Guidance
For
Development and Management
Of
Navy Integrated Learning Environment
Content

Naval Personnel Development Command
9549 Bainbridge Ave
Norfolk, VA

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Version 1.0
1.0 PURPOSE STATEMENT

The Guidance for Development and Management of Navy Integrated Learning Environment Content is intended for learning center personnel, contractors, and contracting officers involved with developing content within the Navy’s Integrated Learning Environment (ILE). The primary purpose of this guide is to standardize processes, techniques, procedures, formats, and functions related to content development. This guide will also serve to familiarize people and organizations, new to the ILE program, with its goals, organization, and function within the Navy training community.

ILE emphasizes collaboration on standards-based versions of reusable learning objects, networks, learning content management and learning management systems, yet may include legacy methods and media. ILE includes numerous media such as paper, CD-ROM, interactive television, videotape, audiotape, and the Internet. While learning can take many forms the emphasis for this guide is converting courses to web-enabled self-pace instruction where appropriate to deliver learning anywhere, anytime.

This guide provides the baseline standards, specifications, and guidelines for the development and management for both classified and unclassified ILE content.

Compliance with this guide:

- Provides consistency in structure, format and function across courses
- Ensures that high quality materials are produced
- Increases course development efficiency, and therefore decreases costs, by avoiding repeated design, development, and evaluation of key content elements
- Ensures a structured content development model based on a skills/task requirement to learning objective statement relational flow
- Simplifies evaluation of products by Navy reviewers

NOTE: Compliance with the procedures and techniques contained herein is required for content development contracted after the release date of this document to the maximum extent practicable. In the event of a conflict with the contractual documents, the contract will take precedence. Any deviation must be approved by the ILE Content Team or NPDC.

NOTE: Classified Content - In this current version (v1.0), this guide only addresses metadata tagging requirements for classified content, it does NOT address the broader range of requirements of classified learning activities or delineate the specifications of a secured network.
2.0 SCOPE

This guide does:

- Provide general information about Navy ILE content development and delivery environment
- Set standards and specifications for learning activity design, development, and production
- Provide example of Statement of Work (SOW) and contract deliverables for asynchronous self-pace learning content

This guide is not:

- A handbook on the use of any particular development tool(s)
- Specific instruction on the development or maintenance of SkillObjects

3.0 HOW TO USE THIS GUIDE

The intended use of this document is during the analysis, design and development phase by personnel who are charged with ensuring that the instructional design of the content is fully compatible with the intended delivery system.

The guide provides guidance and is to be used as a reference. **This document is substantially revised and must be completely reviewed.** Read the entire guide before responding to a SOW or, if Learning Center developer, before beginning any ILE content development project. From that point, refer to each section as needed.

This guide is a living document. Any comments on the guide are welcome in the effort to continually improve Navy ILE content. Please provide suggestions and comments to:

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4.0 GUIDANCE ORGANIZATION

The *Guidance for Development and Management of Navy ILE Content* is organized into nine sections:
- **Section One: Content, Design, Development & Deployment (CD3) for the Navy ILE v1.6**

The document serves as the first step in understanding the Navy Guide to Content Design, Development and Deployment. The initial rules and guidelines listed in this document are a starting point in the process of developing the Navy Content Object Model (NCOM). This document will be used to develop Navy Integrated Learning Environment (ILE) content that adheres to both the Navy ILE vision and mission and Navy-SCORM.

- **Section Two: Learning Center Content Style Guide v1.1**

This guide is a reference for content developers, instructional designers, system developers and other practitioners associated with the US Navy's Integrated Learning Environment (ILE). It provides specific instruction for web-enabled self-pace and instructor lead content style and presentation. Additionally, provides specific instruction for associated training support materials and products.

- **Section Three: ILE Content Metadata Guide and Specification for Development and Delivery v3.0**

This guide is a reference for content developers, instructional designers, system developers and other practitioners associated with the US Navy’s Integrated Learning Environment (ILE). It provides metadata specifications that should be used to annotate content at multiple levels of aggregation including Terminal Learning Object (TLO), Enabling Learning Object (ELO), and assets. This specification is part of the Navy’s Content Design, Development, and Deployment (CD3) Guide which presents the framework for ILE content.

- **Section Four: Navy ILE Technical Specifications & Guidelines v2.0**

This document outlines the technical specifications and guidelines required to insure the technical compatibility between instructional content and the Integrated Learning Environment. Includes specifications for workstations, NMCI Gold disk, Afloat COMPOSE 3.0, testing and content submission procedures and requirements.

- **Section Five: Guidance for Navy Learning Objective Statements (NLOS) Specifications 1553-ISD-3**

The purpose of this document is to identify the specifications needed to create, review, store, search, and maintain learning objects within the Navy’s Integrated Learning Environment (ILE). The document serves as the baseline required to advance the development of learning objectives and learning objective statements that will serve as a link between the SkillObjects™ and related work elements, the learning events, and the content.

- **Section Six: Guidance for Navy Instructional Systems Design (ISD) and Instructional Design (ID) Processes 1553-ISD-1**

The purpose of the ILE Instructional Systems Design and Instructional Design Processes document is to articulate the need for the two processes and to provide high level guidance as
to how the two processes working in tandem support the mission of the Integrated Learning Environment (ILE).

- **Section Seven: Guidance for Navy ILE Assessments 1553-ISD-2**
  To provide guidance for designing, developing, and implementing assessments within the confines of the ILE.

- **Section Eight: Navy XML Specification v1.2**
  This document describes the format for content organization and packaging for delivery to the Navy's Learning Content Management Server. The organization of this document will present the final package with components and break each of those down into their appropriate details and definitions.

  **NOTE:** The Navy XML Specification is only required for content created outside of the Navy's LCMS to ensure unconstrained maximum reuse of content.

- **Section 9: Sample Statement of Work for Asynchronous Self-Paced Learning Content**

  - Appendix A - CDRL A00A/Training Systems Support Document
  - Appendix B - CDRL A001/Training Evaluation Document-Defeciency Report
  - Appendix C - CDRL A002/Management Plan-Integrated Management Plan (IMP)
  - Appendix D - CDRL A003/Inegrated Master Schedule (IMS)
  - Appendix E - CDRL A004/Instructional Performance Requirements Package (IPRP)-Learning Objective Statements
  - Appendix F - CDRL A005/Instructional Media Design Package (IMDP)-Instructional Media Design Stategy
  - Appendix G - CDRL A006/Instructional Media Package (IMP) - Scripts/Storyboards
  - Appendix H - CDRL A007/Instructional Media Package (IMP) - On-screen Lessons
  - Appendix I - CDRL A008/ Test Package - Learner Assessment Package
Navy Integrated Learning Environment

Content Design, Development, and Deployment Guidelines

Version 1.6

July 27, 2005
HOW TO USE THIS DOCUMENT

The document serves as the first step in understanding the Navy Guide to Content Design, Development and Deployment. The initial rules and guidelines listed in this document are a starting point in the process of developing the Navy Content Object Model (NCOM). This document will be used to develop Navy Integrated Learning Environment (ILE) content that adheres to both the Navy ILE vision and mission and Navy-SCORM.

The Navy Guide to Content Design, Development and Deployment is organized into 6 areas of interest. The following will provide the name and a summary of each area of interest.

- **Part One: Overview** - Describes the vision, mission, and goals of the NAVY ILE and the role that Navy-SCORM has within the Navy ILE. This document focuses on the application of Navy-SCORM for design, development, and deployment for the current and legacy ILE systems. Defines the concepts of interoperability, Reuse, Repurpose, and Reference (R3), and discusses the relationship between NCOM and the Advanced Distributed Learning (ADL) Shareable Content Object Reference Model (SCORM).

- **Part Two: Content Design** – Describes the process of organizing content, selecting instructional and assessment strategies, and determining a delivery platform. Instructional Designers (IDs) are referred to the SCORM, SCORM CAM, and SCORM Sequencing and Navigation documents for important information on designing for the Navy. The instructional strategy and design process is summarized, including aspects of learner assessment and feedback. The components and subcomponents of learning content are delineated and successful design principles are recommended.

- **Part Three: Content Development** - This section explains techniques to ensure that the design of any content is adhered to in the development process. The unique characteristics of Content Sequencing in SCORM are described. The concept of metadata is introduced and explained in some detail, along with a discussion of its importance to learning content.

