string	0-1	
5.11	language	1-n	"en-US"

* For a complete list of allowable values (vocabulary tokens) for this field, see SCORM 2004 3rd Edition, pages CAM-4-48, CAM-4-49.

The <rights> element:

No.	Element Name	Multiplicity	Value
6.0	rights	1	**Parent element**
6.1	cost	1	**Parent element**
6.1.1	source	1	"LOMv1.0"
6.1.2	value	1	"no"
6.2	copyrightAndOtherRestrictions	1	**Parent element**
6.2.1	source	1	"LOMv1.0"
6.2.2	value	1	"yes"
6.3	description	1	**Parent element**
6.3.1	string	1	see Copyright statement, below

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The <relation> element:

No.	Element Name	Multiplicity	Value
7.0	relation	0-n	
7.1	kind	0-1	
7.1.1	source	0-1	
7.1.2	value	0-1	
7.2	resource	0-1	
7.2.1	identifier	0-n	
7.2.1.1	catalog	0-1	
7.2.1.2	entry	0-1	
7.2.2	description	0-n	
7.2.2.1	string	0-1	

The <annotation> element:

No.	Element Name	Multiplicity	Value
8.0	annotation	0-n	
8.1	entity	0-1	
8.2	date	0-1	
8.2.1	dateTime	0-1	
8.2.2	description	0-1	
8.2.2.1	string	0-1	
8.3	description	0-1	
8.3.1	string	0-1	

The <classification> element:

No.	Element Name	Multiplicity	Value
9.0	classification	1-n	**Parent element**
9.1	purpose	1	**Parent element**
9.1.1	source	1	"LOMv1.0"
9.1.2	value	1	"security level" or "accessibility restrictions"
9.2	taxonPath	1	**Parent element**
9.2.1	source	1	**Parent element**
9.2.1.1	string	1	For security level and accessibility restrictions nodes, not required.
9.2.2	taxon	1	**Parent element**
9.2.2.1	id	0-1	
9.2.2.2	entry	1	**Parent element**
9.2.2.2.1	string	1	For security level: "Unclassified", "Confidential", or "Secret" (case-sensitive) For accessibility restrictions: "NR", "LR", "NF", "RD", or "CD"
9.3	description	0-1	**Parent element**
9.3.1	string	0-1	
9.4	keyword	0-n	**Parent Element**
9.4.1	string	0-1	