- **Part Four: Content Deployment** - This section briefly covers the testing of content in the LMS through the ADL Test Suite. Good testing practices are mentioned as well as the list of deliverables to accompany each unit of content submitted to the Navy. Emphasis is placed on the Content Submission Form and the protocol for completing it accurately. For more information on the content deployment process please refer to the ILE Support Center, [https://ile-support.nko.navy.mil](https://ile-support.nko.navy.mil)

- **Part Five: References** - The reference list is provided to document resources used to compile information in this document. These references provide useful information for additional reading on a variety of related topics.
• **Part Six:** The appendices provide a glossary, additional detailed information and a variety of examples for use and reference.

★NOTE★
This document is an example of Reuse, Repurpose, and Reference (R3) in that it has repurposed Shareable Content Object Reference Model (SCORM 2004) sequencing content from the Learning Systems Architecture Lab at Carnegie Mellon University. Their work, except where otherwise noted, is licensed under the Creative Commons Attribution-NonCommercial-ShareAlike License.

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PART ONE - OVERVIEW

The following sections briefly describe the vision, mission, and goals of the NAVY Integrated Learning Environment (ILE) and the role that the Navy Content Object Model (NCOM) has within the Navy ILE. Additionally, the concepts of interoperability, reuse, repurpose, and reference (R3) are introduced. Finally, the relationship between Navy-SCORM and the Advance Distributed Learning (ADL) Shareable Content Object Reference Model (SCORM 2004) is discussed.

5.0 INTRODUCTION

5.1. Purpose Statement

The document serves as the first step in understanding Navy-SCORM for the development of Navy Integrated Learning Environment (ILE) content. The initial rules and guidelines listed in this document represent a starting point in the process of the Navy-SCORM development. The document will be used to develop Navy ILE content that adheres to both the Navy ILE vision and mission and Navy-SCORM.
5.2. Task Force EXCEL (TFE)

Task Force Excellence through Commitment to Education and Learning (EXCEL) (TFE) is creating major cultural changes by focusing Navy learning on fleet mission requirements through the use of human performance measures—providing Sailors with the “tools and opportunities” to grow and develop, both professionally and personally, while improving mission accomplishment.

The Four Quadrant Human Performance System Model (HPSM) is the underlying human performance process by which TFE and partners are redefining Navy policies, structures, and mechanisms. For more information on HPSM, go to http://www.excel.navy.mil/human.htm.

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

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

5.3. SeaWarrior

Sea Power 21 is the strategic vision for how the Navy will organize, integrate and transform to deal with the dynamic threats we face in today’s global environment. It reflects fundamental changes in the technology and tactics used to strike our enemies, in how we defend the fleet and the nation through control of the seas, and in the approach to how we deploy resources to support both our offensive and defensive capabilities. Sea Power 21 consists of three key components:

- Sea Strike – Projecting Precise and Persistent Offensive Power
- Sea Shield – Extending Global Defensive Assurance
- Sea Basing – Enhancing Joint Operational Independence

Sea Strike, Sea Shield, and Sea Basing will be enabled by ForceNet, an overarching effort to integrate warriors, sensors, networks, command and control, platforms, and weapons into an integrated and networked combat force from the seabed to space. ForceNet will be the Navy's plan to make network-centric warfare an operational reality. Essentially, it entails using information technology (particularly networked sensors and command and control systems) to improve real-time situational awareness, and enable warriors at all levels of the chain of command to make more informed decisions and therefore improve combat operations and increase force survivability.
Underlying Sea Power 21 is a Global Concept of Operations which governs how we will manage and deploy unprecedented combat power and war fighting capabilities. It determines the size and composition of the Fleet, based on the war fighting strategy. This Global Concept of Operations is supported by a triad of organizational processes:

- **Sea Warrior** – Putting the right Sailor with the right skills in the right job at the right time
- **Sea Trial** – Enabling innovation through rapid concept and technology development
- **Sea Enterprise** – Streamlining operations and retiring obsolete systems/platforms to free up resources for investment in the new infrastructure needed to transform the Navy

This triad comprises a blueprint for a dramatic and fundamental transformation of how the Navy performs some of its most basic mission-essential functions. Sea Warrior encompasses the full human resources lifecycle — from recruiting, to training and education, to staffing and career management, to how we leverage the investment made in a Sailor after they retire. Taken together, Sea Trial and Sea Enterprise address the full lifecycle of technology resources — from requirements gathering, to innovation and research & analysis, to prototype development, to acquisition, to how and when to sunset obsolete or redundant systems and platforms.

According to Admirals Harms, Hoewing, and Totushek:

*This is the goal of Sea Warrior: to integrate the Navy's manpower, personnel, and training organizations—active and reserve—into a single, efficient, information-rich human resource management system. Its focus is on growing individuals from the moment they walk into a recruiting office through their assignments as Master Chiefs or Flag Officers, using a career continuum of training and education that gives them the tools they need to operate in an increasingly demanding and dynamic environment. Through Sea Warrior, we will identify Sailors' precise capabilities and match them to well-articulated job requirements that far exceed the simplistic criteria used today. In addition, we will implement different types of incentives and flexible rotation dates and move the Navy toward a job-based compensation system.*

- U.S. Naval Institute Proceedings from June 2003

This solution provides the Sailor with access to a career-long training and education continuum and allows learners instant access to the tools to perform their jobs successfully.
5.3.1. **SkillObjects™**

In 2002, the Chief of Naval Operations (CNO) funded the Navy’s Workforce (INWF) project, an aggressive effort to develop a data rich, occupational analysis that would update the Navy Occupational Standards. The initial requirement was to capture and characterize the occupational work (jobs) for Navy enlisted personnel and develop a new occupational classification system. The SkillsNET Corporation process, suite of technology, and information rich data model was selected by Navy Leadership to underpin the occupational analysis effort. SkillsNET’s data model, the trade marked SkillObject™, brings a fidelity and structure to an otherwise incomplete and unstructured human resource data modeling.

The Navy has proven the utility of the SkillsNET approach and data model with its integrated data clusters of knowledge, skills, abilities, tasks and tools (KSATT) components of the SkillObject™. SkillObjects are used to develop a set of normative data ready for multiple uses in all types of other applications and other processes. The SkillsNET organizational structure of occupational data affords Naval Leadership a strategic view of work and adds a new dimension of currency to work descriptors. Refer to Appendix J for SkillsNET Taxonomies; Knowledge, Resources, and Skills and Abilities.

Subsequent CNO funding supported the effort to classify SkillObjects into skill standards that are used for numerous Navy functions, including manpower, recruiting, distribution, and training. More recently, CNO initiated the Sea Warrior Project that builds from the work-based standards to capture and provide Sailors with an environment whereby they can make decisions about career choices, follow-on duty assignments, and training.

5.3.1.1. **Level I – Occupational Job Task Analysis**

The Level I process generates two kinds of SkillObjects which relate to work being accomplished. These are Occupational and Organizational SkillObjects. Occupational SkillObjects are defined as work accomplished that is primary to a Navy occupation. The training for this work is usually accomplished through formal training as in schools or center classes.

Organizational SkillObjects are defined as work accomplished through “other duties as assigned” or collateral duties, work that is not considered official Navy occupation, these include watches.
5.3.1.2. Level II – Training and Requirements Analysis

The Level II process is a method which gathers information for training and the Integrated Learning Environment. The content data elements offer more granular/discrete descriptors of work requirements and performance statements. Level II data elements are anchored by subtasks, steps, specialty skills, special abilities, specific tools, specific knowledge, specific resources and performance standards.
5.4. Integrated Learning Environment

In December of 2002, NETC established the Integrated Learning Environment (ILE) as a mechanism for transforming legacy systems and business processes into a "system of systems" that would enable the changes needed to accomplish RiT (Revolution in Training) goals and provide the functions required to realize Sea Warrior. The stated ILE vision is, "Improve and support job performance and mission readiness by providing high quality learning and performance support available anytime and anywhere. Provide an environment to analyze, define, develop, document, and implement human performance and learning alternatives, acquire products, and provide life cycle support per the vision, goals, and objectives of the "Revolution in Training."

There is a range of key functional participants that will be operating in the Navy's Integrated Learning Environment:

- **Navy Learners** -

- **Navy “Users”** – people and organizations responsible for providing learning (e.g., educators, trainers, managers, personnelists, and operators) and receiving learning to improve readiness and performance;

- **Acquisition Interests** – those responsible for learning acquisition considerations, including government and private-sector interests having both managerial and technical responsibilities; and

- **Content and Tool Providers** – government and private-sector interests responsible for designing and developing learning content and tools (e.g., SCORM-conformant content, Learning Management Systems, Learning Content Management Systems, information technology architectures, etc.).

The Integrated Learning Environment, therefore, must have well-defined interfaces that allow people to interact, organizationally and technically, within the Navy, as well as with other audiences in the Department of Defense, Federal government, and the private sector. This will be especially important as technology-enabled, sharable, reusable content and tools become more ubiquitous, and as technology-enabled interactions between the learning, personnel, and operational communities become more commonplace.

The ILE is people, processes, and technologies. While the most obvious attributes are technologies, the ILE is conceived as a means to enable individual excellence through highly personalized interfaces to essential decision support and learning activities with supporting business rules. The ILE combines support tools for developing and distributing electronic course materials, and managing student and curriculum records, with standards for classifying content, formatting files, and interoperability among other systems. It provides five primary services to its users:
Design, develop, and display of individual learning plans derived from Sea Warrior validated organizational requirements
- Learning and performance support content design, development, display, and event data capture
- Learning consumption, ashore and afloat
- Performance assessments
- Business analytics for managing investments

The ILE will support a range of pedagogical and andragogical learning approaches to meet the diverse requirements of the Navy’s workforce. Learning and performance support materials will be provided in the most cost-effective manner to include a larger body of foundational simple serial learning media to a growing body of highly adaptive learner-sensitive content. The ILE will avoid lowest common denominator solution paths including geographically constrained, instructor-centric training as these will by definition address a limited subset of the required population. The Navy’s primary investment will be learner-centric, highly deployable content.

5.4.1. ILE Architecture

Multiple legacy systems will be used in the initial phases of ILE implementation. While these support legacy training methods, the transition to full functionality will avoid constraints imposed by these tools and associated business rules. Therefore, the Navy intends to build ILE using an Information Services Architecture (ISA) to allow maximum data interoperability and commonality across systems. The Integrated Learning Environment – Information Services Architecture (ILE-ISA) is the technological and procedural foundation of the RiT, which enables the CNO’s vision to become reality. ILE-ISA will comply with the Sea Warrior Enterprise Architecture conforming to DoD guidance and industry best practices that addresses technology, business processes, and organizational roles and responsibilities as one unified comprehensive architecture. As a key component of the Sea Warrior Enterprise Architecture, it encompasses the full set of integrated functions and specifications from networks, computing hardware, software applications, database design, standards-based interoperability methods and protocols, user-based use cases, and advanced information specifications. ILE-ISA provides the primary operational capabilities required for the RiT that can be enabled or supported by technology.
Figure 1.1: ILE-ISA layered architecture of the Navy training and education planned information infrastructure.

5.4.2. **My Course**

My Course is defined as the collection of learning content that is personalized for an individual Sailor and delivered within the context of My Learning Event. My Course content consists of Terminal Learning Objects (TLO) matched to the Terminal Objectives of an individual Sailor as determined by a skills gap analysis using SkillObjects. Each TLO is composed of the set of Enabling Learning Objects (ELO), which have been chosen and sequenced to enable the Sailor to meet a Terminal Objective. Training needs are based on a gap analysis via an algorithm. The gap analysis identifies all of the SkillObjects needed to satisfy a training requirement.

SkillObject data is linked to ELO(s) and TLO(s) via the Navy Learning Objective Statements (NLOS)
5.4.3. ILE Process

The overall objective of instructional design is to conduct a systematic planning process prior to the development of courseware. Instructional design is distinguished from other forms of instructional planning by the level of precision, care, and expertise that is employed in the process. Instructional design involves the consideration of many factors that may affect or be affected by the implementation of an instructional plan. At its most basic level, the instructional designer:

1. Identifies the goals of the instruction
2. Determines the instructional strategy and the medium
3. Determines how the course and instructional materials are evaluated

For a complete coverage of the process used refer to (SOP_ILE_ID_072205)
5.5. **Navy-SCORM**

5.5.1. **The SCORM and Navy-SCORM Relationship**

In order for the NCOM to accommodate sound ISD, learning theories, and R3, it must abide by specific Extensible Markup Language (XML) and data design rules. Technically, it is a data drill down that gives meaning to the Assets, Enabling Learning Object (ELOs), Terminal Learning Objects (TLOs) within the NCOM hierarchy. The data drill down hierarchy of the NCOM dictates that a:

- Learning Object Aggregation is the top-level grouping of related content containing TLOs and ELOs
- TLO is an aggregation of one or more ELOs
- ELO is an aggregation of one or more Assets
- Asset is a single media element or a single text element

The NCOM organizational structure is devised according to the requirements of XML and data systems logic. This logic is captured in the NCOM XML model and allows for the storage and retrieval of content data by Content Management Systems (CMS) and Learning Management Systems (LMS). The integrity of the NCOM content XML structures must be strictly maintained in order for the ILE to function.

The TLO is coded as an XML “container” element, as is an ELO. Container elements are formal, hierarchical designations devised for the sake of sound XML data design. The TLO and ELO elements hold no raw data. Only the Asset element holds raw data. Just as relational databases must follow strict rules of data design, so must the NCOM.

A SCO is a launchable object that includes the Computer Managed Instruction (CMI) tracking for launch and completion. An ELO shall be represented by a SCO.

A Sharable Content Object (SCO) is the basic building block for SCORM conformant courseware. A SCO is a collection of assets developed to provide the instructional requirements of a Learning Objective (TLOs and ELOs). The Navy has mapped a SCO to the Enabling Learning Objective, and in its absence, the Terminal Learning Objective.

Navy-SCORM builds on established SCORM principles and facilitates the implementation of SCORM 2004. Navy-SCORM is a SCORM -based standard that facilitates content organization and SCORM 2004 supported behaviors through advanced aggregations of content. These aggregations enhance R3 capabilities by defining required and recommended meta-data data values and strategies as supported by the SCORM 2004 CAM. By default, learning content delivered according to the -Navy-SCORM standard will be SCORM -conformant.

Content that has earned designation as "SCORM 2004 conformant" has been designed, developed, and validated according to the rules and regulations specific to ADL
SCORM. Therefore, it is incumbent upon content developers who intend to design and deliver content according to SCORM 2004 and the emerging Navy-SCORM specifications to gain a firm grasp of the fundamental principles and requirements set forth for SCORM conformant content within the ADL SCORM 2004 guidelines documentation.

While it is beyond the scope of this document to provide SCORM documentation for those who may not have such an understanding, these materials are available on the ADL SCORM Website, www.adlnet.org, and may be freely downloaded for review. For developers unfamiliar with SCORM 2004 content design, the study of SCORM documentation is strongly recommended in order to gain a working knowledge of the concepts and requirements of the NCOM model. We feel it is unlikely that an understanding of the NCOM model can be achieved without first acquiring at least a familiarity with the SCORM design and development guidelines serving as Navy-SCORM foundation.

5.5.2. Reuse, Repurpose, and Reference (R3)
The development of the NCOM was fueled by the need to efficiently and effectively R3 objects in order to create content for the Navy ILE. The following defines reuse, repurpose, and reference:

- **Reuse**—the use of an existing object in a new learning event without any modification to its instructional treatment, context, or content
- **Repurpose**—the use of an existing object in a new learning event with little to no modification to its instructional treatment, context, or content
- **Reference**—the use of an existing object(s) as an information source or resource for generating ideas for new learning events

Specifically, Navy-SCORM was devised to provide a data structure that would fulfill the following requirements:

- Interoperability to facilitate the R3 of content items across multiple communities
- Using and applying creative, sound, and effective Instructional Systems Design (ISD)
- The application of various learning theories to facilitate performance-based learning and measurable outcomes

Navy-SCORM fulfills these requirements by accommodating sound instructional designs and abiding by specific Extensible Markup Language (XML) and data design rules.

5.5.2.1. DoD and the Advanced Distributed Learning (ADL) SCORM
The Sharable Content Object Reference Model (SCORM) is part of a strategy called the Advanced Distributed Learning (ADL) initiative. The primary sponsors of the ADL initiative are the United States Department of Labor, Department of Defense (DoD), and
the National Guard Bureau. The White House Office of Science and Technology Policy established the ADL initiative in 1997 to standardize and modernize the way in which training and education are delivered. The ADL initiative and SCORM seek to maximize technology-based learning to generate substantial costs savings. Government, academia, and private industry from around the world support ADL and SCORM initiatives. SCORM promotes efforts in four areas: reusability, durability, accessibility, and interoperability (see Table 1.1: SCORM Concepts and Definitions).