V. Example of SCO Metadata

```
<?xml version="1.0"?>
<lom xmlns="http://ltsc.ieee.org/xsd/LOM">
    <general>
        <identifier>
            <catalog>SOBT Course Catalog</catalog>
            <entry>DODUSNSLCSOBT_00014_02_03</entry>
        </identifier>
        <title>
            <string language="en">Activity and Buffer Functions</string>
        </title>
        <language>en</language>
        <description>
            <string language="en">Describes the purpose and location of the Activity and Buffer Circuit Card
                        Assemblies (CCAs) and their functions and describes the operation of the Activity
                        Buffer Functions.
            </string>
        </description>
        <keyword>
            <string language="en">DD-CU</string>
        </keyword>
        <keyword>
            <string language="en">CCA</string>
        </keyword>
        <keyword>
            <string language="en">Circuit Card</string>
        </keyword>
        <keyword>
            <string language="en">Activity</string>
        </keyword>
        <keyword>
            <string language="en">Buffer</string>
        </keyword>
    </general>
    <lifeCycle>
        <version>
            <string language="en">2.51</string>
        </version>
        <status>
            <source>LOMv1.0</source>
            <value>final</value>
        </status>
        <contribute>
            <role>
                <source>LOMv1.0</source>
                <value>content provider</value>
            </role>
            <entity>BEGIN:VCARD\nVERSION:2.1\nN:SOBT;Director\nTITLE:SOBT Director\nORG:Submarine
On Board Training (SOBT)\nEND:VCARD</entity>
        </contribute>
    </lifeCycle>
    <metaMetadata>
        <metadataSchema>LOMv1.0</metadataSchema>
        <metadataSchema>SCORM_CAM_v1.3</metadataSchema>
    </metaMetadata>
    <technical>
```

```
        <format>text/html</format>
        <format>application/x-javascript</format>
        <format>application/x-shockwave-flash</format>
        <requirement>
            <orComposite>
                <type>
                    <source>LOMv1.0</source>
                    <value>browser</value>
                </type>
                <name>
                    <source>LOMv1.0</source>
                    <value>ms-internet explorer</value>
                </name>
                <minimumVersion>8.0</minimumVersion>
                <maximumVersion>8.0</maximumVersion>
            </orComposite>
        </requirement>
        <installationRemarks>
            <string language="en">This content requires the browser to have the following plug-ins installed:
Adobe Flash Player, Windows Media Player.</string>
        </installationRemarks>
        <otherPlatformRequirements>
            <string language="en">This content requires the following: 1024 x 768 or higher.</string>
        </otherPlatformRequirements>
         <duration>
              <duration>PT0H20M</duration>
              <description>
                  <string language="en">run time based on a total of 50 instructional screens with an average of
150 screens per hour</string>
              </description>
         </duration>
    </technical>
    <educational>
        <interactivityType>
            <source>LOMv1.0</source>
            <value>mixed</value>
        </interactivityType>
        <learningResourceType>
            <source>LOMv1.0</source>
            <value>narrative text</value>
        </learningResourceType>
        <interactivityLevel>
            <source>LOMv1.0</source>
            <value>medium</value>
        </interactivityLevel>
        <typicalAgeRange>
            <string language="en">Apprentice</string>
        </typicalAgeRange>
        <difficulty>
            <source>LOMv1.0</source>
            <value>medium</value>
        </difficulty>
        <language>en-US</language>
    </educational>
    <rights>
        <cost>
            <source>LOMv1.0</source>
            <value>no</value>
```

```
        </cost>
        <copyrightAndOtherRestrictions>
            <source>LOMv1.0</source>
            <value>yes</value>
        </copyrightAndOtherRestrictions>
        <description>
            <string language="en">Copyright:
            Submarine On Board Training (SOBT) grants you ("Licensee") a non-exclusive,
            royalty-free license to use this software in source and binary code form,
            provided that i) this copyright notice and license appear on all copies of
            the software; and ii) Licensee does not utilize the software in a manner
            which is disparaging to SOBT.
            Re-use and re-purposing shall be on a case-by-case basis as specified by the
            Submarine On Board Training Office.  Contact the SOBT Office for details.
            </string>
        </description>
    </rights>
    <classification>
        <purpose>
            <source>LOMv1.0</source>
            <value>security level</value>
        </purpose>
        <taxonPath>
            <source>
                <string language="en" />
            </source>
            <taxon>
                <entry>
                    <string language="en">Unclassified</string>
                </entry>
            </taxon>
        </taxonPath>
    </classification>
</lom>
```

VI. Keywords

Keywords shall be specific to the content that is covered in the course. For example, for a Signal Analysis course that covers the operation of WLR-8, some good keywords would be "signal analysis" and "WLR-8".

A minimum of three keywords is required in the course metadata file. At least one keyword is required in each SCO metadata file. Keywords for SCO metadata shall use terms covered in the Terminal Objective and all the Enabling Objectives for that SCO, as well as any related Continuing Training Qualification System (CTQS) capabilities. Keywords for course metadata shall be a summation of the keywords for all SCOs in the course. Developers shall coordinate with the government to identify keywords prior to delivering the IMDP. The keywords will normally be provided by SOBT to the developer, along with the completed FEA form (if an FEA was conducted).

The following tables show examples of more general keywords, which may also be used where appropriate.

Shipclass Keywords:

SSBN
SSGN
SSN 688
SSN 688(I)
SSN 774
SSN 21
SSN 23

Note: If the course applies to all ship classes, then Shipclass keywords shall not be used.