Table 1.1: SCORM Concepts and Definitions

<table>
<thead>
<tr>
<th>SCORM Concept</th>
<th>Definition</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reusable</td>
<td>Content is reused in a new context without any modification to its</td>
<td>Content about the hydraulic mechanisms of a turbine engine can be used</td>
</tr>
<tr>
<td></td>
<td>instructional treatment, context, or content, and is able to &quot;stand-alone.&quot;</td>
<td>across communities of practice within the Navy as well as other DoD</td>
</tr>
<tr>
<td></td>
<td>It can be used across communities for many different learners.</td>
<td>entities.</td>
</tr>
<tr>
<td>Interoperable</td>
<td>Content will function in multiple applications, environments, and</td>
<td>Content developed in a development software tool for delivery in a LMS</td>
</tr>
<tr>
<td></td>
<td>hardware and software configurations regardless of the tools used to</td>
<td>will operate in any other SCORM-conformant LMS equally well.</td>
</tr>
<tr>
<td></td>
<td>create it and the platform on which it is delivered.</td>
<td></td>
</tr>
<tr>
<td>Durable</td>
<td>Content does not require modification to operate as software systems and</td>
<td>Purchasing a new revision of a development software tool or upgrading</td>
</tr>
<tr>
<td></td>
<td>platforms are changed or upgraded.</td>
<td>the existing development tools will have no impact on the delivery of</td>
</tr>
<tr>
<td>Accessible</td>
<td>Content can be identified and located when it is needed and as it is</td>
<td>content to the learner.</td>
</tr>
<tr>
<td></td>
<td>needed to meet training and education requirements.</td>
<td></td>
</tr>
</tbody>
</table>

5.5.3. Navy-SCORM and its Application to Learning Events

The ILE NCOM acknowledges the SCORM concepts and definitions in Table 1.1: SCORM Concepts and Definitions and achieves R3 within and across various communities of practice for the development of enabling objectives with the use of Enabling Learning Objects (ELOs) and Assets—which will be discussed in Section 2.0: The Navy Content Object Model Defined. This document specifically applies the NCOM to the training community for the design and development of ILE content.

5.5.4. Navy-SCORM Metadata

The purpose of meta-data is to provide a common nomenclature enabling learning resources to be described in a common way. Meta-data can be collected in catalogs, as
well as directly packaged with the learning resource it describes. Learning resources that are described with meta-data can be systematically searched for and retrieved for use and reuse. (ADL, 2004, p. CAM-4-4)

In order to catalogue and search for objects (i.e., Assets, ELOs, and TLOs) within the repository SCORM LOM XML metadata must be applied to these objects. XML Metadata can be defined as:

- Descriptive information about an object for “purposes of description, administration, legal requirements, technical functionality, use and usage, and preservation” (Getty). Metadata is designed to help locate, organize, access, and use objects effectively
- Navy-SCORM uses the SCORM/IMS Packaging and the IEEE 1484.12.1 Learning Object Metadata (LOM) specification as its content and configuration model. Figure 1.6: SCORM and NCOM Hierarchies depicts this relationship

<table>
<thead>
<tr>
<th>SCORM</th>
<th>NCOM</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Root Aggregation</td>
<td>- Learning Object Aggregation</td>
</tr>
<tr>
<td>- Aggregation</td>
<td>- Terminal Learning Object (TLO)</td>
</tr>
<tr>
<td>- Sharable Content Object (SCO)</td>
<td>- Enabling Learning Object (ELO)</td>
</tr>
<tr>
<td>- Asset (with metadata)</td>
<td>- Asset</td>
</tr>
</tbody>
</table>

Figure 1.6: SCORM and NCOM Hierarchies

SCORM/IMS Packaging and its LOM are a specific form of metadata. Within the SCORM/IMS Packaging model there are essentially two types of metadata documents:

1. Manifest document—The manifest document supplies the content references and organization of an amalgamation of content objects
2. Learning Object Metadata (LOM)—Supplies descriptive information concerning the nature and contents (assets) of specific learning objects

The SCORM notion of a learning object embraces individual media files as well as amalgamations of content into hierarchical structures. For more information, reference the SCORM/IMS Packaging specification.

Within the NCOM, metadata tags are required at the Asset, ELO, and TLO levels. Appendix C and the Navy ILE Content Metadata Guide for Development and Delivery provides Navy-SCORM metadata requirements that are specific to the Navy. All content that is created for the Navy ILE must be conformant with Navy-SCORM metadata requirements. Note: to achieve the goals of the ILE, the developer must work closely with the Instructional Designer (ID) to properly and consistently identify/label the tags, particularly those within the educational and classification categories.
5.5.5. Repository

A content repository is a data storage facility for content and content metadata. The Navy’s ILE NCOM is designed to harness the repository and R3 concepts and allows for the following:

- Reuse of objects contained within the repository
- Repurpose of objects contained within the repository (this can also include the use of raw data)
- Reference to objects contained within the repository
- Development of new objects created from raw data
- Reliable presentational rendering of content by a conformant LMS or LCMS according to the intentions of content designers and developers.

The upcoming DoD Instruction 1322.20 will provide much additional detail and requirements for repositories and registration and should be referred to for all such matters.

Similarly the evolving work from the CORDRA (Content Object Repositories Discovery and Resolution Architecture) will contribute much more in the future to these issues.

5.6. Navy Objective Statements

The following text and diagram is a direct excerpt from the introduction to the Navy Objective Statement specification which should be referenced for any additional information and as the authoritative source for Enabling and Terminal Objectives.

5.6.1. Learning Objectives

Learning objectives serve as the link to SkillObjects™ and related work elements; Enterprise Competencies (competencies that show the linkage between DoD and Navy mission-essential competencies); and content. As the Navy moves forward with its commitment to the ILE as the learning platform for SeaWarrior, there is an identified need to develop a common language or data model to capture, store, share, and reuse learning objectives which may then be assembled into learning objective statements (LOS) to support content-specific learning objects. Learning objective statements will be formulated utilizing SkillObjects™ taxonomy as the foundation for defining job/position requirements for position skills, unique knowledge, tools, resources, and abilities to represent the full spectrum of work proficiency required.

The data model includes structure, syntax, and semantics of the learning objective. This effort of statement specificity affords the opportunity to house learning objectives in repositories. Learning objectives (verb and object) stand alone. Learning objective statements (behavior, condition, and standard) are set in the context of the learning event and the content. See Figure 1.

![Figure 1.6 Assembling a Learning Event beginning with the learning objective](image-url)
Learning objective statements act as the triggers or catalysts for the assembly and aggregation of content assets to form Terminal and Enabling Learning Objects. These objects may then be logically connected to enterprise competencies structured from SkillObjects™ work elements are aggregates of required unique knowledges, skills, tools, abilities and resources.

Instructional designers use learning objectives statements as the cornerstone to designing content or curriculum. Traditionally, learning objective statements are used to:

- Offer a means to designers to select and organize activities and resources associated with the learning process;
- Provide a means by which assessment can measure a learner’s performance or evaluate a program’s worth;
- Identify the skills and knowledge that must be mastered in the learning event (Morrison, Ross, & Kemp, 2004).
- Serve as anchor points in sustaining proper alignment between competency gaps, TO/EO selection, content assembly, sequencing, delivery methodology and medium, student assessment, and program evaluation.

With the advent of learning content management systems and the SCORM specifications, designers now have the opportunity to search repositories and reuse learning objectives and content. Carefully crafted learning objectives comprised of discrete and precise components aligned to SkillObjects™ and related work elements are critical to content or curriculum design and development in the future for reasons as follows:

- Reduce costs associated with development and maintenance efforts
- Ensure the building of relevant content in the present systems
- Serve as the cornerstone in prescriptive learning events in future systems
- Identify measurable attributes for successful performance
- Align content to mission-specific requirements

### 5.6.2. Terminal Objectives

A terminal objective is a major objective for a topic or task and it describes the overall learning outcome.

For example:

Topic: Isolate the fault

Terminal objective: Isolate the fault in the high frequency radio system.

Terminal objective statement: Given a damaged high frequency radio system, the technician will isolate the fault within 30 minutes.
5.6.3. Enabling Objectives

An enabling objective supports a terminal objective. It is written at a lower level (category) of knowledge than the terminal. It generally describes specific behaviors (single activities) that must be learned or performed.

To continue the example above:
Terminal objective: Isolate the fault in the high frequency radio system.
Enabling objective: Trace the electrical flow of transistors in a radio unit.