Department Keywords:

Engineering
Combat Systems
Navigation Operations
Executive
Supply
Strategic Weapons Systems

Division Keywords:

RC	FT	ET	ET(COM)	HM	LS
EM	ST	MT	ET(NAV)	YN	CS
MM(NUC)	MM(WEPS)				
MM					

Mission Keywords:

Mission Name	Mission Description
ASW	ANTI-SUBMARINE WARFARE
CCC	COMMAND, CONTROL, AND COMMUNICATIONS
CSAR	COMBAT SEARCH AND RESCUE
ISR	INTELLIGENCE, SURVEILLANCE, AND RECONNAISSANCE
MIW	MINE WARFARE
MOB(BASIC)	MOBILITY BASIC (SUB QUALS, MEDICAL, ETC.)
MOB(ENG)	MOBILITY ENGINEERING
MOB(NAV)	MOBILITY NAVIGATION
NSW	NAVAL SPECIAL WARFARE
STW	STRIKE WARFARE
SUW	ANTI-SURFACE WARFARE
SWS	STRATEGIC WEAPONS SYSTEMS

Watchstation Keywords:

Watchstation
See COMSUBLANT/COMSUBPACINST 2305.1(series) (IC Manual) Use Written Abbreviation "COW" and listing "Chief of the Watch".

Equipment Name Keywords:

Equipment
See COMSUBLANT/COMSUBPACINST 2305.1(series) (IC Manual) Use Written Abbreviation "MHCP" and listing "Missile Heating and Cooling Pump". If not listed in the IC Manual, the common name and abbreviation used in the reference material shall be used.

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Appendix G: Restrictions on Sequencing and Navigation

SOBT is currently placing restrictions on the use of some Sequencing and Navigation elements. The following table shows which elements are prohibited and which are allowed.

Green = allowed Yellow = allowed, but with defaults only
Orange = prohibited

Element	Sub-Element(s)	Attributes	Vocabulary	Default
<sequencing>				
	<controlMode>	choice		true
		choiceExit		true
		flow		false
		forwardOnly		false
		useCurrentAttemptObjectiveInfo		true
		useCurrentAttemptProgressInfo		true
	</controlMode>			
	<sequencingRules>			
	<preConditionRule>			
	<ruleConditions>	conditionCombination	all	all
			any	
	<ruleCondition>	referencedObjective		
		measureThreshold		
		operator	noOp	noOp
			not	
		condition	satisfied	
			objectiveStatusKnown	
			objectiveMeasureKnown	
			objectiveMeasureGreaterThan	
			objectiveMeasureLessThan	
			completed	
			activityProgressKnown	
			attempted	
			attemptLimitExceeded	
			timeLimitExceeded	
			outsideAvailableTimeRange	
			always	
	</ruleCondition>			
	</ruleConditions>			
	<ruleAction>	action	skip	
			disabled	
			hiddenFromChoice	
			stopForwardTraversal	
	</ruleAction>			
	</preConditionRule>			

Element	Sub-Element(s)	Attributes	Vocabulary	Default
<postConditionRule>				
	<ruleConditions>	conditionCombination	all	all
			any	
		<ruleCondition>	referencedObjective	
			measureThreshold	
			operator	noOp	noOp
				not
			condition	satisfied
				objectiveStatusKnown
				objectiveMeasureKnown
				objectiveMeasureGreaterThan
				objectiveMeasureLessThan
				completed
				activityProgressKnown
				attempted
				attemptLimitExceeded
				timeLimitExceeded
				outsideAvailableTimeRange
				always
		</ruleCondition>		
	</ruleConditions>			
	<ruleAction>	action	exitParent	
			exitAll	
			retry	
			retryAll	
			continue	
			previous	
	</ruleAction>			
</postConditionRule>				

Element	Sub-Element(s)	Attributes	Vocabulary	Default
<exitConditionRule>				
	<ruleConditions>	conditionCombination	all any	all
		<ruleCondition>	referencedObjective measureThreshold		
			operator	noOp not	noOp
			condition	satisfied objectiveStatusKnown objectiveMeasureKnown objectiveMeasureGreaterThan objectiveMeasureLessThan completed activityProgressKnown attempted attemptLimitExceeded timeLimitExceeded outsideAvailableTimeRange always	
		</ruleCondition>		
	</ruleConditions>			
	<ruleAction>	action	exit	
	</ruleAction>			
</exitConditionRule>				
</sequencingRules>				
<limitConditions>		attemptLimit attemptAbsoluteDurationLimit		
</limitConditions>				
<auxiliaryResources>				
</auxiliaryResources>				

Element	Sub-Element(s)	Attributes	Vocabulary	Default
<rollupRules>		rollupObjectiveSatisfied		true
		rollupProgressCompletion		true
		objectiveMeasureWeight		1.0000
	<rollupRule>	childActivitySet	all	all
			any	
			none	
			atLeastCount	
			atLeastPercent	
		minimumCount		0
		mimimumPercent		0.0000
		<rollupConditions>	conditionCombination	all	any
				any	
			<rollupCondition>	operator	noOp	noOp
					not	
				condition	satisfied	
					objectiveStatusKnown	
					objectiveMeasureKnown	
					completed	
					activityProgressKnown	
					attempted	
					attemptLimitExceeded	
					timeLimitExceeded	
					outsideAvailableTimeRange	
			</rollupCondition>			
		</rollupConditions>				
		<rollupAction>	action	satisfied	
				notSatisfied	
				completed	
				incomplete	
		</rollupAction>			
	</rollupRule>				
</rollupRules>				

Element	Sub-Element(s)	Attributes	Vocabulary	Default
<objectives>				
	<primaryObjective>	satisfiedByMeasure		false
		objectiveID		
		<minNormalizedMeasure>		1.0
		</minNormalizedMeasure>		
		<mapInfo>	targetObjectiveID	
			readSatisfiedStatus	true
			readNormalizedMeasure	true
			writeSatisfiedStatus	false
			writeNormalizedMeasure	false
		</mapinfo>		
	</primaryObjective>			
	<objective>	satisfiedByMeasure		false
		objectiveID		
		<minNormalizedMeasure>		1.0
		</minNormalizedMeasure>		
		<mapInfo>	targetObjectiveID	
			readSatisfiedStatus	true
			readNormalizedMeasure	true
			writeSatisfiedStatus	false
			writeNormalizedMeasure	false
		</mapInfo>		
	</objective>			
</objectives>				
<randomizationControls>		randomizationTiming	never	never
			once	
			onEachNewAttempt	
		selectCount		
		reorderChildren		false
		selectionTiming	never	never
			once	
			onEachNewAttempt	
</randomizationControls>				
<deliveryControls>		tracked		true
		completionSetByContent		false
		objectiveSetByContent		false
</deliveryControls>				

Element	Sub-Element(s)	Attributes	Vocabulary	Default
<constrainedChoiceConsiderations>		preventActivation		false
		constrainChoice		false
</constrainedChoiceConsiderations>				
<rollupConsiderations>		requiredForSatisfied	always	always
			ifAttempted	
			ifNotSkipped	
			ifNotSuspended	
		requiredForNotSatisfied	always	always
			ifAttempted	
			ifNotSkipped	
			ifNotSuspended	
		requiredForCompleted	always	always
			ifAttempted	
			ifNotSkipped	
			ifNotSuspended	
		requiredForIncomplete	always	always
			ifAttempted	
			ifNotSkipped	
			ifNotSuspended	
		measureSatisfactionIfActive		true
</rollupConsiderations>				
</sequencing>				

<presentation>		
<navigationInterface>		
<hideLMSUI>	previous	
	continue	
	exit	
	exitAll	
	abandon	
	abandonAll	
	suspendAll	
</hideLMSUI>		
</navigationInterface>		
</presentation>		

Appendix H: Simulators

Simulators are executables; and therefore, they must be SubLAN-certified before they can be used on SubLAN. Some simulators are designed as team trainers, such that multiple users can participate together simultaneously in a team-based scenario. Simulators are not in SCORM format and do not play in a SCORM-based Learning Management System (LMS).