5.7. The Navy Content Object Model Defined (NCOM)

Technically, the NCOM is a data drill down that gives meaning to the Learning Object Aggregation (LOA), Terminal Learning Object (TLO), Enabling Learning Object (ELO), and the Asset that make up the NCOM hierarchy (see Figure 1.6). The NCOM seamlessly correlates to the SCORM. The NCOM’s hierarchical objects are defined as:

- **Learning Object Aggregation** - top level grouping of related content; the TLO is also called the organization that contains TLOs and ELOs
  - **Terminal Learning Object (TLO)** — an aggregation of 1 or more or ELOs, it satisfies one terminal objective and correlates to a SCORM aggregation
  - **Enabling Learning Object (ELO)** — an aggregation of 1 or more Assets, it satisfies one enabling objective and correlates to SCORM SCO
  - **Asset** — the base building block of TLOs, it is either a representation of text or a media element (e.g., web file, assessment object, video, and other data elements)

![Diagram of NCOM hierarchy](image)

*Figure 1.7: SCORM Hierarchy compared to the NCOM Hierarchy and SkillsNET SkillObjects*
It is important to understand the one to one relationship between SCORM and NCOM. A SCO (ELO), an aggregation (TLO), or a Learning Object Aggregation could represent any number of “traditional” instructional design components such as lessons, modules, units, segments, or courses (Carnegie Mellon University, 2003). In Figure 1.7 the red boxes represent the Learning Object Aggregation which correlates to SCORM root aggregations—these are the highest levels of groupings. The green boxes represent TLOs, which correlate to SCORM aggregations—these are the lower level groupings. The yellow boxes represent an ELO, which correlate to a SCO within SCORM. The turquoise boxes represent the combination of one or more Assets contained within an ELO (SCO).

Figure 1.8: NCOM TLOs
Repurposed with permission: Copyright 2003, Carnegie Mellon University
The following sections will discuss the NCOM, beginning with the smallest unit, the Asset, to the largest unit, the TLO.
5.8. Asset

Within and across communities of practice, the Asset is defined as any digital resource that can be repetitively used across different environments, for different purposes, having different end users (McGee 2003; Wiley, 2002). In general, the Asset enables reuse of data within and across communities of practice.

Within the NCOM, the Asset (see Fig. 1.9 Asset) is the object that has the most reuse potential across applications and across communities of practice. These applications can be for instructional purposes (i.e., as presented in the NCOM) or for technical publication, simulation, electronic support systems, or other information dissemination purposes.

Figure 1.9: Assets

An Asset (see Figure 1.9: Assets) is the smallest unit within the NCOM. An Asset:

- Is any media type—text, graphic, sound, animation, video, web page, assessment object, or other data piece that can be delivered to a web client
- Is the base building block of TLOs (e.g., content, technical publications, instructor/student guides, etc.)
- Has reuse potential in many applications across various communities of practice
- Requires metadata
- Appears within an ELO

In order for a single Asset to be reused, repurposed, or referenced (R3), it must have metadata so that it can be searched and found. Assets assigned with metadata descriptions have greater R3 potential as they may be returned as distinct, individual
items by a specific search. Within the NCOM, all Assets that are non-gratuitous media type files—text, graphics, images, sounds, animation, video, etc. require metadata.

5.9. Enabling Learning Object (ELO)

For the Navy ILE an ELO is designated as the level of the SCO and as such it is the smallest piece of instruction delivered and tracked by an LMS—it is inherently instructional (see Figure 1.10: Enabling Learning Objects (ELOs)). An ELO is a collection of Assets that include instructional treatment and are designed to present learning activities that meet a single Navy Enabling Objective.

An ELO:
- Is a collection of one or more Assets
- Represents an independent piece of instruction
- Satisfies a single enabling objective (see details in the Navy Objective Statement specification)
- Cannot directly access another ELO—cannot contain links to another ELO
- Has reuse potential across applications within the training community

Figure 1.10 Enabling Learning Objects (ELOs)

Figure 1.10 Enabling Learning Object (ELO) depicts ELOs as lessons. However, ELOs can be used to depict various instructional components. The ways that ELOs are used will depend upon the way the instruction and learner navigation is designed and structured as well as how the learner is tracked.
Within the NCOM, an ELO is an independent stand-alone unit of instruction that satisfies one enabling objective. Since the NCOM facilitates R3 and adheres to the SCORM standard, an ELO must be small enough to accommodate R3, address a single enabling objective, and contain all of the related materials to support its enabling objective.

5.10. Terminal Learning Object (TLO)

A TLO is based on the research about Learning Objects. Within the instructional design community at large, a Learning Object is defined as:

Any digital resource that can be reused to support learning. The term "learning objects" generally applies to educational materials designed and created in small chunks for the purpose of maximizing the number of learning situations in which the resource can be utilized. (Wiley, 2002, p.1)

Figure 1.11: Terminal Learning Object (TLO)

A TLO:

- Is used to aggregate ELOs—this is simply a TLO
- Satisfies a single terminal objective
- Has reuse potential across applications within the training community
5.11. Learning Object Aggregation

Within the NCOM a Learning Object Aggregation allows for the aggregation of ELOs and TLOs to build a specific learning event most commonly referred within the Navy ILE context as “My Learning Event” (see Figure 1.12 Learning Object Aggregation). Navy-SCORM adapts the Carnegie Mellon (2003) definition of an aggregation to describe aggregations within the NCOM.

An aggregation is a parent and its children in a tree structure. Aggregations are used to group related content (i.e., Assets, ELOs, and TLOs) so that it can be delivered to the learner in the manner prescribed by the instructional design. SCORM sequencing rules allow you to prescribe the behaviors and functionality of the content (ELO) within the aggregation (TLO) as well as how the aggregation (TLO) relates to other aggregations (TLOs) within the same root aggregation (Learning Object Aggregation).

A Learning Object Aggregation is the top-level grouping of related content; the Learning Object Aggregation is also called the organization. It is used as the highest level of aggregation – this is the Learning Object Aggregation.

![Figure 1.12: Learning Object Aggregation](image)

Within the ILE, a Learning Object Aggregation is any learning opportunity—formal or informal—that has a specific intended learning outcome. It is translated in the NCOM as an aggregated unit of instruction that fulfills either an enabling or a terminal objective. In Figure 1.12 Learning Object Aggregation, the red box depicts the Learning Object Aggregation (root aggregation) that fulfills a terminal objective of the entire learning event. The green box depicts a TLO (aggregation) that fulfills a terminal objective for the lower level learning event. Each yellow box is an ELO that fulfills a single enabling objective or serves as an assessment.
5.12. **Summary**

- The Integrated Learning Environment (ILE) was established by NETC to support the changes needed to accomplish the Revolution in Training goals and provide the necessary functions to accomplish SeaWarrior.
- NCOM provides guidance on how to effectively reuse, repurpose, or reference (R3) content.
- The NCOM hierarchy consists of Learning Activities, which contain Terminal Learning Objects (TLOs), which contain Enabling Learning Objects (ELOs), which contain assets.
- An ELO equates to a Shareable Content Object (SCO) as defined in SCORM. A SCO is a launchable object and must include computer managed instruction (CMI) tracking for launch and completion.
- A TLO satisfies a single terminal objective.
- An ELO satisfies a single enabling objective.

The Navy Integrated Learning Environment is a groundbreaking initiative that promises to revolutionize how the Navy provides education, training and performance support. It is the flagship of the learning technology fleet.

It is also an integrating mechanism that will make it possible to move tailored learning across the personnel and learning domains – anytime and anywhere -- in order to improve individual and mission readiness and performance. In that regard, it is a critical enabler for several of the Navy’s priority transformation initiatives, like Sea Warrior and Sea Power 21.

Many of the pieces – technologies, organizational structures, and operating procedures – have been developed, and some have been put into operation. A few must still be developed. Putting the remaining pieces in place will allow the Navy to test and assess the capabilities and effectiveness of its Integrated Learning Environment.
PART TWO - CONTENT DESIGN

The following section: Content Design focuses on the application of NCOM for designing learning activities. Optimizing the benefits of Navy-SCORM to design effective instructional materials requires that designers and developers work closely together throughout the process. Such collaborative efforts can ensure that the development of ILE content adheres to Navy-SCORM guidelines and will function within the Navy ILE.

6.0 DESIGNING CONTENT FOR THE ILE

Understanding Navy-SCORM is only the first step in designing content acceptable for meeting the Navy ILE’s vision, mission, and goals. Understanding the science of learning sufficiently to design effective learner-centric instruction is also required. Most important is acknowledging that Instructional Designers (IDs) must depart from old models that focused almost exclusively on information display, chunking, and sequencing. It is imperative that IDs employ models that use a combination of learning principles having the intent to very specifically lead the learner to the desired operational environment performance. The following sections present designer qualifications, various principles that IDs will consider in their design, and the major steps in preparation for development of ILE materials.
6.1. Designer / Developer Qualifications to Develop ILE NCOM Content

Note that the human performance parameters and goals mentioned as central to the Navy’s Revolution in Training are equally applicable to those developing learning. The majority of the labor categories required for development of learning activities are not essentially changed from those required in previous content development efforts except for the application of the following additional requirements:

- SCORM 2004
- Americans with Disabilities Act, Section 508
- Navy-SCORM

6.2. SCORM 2004 Reference Documents:

The following is a list of SCORM 2004 reference documents with a brief description of their contents:

**Sharable Content Object Reference Model (SCORM) 2004 2nd Edition Addendum**

The SCORM 2004 2nd Edition Addendum documents all of the ADL Community reported issues with the SCORM 2004 2nd Edition. The document also captures the corrections needed to address these reported issues. Corrections, changes and clarifications found in this document should immediately be reviewed and implemented by the ADL Community. The information in this addendum supersedes referenced information in the SCORM 2004 2nd Edition document suite.