Simulator development differs from courseware development in that each project will have different production schedules and expected deliverables. Requirements, development timelines, and periodic deliverables must be clearly identified and agreed upon at the project's kickoff. Simulator specific requirements include identification of intended project completion date and its correlation to SubLAN testing submission deadlines. SubLAN has limited certification testing events and missing the submission deadlines can significantly delay a product's release to the fleet.

Frequent communications between the developer and SOBT project manager are key to successful simulator development. To facilitate communications, monthly phone conferences and frequent IPRs must be scheduled in the POA&M. Phone conferences should consist of project status, next deliverable/milestone, and discussions of potential issues that would prevent timely milestone/project completion. Deliverables, without regard to level of functionality, shall be scheduled at intervals that allow SOBT the opportunity to verify expected milestone completion and provide feedback throughout the development process.

Simulator POA&Ms shall contain the following:

- POP start and end dates
- Kickoff date
- Monthly phone conferences
- Frequent IPRs
- Software deliverables/prototypes/betas as agreed upon during kickoff meeting
- SubLAN testing submission and certification dates (provided by SOBT post kickoff)

Timeline Considerations:

- Delivery date and level of effort shall be set to accommodate SubLAN testing schedule. Missing a SubLAN testing date could result in up to 9 months delay to the fleet.
- Date product is expected for fleet delivery (development plus SubLAN testing)
- Integration testing with other simulators that interoperate with product being developed (must occur prior to SubLAN testing submission)

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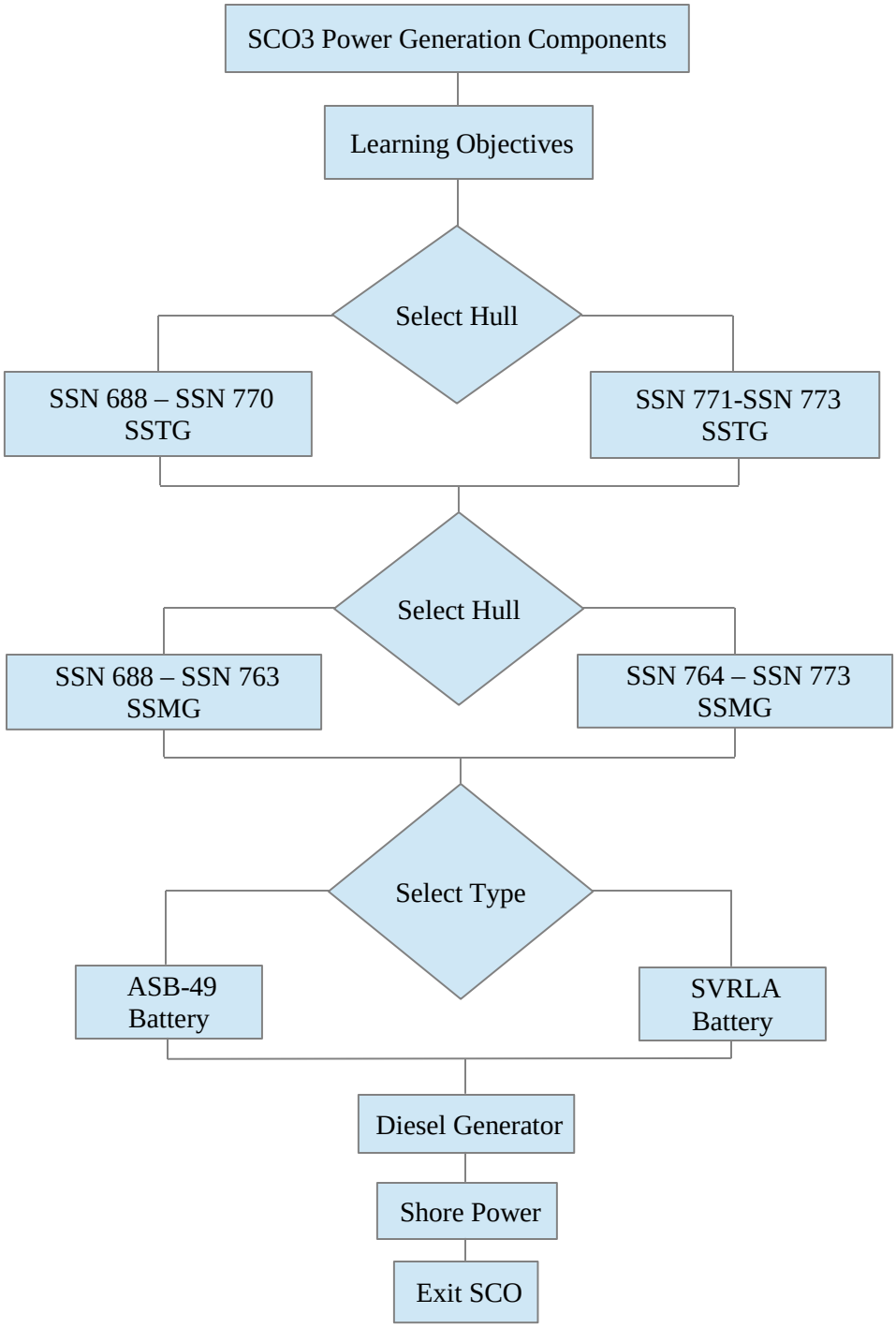
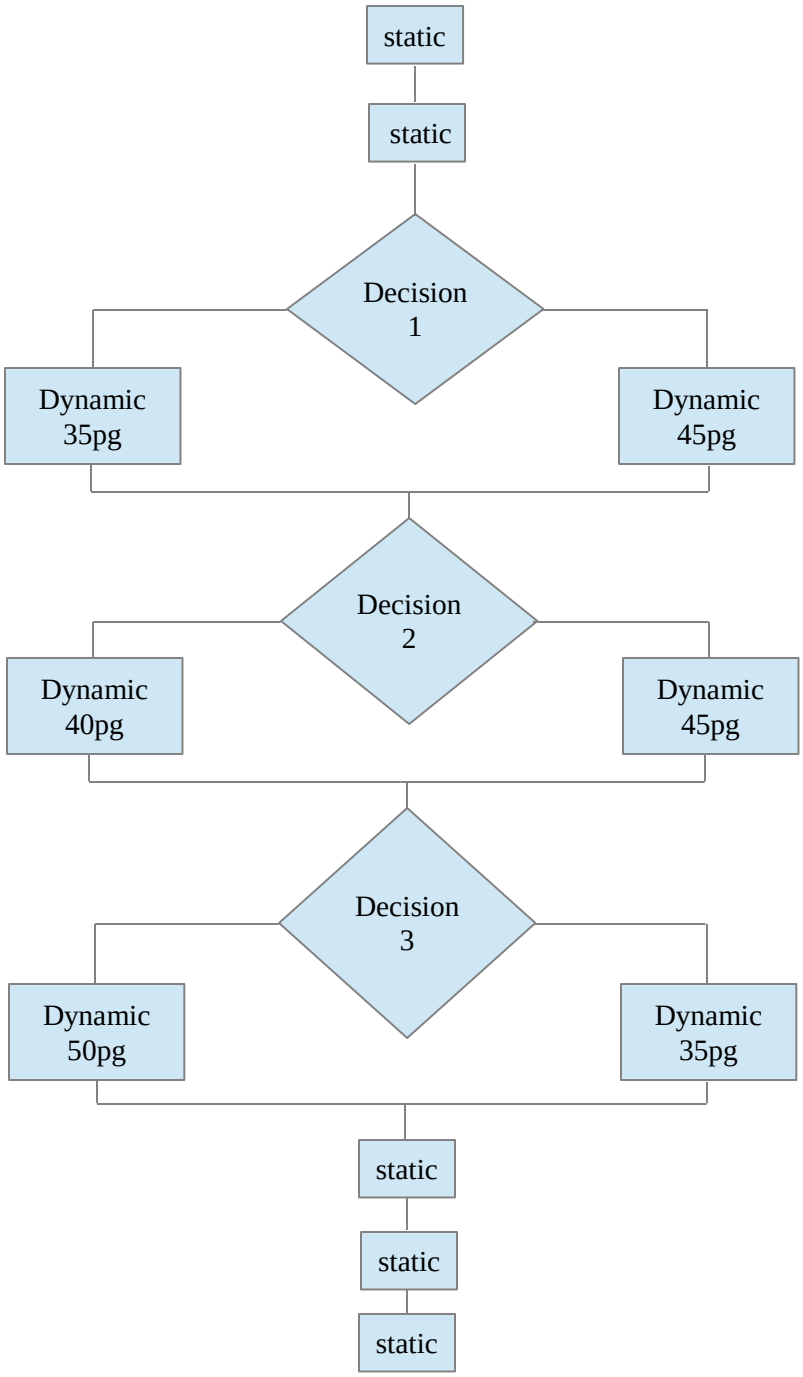
Appendix I: Optional Branching