**Sharable Content Object Reference Model (SCORM) 2004 2nd Edition Overview**

The SCORM 2004 Overview book covers the history and objectives of the ADL Initiative and SCORM, including the specifications and standards from which SCORM borrows. It also describes how the various SCORM books are related to one another.

**Sharable Content Object Reference Model (SCORM) Content Aggregation Model (CAM) Version1.3.1**

The SCORM Content Aggregation Model (CAM) book describes components used in a learning experience, how to package those components for exchange from system to system, how to describe those components to enable search and discovery, and how to define the sequencing rules for the components.

**Sharable Content Object Reference Model (SCORM) Run-Time Environment (RTE) Version 1.3.1**
The SCORM RTE book describes the Learning Management System (LMS) requirements for managing the run-time environment (i.e., content launch process, communication between content and LMSs and standardized data model elements used for passing information about the learner). The RTE covers the requirements of SCOs and their use of the API and the SCORM Run-Time Environment Data Model.

**Sharable Content Object Reference Model (SCORM) Sequencing and Navigation (SN) Version 1.3.1**
The SCORM SN book describes how SCORM conformant content may be sequenced through a set of learner-initiated or system-initiated navigation events. The branching and flow of that content may be described by a predefined set of activities, typically defined at design time. The SCORM SN book also describes how a SCORM conformant LMS interprets the sequencing rules expressed by a content developer along with the set of learner-initiated or system-initiated navigation events and their effects on the run-time environment.

**Sharable Content Object Reference Model (SCORM) 2004 2nd Edition Document Suite**

**Shareable Conference Object Reference Model 2004 Conformance Requirements (CV) v1.1**
SCORM 2004 contains a great deal of technical information for a variety of audiences, but product vendors need to know which specific information is critical to making their learning products SCORM 2004 conformant. The ADL Technical Team has collected and structured that information in a concise format that product vendors can reference in the creation of their products. This document provides a detailed listing of the SCORM conformance requirements as defined in the Sharable Content Object Reference Model (SCORM®). Learning Management Systems (LMSs), Sharable Content Objects (SCOs), Meta-data and/or Content Packages must adhere to these requirements to be recognized as SCORM 2004 conformant. To achieve a conformance label all conformance requirements for the associated product must be met. This document is technical by nature and is meant for LMS Vendors, Content Providers, Meta-data Creators and Content Package Creators.

**SCORM Version 1.2 To SCORM 2004 Changes Document**
This document provides a high-level summary of the key differences between SCORM Version 1.2 and SCORM 2004. This document is not an exhaustive listing of all SCORM Version 1.2 to SCORM 2004 changes, but rather a guide to be used with the SCORM 2004 documentation suite to allow SCORM implementers to understand the changes from SCORM Version 1.2 to SCORM
2004 more easily and to determine what changes are needed to SCORM Version 1.2 products to migrate them from SCORM Version 1.2 to SCORM 2004 conformance. Note: This document does not address changes between the SCORM 2004 and the SCORM 2004 2nd Edition. For detailed treatment of these changes, refer to the Revision History appendix in each book of the SCORM 2004 2nd Edition.

6.3. What Designers Should Know About the SCORM RTE

The programmatic nuts-and-bolts of the SCORM RTE may be of little use or interest to most IDs. However, knowledge of the prescribed methods for the aggregation and configuration of content as SCOs (i.e., ELOs within the Navy model) to satisfy the technical requirements of the SCORM RTE is critical to achieving both SCORM compliance and effective instruction within SCORM boundaries.

6.4. What Designers Should Know About the SCORM CAM

The SCORM CAM is the heart and soul of all SCORM issues. It defines the how-to and why of SCO organizations (i.e., ELO organizations in the Navy model). Without this knowledge, it is virtually impossible to manage content design in accordance with SCORM requirements. IDs do not need to know the extensive catalog of possible XML attributes within the LOM specification, there are, however, certain required metadata elements and data values that must be applied as prescribed in order to achieve compliance within the SCORM and the Navy specifications.

6.5. What Designers Should Know About SCORM Sequencing and Navigation

The SCORM Sequencing and Navigation (SN) book (ADL, 2004) describes how SCORM-conformant content may be sequenced to the learner through a set of learner or system-initiated navigation events. The branching and flow of that content may be described by a predefined set of learning activities. The SCORM SN book describes how sequencing information can be applied to define various sequencing strategies; how sequencing information is interpreted at run-time to make sequencing evaluations; and how navigation requests, triggered through a learner’s interactions with content objects, are processed to identify the next content object for delivery (launch).

It is not necessary for IDs to know how sequencing information is interpreted at run-time to make sequencing evaluations, but it is necessary for IDs to understand the rules regarding SCORM sequencing and navigation so that their instructional organization, structure, and navigation is SCORM conformant and will work in a SCORM environment.
6.6. **Analysis**

All good designs begin with a quality analysis. Contracted IDs and developers of ILE content will be supplied this information by the government in the form of GFI/M (government furnished information/material).

The Navy will conduct analyses, which involve occupational and human performance analyses to identify the tasks, knowledge, skills, abilities, tools, subtasks, conditions, equipment, performance standards, and instructional learning objectives related to a specific job. In addition, the analysis data will include other essential information for the ID to fully understand the performance requirements of the learner.

**Level I Data Available:**
- SkillObject
- Tasks
- Unique Knowledge
- Abilities
- Tools
- Skills
- Resources

**Level II Data Available:**
- All data in Level I
- Terminal Learning Objectives
- Enabling Objectives
- Learning Object Aggregation
- Performance Standards

With this information in hand, the design phase can begin.
Figure 2.1  SkillObject Content - Level I and II Data
6.7. Instructional Design

Before the first Asset is developed, ELOs identified, and TLOs aggregated the instructional strategy(s) must be identified and the instructional design must be completed. The inputs from the analysis are considered in conjunction with instructional design theories to formulate the most effective and efficient instructional strategy and design.

One of the greatest impacts to your instructional strategy and design will be sequencing, discussed in Appendix F. Once you determine what type of instructional and assessment strategies you will employ in your design, you should consult with a developer/programmer immediately to decide if and how you can implement them using sequencing.

6.7.1. Instructional Design within Navy-SCORM

This document is not designed to teach learning theory or instructional design to the novice. However, we have provided a brief overview and examples of instructional design theories and approaches in Appendix E. This reference is not meant to be a step-by-step guide for designing effective instruction. The examples of instructional theory and approaches provided here are only samples of what can be found in the literature (see Jonassen, 2004 and Reigeluth, 1999). Their inclusion in this document is not meant to imply that instructional designs must be based on one of these theories. It is hoped that this description of sample theories will enable the ID to recognize the importance of basing a design on an instructional design theory or theories, consider the many possibilities at their disposal, recognize that each theory implies certain activities and approaches to instructional design, and that alone, or in combination, these theories can lead to learner-centered designs. The ID must be purposeful in their instructional design and have a theory on which to base decisions makes the design defendable.

Navy-SCORM was designed to accommodate any instructional design theory for the construction of terminal learning objects, while also taking into consideration the constraints dictated by the current technical standards. This approach is the key to a reusable terminal learning object strategy that is not only instructionally sound; but also provides a return on investment that is expected of such a model.

The definition of learning is no longer limited to a change in behavior as was thought for many years. Research in the psychological sciences has given rise to cognitive learning theory. The definition of learning has expanded to include a change in the learners knowledge structures (Woolfolk, 1998). Learning requires the learner to “actively construct new knowledge by integrating data from the environment with existing knowledge in long-term memory. Instructional methods must support this process” (Clark, 2002, pg. 14). We cannot simply present learners with information and expect them to learn. IDs must uphold the core goals central to the ILE and build in instructional strategies that engage learners.
in processing information to help them transfer it to performance on the job. This is essential to the goals of the Navy’s ILE.

Unlike many learning object construction documents, templates for combining learning objects will not be provided in this document because the instructional design drives the instructional solution and templates can be created by the developer as necessary. However, sound guidelines, best practices, and examples are provided to ensure development consistency and promote reusability of objects.