Standard behavior for completion is to look at how many pages viewed and determine completion based upon a percentage of pages actually visited. However, with optional branching, it is not determinate of which content will be viewed. Due to this a prediction of the appropriate minimum content viewed will not be able to be accurately determined just from an overview examination. However, a solution to this is to rely on the content itself to make this determination. All static sections, those which do not rely on branching, can be rendered as set pages that must be viewed. So static + branching = pages that must be viewed. Completion should therefore be determined by the IMDP defined percentage of pages that must be viewed. Take the following example:



Let us say that the total page count for this course is 350. Each of the process boxes will represent the actual content contained in the course. Our static content will be pages required to be visited regardless of any branch chosen. In our example those are: Power Generation, Learning Objectives, Diesel Generator, and Shore Power. Our dynamic portions are going to be: SSN 688 SSTG, SSN 771 SSTG, SSN 688 SSMG, SSN 764 SSMG, ASB-49 Battery, and SVRLA Battery. Keep in mind that we can't just add all section lengths together. We can only add together sections which have been selected. To find out which ones, we have to look at our decision statements. With 3 decisions we find that only 3 out of all the dynamic sections can be selected. So our dynamic sections can be added as Decision1 + Decision2 + Decision3. With this in mind, our total page count necessary for any specific branch will be Static+Decision1+Decision2+Decision3. Our range for acceptable completion will be from a lower range of (Static+Decision1+Decision2+Decision3)*percentage of content for completion, to an upper range of (Static+Decision1+Decision2+Decision3).

For our example of 350 pages, let us determine that our static page content is 100 pages. SSN 688 SSTG is 35 pages. SSN 771 SSTG is 45 pages. SSN 688 SSMG is 40 pages. SSN 764 SSMG is 45 pages. ASB-49 Battery is 50 pages. SVRLA Battery is 35 pages. Now with these values in mind we can look at our content like this:



Now say the student takes the left path in Decision 1, the right path in Decision 2, and the right path in Decision 3. As well, let's define the threshold for completion of the content to be 80%. The course should calculate at the end of the course logically as the maximum number of pages that can be visited on this path to be 100+35+45+35 = 215. Our completion range will then be 172-215 pages of content visited to qualify for content completion.

Now let's say that the student took a wrong choice and goes back and takes a different branch because they realize they made the wrong choice. So now they will go back to Decision 1 and take the right path, then go to Decision 2 and take the right path, then go to Decision 3 and take the left path. The system should then recalculate our path to be 100+45+45+50 = 240. Now our new content completion range will be 192-240 pages.

To handle a system like this, more complex programming will be necessary. There will need to be an addition of tracking flags for decision events. These flags should be utilized for more than just tracking a decision made. The first indication should be that a decision is made. The second indication should be for size of content of that branched selection. The third indication should tell the tracking system which pages are relevant in tracking branched content, so that the student doesn't take a different path to subvert the content completion requirements.