6.7.2. Learning Objectives

Instructional designers use learning objectives statements as the cornerstone to designing content or curriculum. Traditionally, learning objectives statements are used to:

- Offer a means to designers to select and organize activities and resources associated with the learning process;
- Provide a means by which assessment can measure a learner’s performance or evaluate a program’s worth;
- Identify for the learner the skills and knowledge that must be mastered in the learning event (Morrison, Ross, & Kemp, 2004).

A Learning Objective is a formal description of what a trainee should be able to do after training is completed. Therefore, a set of well-defined learning objectives serves as a road map for training designers and instructors who have to decide what is to be taught in the training program.

Robert Mager (1962) was first to describe a learning objective [statement] as a three-component verbal statement. The three components are a description of the:

- behavior or action that will demonstrate or evidence learning
- conditions of demonstration of that action
- standard that will be applied to measure successful completion

These three components are identified in the remainder of this document as behavior, condition, and standard respectively.

Learning objectives are then categorized into five outcome groups, which include: cognitive, motor, verbal, social, and affective/attitudinal.

More information regarding how to develop learning objectives can be found in NLOS Specification document.

6.7.3. Learning Activities

Learning activities are selected based on the learning objectives and their intent based on job performance requirements. Identifying the appropriate learning activities requires many considerations including job information requirements,
cognitive skill requirements, performance, and learner characteristics. The final instructional design is likely to be a blending of strategies and methods to accomplish the performance goals. Using the Navy Learning Objective Statements provided the instructional designer will identify the four major areas of training development:

- **The extensiveness of training required**: The depth and time spent instructing the trainees on job relevant knowledge, skills, abilities, tasks, and tools. In low extensiveness training, a relatively simple depth of knowledge is needed to do the job. In high extensiveness training, a fairly complex breadth of knowledge is needed to do the job.

- **The nature of training transfer needed**: The need for simple, adaptable acquisition of training. In simple acquisition, the application of what is learned in training on the job is exact or requires little adaptation. In adaptable acquisition, the application of what is trained on the job must be flexible and adaptable to changing environments.

- **The site or location of training**: The location where employee training will occur. Major areas of training sites include on-site and off-site training. On-site is training that is done on the same location as the job. Off-site training is conducted away from the job location.

- **Difficulty to learn the tasks within the training program**: The difficulty to learn the tasks, tools, unique knowledge, and skills of the learning objective. A high difficulty to learn means that the tasks, tools, unique knowledge, and skills are more difficult to learn. A low difficulty to learn means that the tasks, tools, unique knowledge, and skills are fairly easy to learn.

As a result, the four major areas of training development will then determine the appropriate training recommendations. The recommendations will include the following areas:

- **Method**: Specific instructional techniques involved in training employees on job relevant unique knowledge, skills, and tasks. An example might be on-the-job training or classroom instruction.

- **Time and structure of practice**: The amount of time needed for training. This includes the amount of hours needed for training as well as whether training should be massed or blocked.

- **Meaningfulness**: The degree of purposefulness built into the system for the trainee. This is meant to make sure that the trainee understands why training is important to them. An example includes the need for contextual examples.

- **Hands-On practice**: The amount of hands-on practice that is necessary for training.

- **Vicarious learning**: The degree of and type of demonstrations necessary for training. Examples might include live or computer demonstrations.
- **Nature of feedback / Trainer to trainee ratio**: The type and degree of feedback that is necessary for the trainer to give the trainee and the number of trainees verses the number of trainers recommended

Utilizing the Learning Activities Matrix (Figure 2.2), developed by SkillsNET, will complete this step.

Hence, for; “with high extensiveness”, “off site”, “difficult to learn”, “with simple transfer”, the recommendations would be the following:

- **Method**: Simulator, simulation, or computer adaptive instruction. Refer to Appendix J for SkillsNET Taxonomies; Knowledge, Resources, and Skills and Abilities.
- **Time and Structure of Practice**: Participants should have distributed, constant, blocked, for weeks to months
- **Hands-on Practice**: High
- **Meaningfulness**: Provide many contextual examples
- **Vicarious Learning**: Provide a combination of video and live demonstrations
- **Nature of Feedback and Trainee to Trainer Ratio**: Some pre-training, no or little post training, immediate feedback from SME, moderate ratio, some singling out
- **Learning Activities**: Lecture, Developmental Organizers, Skill-Practice Exercises, Scenarios, Guided Practice, Game, Demonstration with Return Demonstration, Tests, Reflective Practice, Computer-based Learning, Trial and Error Practice, Video Game Simulations, Action Simulations
### Figure 2.2: Learning Activities Matrix

<table>
<thead>
<tr>
<th>Extensiveness</th>
<th>Site</th>
<th>Transfer</th>
<th>Difficulty to Learn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low&lt;br&gt;- Classroom&lt;br&gt;- Computer Based Instruction&lt;br&gt;- Self-directed Learning&lt;br&gt;- Readiness Preparation&lt;br&gt;- Behavioral Modeling</td>
<td>Off&lt;br&gt;- Action Learning&lt;br&gt;- Mentoring&lt;br&gt;- Job Rotation&lt;br&gt;- Coaching&lt;br&gt;- Apprentice Systems&lt;br&gt;- Embedded Training</td>
<td>Off&lt;br&gt;- Pre Training&lt;br&gt;- Post Training&lt;br&gt;- Funneling Examples&lt;br&gt;- Build Interest&lt;br&gt;- Motivational&lt;br&gt;- Immediate Need for Performance&lt;br&gt;- Build Interest&lt;br&gt;- Need for extra Motivation</td>
<td>Easy&lt;br&gt;- No need for Individualized Feedback&lt;br&gt;- Immediate Training&lt;br&gt;- Moderate ratio&lt;br&gt;- Some Individualized Feedback&lt;br&gt;- Immediate&lt;br&gt;- SME&lt;br&gt;- Moderate ratio&lt;br&gt;- Some Individualized Feedback&lt;br&gt;- Immediate&lt;br&gt;- SME&lt;br&gt;- High ratio&lt;br&gt;- A lot of Individualized Feedback</td>
</tr>
<tr>
<td>High&lt;br&gt;- Simulator&lt;br&gt;- Simulation&lt;br&gt;- Computer Adaptive Instruction&lt;br&gt;- Readiness Preparation</td>
<td>On&lt;br&gt;- Distributed Learning&lt;br&gt;- Constant&lt;br&gt;- Blocked&lt;br&gt;- Wks/Months</td>
<td>On&lt;br&gt;- Post Training&lt;br&gt;- Funneling Examples&lt;br&gt;- Underlying Connections&lt;br&gt;- Mental Models&lt;br&gt;- Immediate&lt;br&gt;- SME&lt;br&gt;- Moderate ratio&lt;br&gt;- Some Individualized Feedback&lt;br&gt;- Immediate&lt;br&gt;- SME&lt;br&gt;- Moderate ratio&lt;br&gt;- Some Individualized Feedback&lt;br&gt;- Immediate&lt;br&gt;- SME&lt;br&gt;- High ratio&lt;br&gt;- A lot of Individualized Feedback</td>
<td>Moderate&lt;br&gt;- No need for Individualized Feedback&lt;br&gt;- Immediate Training&lt;br&gt;- Moderate ratio&lt;br&gt;- Some Individualized Feedback&lt;br&gt;- Immediate&lt;br&gt;- SME&lt;br&gt;- Moderate ratio&lt;br&gt;- Some Individualized Feedback&lt;br&gt;- Immediate&lt;br&gt;- SME&lt;br&gt;- High ratio&lt;br&gt;- A lot of Individualized Feedback</td>
</tr>
<tr>
<td>Simple&lt;br&gt;- Massed&lt;br&gt;- Constant&lt;br&gt;- Blocked&lt;br&gt;- Wks/Days</td>
<td>Adaptable&lt;br&gt;- Distributed Learning&lt;br&gt;- Variable&lt;br&gt;- Random&lt;br&gt;- Wks/Months</td>
<td>Adaptable&lt;br&gt;- Underlying Connections&lt;br&gt;- Mental Models&lt;br&gt;- Immediate&lt;br&gt;- SME&lt;br&gt;- Moderate ratio&lt;br&gt;- Some Individualized Feedback&lt;br&gt;- Immediate&lt;br&gt;- SME&lt;br&gt;- Moderate ratio&lt;br&gt;- Some Individualized Feedback&lt;br&gt;- Immediate&lt;br&gt;- SME&lt;br&gt;- High ratio&lt;br&gt;- A lot of Individualized Feedback</td>
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</tr>
<tr>
<td>Difficult&lt;br&gt;- None-little&lt;br&gt;- Moderate</td>
<td>Easy&lt;br&gt;- None-single&lt;br&gt;- Video or Live</td>
<td>Difficult&lt;br&gt;- Multiple&lt;br&gt;- Combo of video and live&lt;br&gt;- Strong Need for Post Training Evaluation</td>
<td>High&lt;br&gt;- No need for Individualized Feedback&lt;br&gt;- Immediate Training&lt;br&gt;- Moderate ratio&lt;br&gt;- Some Individualized Feedback&lt;br&gt;- Immediate&lt;br&gt;- SME&lt;br&gt;- High ratio&lt;br&gt;- A lot of Individualized Feedback&lt;br&gt;- Immediate&lt;br&gt;- SME&lt;br&gt;- High ratio&lt;br&gt;- A lot of Individualized Feedback</td>
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</tr>
<tr>
<td>Difficulty to Learn</td>
<td>Handson practice</td>
<td>Vicarious Learning</td>
<td>Nature of Feedback to Train ratio</td>
</tr>
<tr>
<td>Easy&lt;br&gt;- None-little&lt;br&gt;- Moderate</td>
<td>Easy&lt;br&gt;- Single&lt;br&gt;- Live</td>
<td>Easy&lt;br&gt;- Immediate&lt;br&gt;- Delayed&lt;br&gt;- Computer or video&lt;br&gt;- Moderate ratio&lt;br&gt;- Some Individualized Feedback&lt;br&gt;- Immediate&lt;br&gt;- SME&lt;br&gt;- Moderate ratio&lt;br&gt;- Some Individualized Feedback&lt;br&gt;- Immediate&lt;br&gt;- SME&lt;br&gt;- High ratio&lt;br&gt;- A lot of Individualized Feedback</td>
<td>Easy&lt;br&gt;- Immediate&lt;br&gt;- Delayed&lt;br&gt;- Computer or video&lt;br&gt;- Moderate ratio&lt;br&gt;- Some Individualized Feedback&lt;br&gt;- Immediate&lt;br&gt;- SME&lt;br&gt;- Moderate ratio&lt;br&gt;- Some Individualized Feedback&lt;br&gt;- Immediate&lt;br&gt;- SME&lt;br&gt;- High ratio&lt;br&gt;- A lot of Individualized Feedback</td>
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</tr>
</tbody>
</table>
6.8. **Content Organization and ELO Design within Navy-SCORM**

The following section will describe what to include for selection of instructional, assessment, and remediation strategies.

**6.8.1. **Navy-SCORM Content and Instructional Integrity**

This section is designed to demonstrate a process for creating ELOs and identifying TLOs. The tips and techniques explained in this section will facilitate your understanding of how to develop conformant content.

To ensure the instructional integrity of Navy-SCORM content make each ELO is a stand-alone instructional unit. Navy-SCORM requires that ELOs be developed as topics addressing a single enabling learning objective. As such, ELOs are intended to be inherently small to facilitate reuse by persons other than the original developer. A well developed ELO should contain all of the materials and resources required for the Sailor to successfully meet the criteria and standards defined by the Enabling Objective.

If ELOs are limited to a single, well-written enabling objective (as defined by the NLOS specification), then it is easier to make more of them context-neutral. Where context-specific instruction is required, such as for introductions, conclusions, and transitions, you can create context-specific objectives such as: “Differentiate between your roles and responsibilities as a workplace trainer and as an apprentice trainer in the Instructor Delivery Continuum (IDC).” Although, some of the content will be context-specific to the IDC, most of the content regarding roles and responsibilities of a workplace and apprentice trainer can still remain context-neutral, which will increase its R3 potential.

**6.8.1.1. Assets, ELOs, and Reusability**

Reusability can and should occur at all levels of NCOM, from Assets to ELOs to TLOs. The amount of reuse potential in each of those items varies. The most reusable components will usually be Assets, because they have the highest level of context independence.

A well-designed ELO should serve numerous audiences in achieving multiple outcomes, across many contexts, making it ideal for courses and uses in addition to the ones for which it was originally designed. They are not only reusable in more contexts than a traditional course, but are also easier to maintain and update, as content requires changes or customization. Since the ELO is stored in an LCMS and delivered via an LMS, it can also be configured in many different ways to meet many different needs.

This ability to reuse ELOs for many different purposes can generate significant time and cost savings and allow the Navy to better respond to its training needs. When you discover an education or training need, you can search the LCMS for
existing instructional materials. You can then retrieve content created by different entities and configure or sequence the content to meet your learners' specific training needs. This “custom” course can then be delivered by a SCORM-conformant learning management system when it is needed ("just-in-time training") without waiting for weeks or months of development.

As discussed previously, you can reuse any number of NCOM or SCORM components, from Assets to ELOs/SCOs to TLOs/aggregations of content. However, Assets are typically the most context independent items, so they will likely be the most reusable. Learning Activities, courses, and curricula are your most context dependent items, so they may not be reused as often.

The diagram below shows how to structure/organize content in the NCOM. Assets exist as stand-alone items. ELOs contain assets and satisfy a single enabling objective. TLOs are made up of ELOs and satisfy a single terminal objective. Learning Activities are made up of TLOs and ELOs and are groupings designed to accomplish a job performance goal.

**Figure 2.3: NCOM component reuse from Assets to Learning Object Aggregation**

Learning activities may be grouped as necessary to accomplish goal.
To understand how much reusability you can expect from each level of your content, as well as how much context each level will have, consider Figure 2.4. As you move from left to right (from Assets to Curriculum), the amount of reusability decreases with each level, but as you move from right to left (Curriculum to Assets), the amount of context in each level decreases. Your job is to determine the best balance of reusability versus context when you create your ELOs. Remember, the smaller the NCOM component, the more reusable it will be. The larger the component, the more context it will have.

![Navy Content Object Model (NCOM)](image)

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**Figure 2.4: Determining amount of reusability versus context across NCOM components**

For example, it is determined that IDC trainees need training on effective communication as do new Navy recruits. After assessing the performance issues and determining which objectives apply to the audiences identified, you search the repository or your company’s database for existing ELOs.

Based on your search results, you decide to use existing ELOs found in the repository and in your company’s own database for both the IDC training as well as the new recruit training. Since, the IDC trainees will need more in-depth training you decide to reuse several “effective communication” ELOs that you found. However, the new recruits only need an introductory lesson on effective
communication so you will only use a few of the ELOs that you found. Two of the ELOs you found were used in both courses. This example illustrates the importance of reusability for the Navy ILE.

6.8.2. Designer Decisions
As discussed in previous sections of this document, content can be grouped or aggregated in various ways depending on factors to include objectives of the content, characteristics of the intended audience, and the available resources. The ID must establish the organization of the content including:

- How the content will be organized
- Content of the assessments and mapping of items to content
- Process the learner will follow to access assessments, remediation, and content
- What actions will be taken on completion of the assessment

These decisions begin during the instructional design process and continue through the content development process. These decisions impact how ELOS are identified, developed, and aggregated into TLOs.

6.8.3. Identifying and Designing ELOs—Overview
ELOs are the smallest logical unit of instruction delivered and tracked via a learning management system (LMS). One approach to consider for designing ELOs is to write them as a topic that addresses an EO. Enabling objectives will be based on NLOS defined objectives.

Additionally, since NCOM is SCORM-based, just like SCOs cannot directly access other SCOs, ELOs cannot directly access other ELOs. Therefore, ELOs should not be created with any links to content in other ELOs. Put another way, this means a learner cannot access supplemental content from another ELO. It is very important to remember that each ELO should be able to stand-alone. This is significantly different from the way most Computer-Based Training (CBT) lessons and courses function.

An ELO must exist independent of other instruction, so it cannot rely on other ELOs or a particular course structure to give it meaning or place it within a certain context. For IDs, this may pose a concern—how do you ensure the instructional integrity of a ELO if there is no supporting course structure and you don’t know the context in which it may be used?

If you use the general guideline of creating your ELOs as individual topics representing an EO and all of the related materials required to support that objective, the effective completion of the ELO will impart the knowledge or skill for which it was designed. As such, an ELO should be instructionally sound.
6.8.4. Moving from a Traditional Course Structure to NCOM

Traditional course structures tend to follow a hierarchical scheme with a course being composed of various lessons and each lesson being composed of topics. Each topic then has one or more objectives.

Table 2.1 lists the enabling objectives (EOs) and the terminal objectives (TO) for one lesson of the Apprentice Trainer Course.

Refer to APPENDIX D for more information on the Instructional Design and Assessment Strategy for the Apprentice Trainer Course

Table 2.1: EOs Identified For One Lesson Of The Apprentice Trainer Course

<table>
<thead>
<tr>
<th>Lesson Title</th>
<th>Topic Outline</th>
<th>Objective</th>
<th>Objective level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lesson: Becoming a Qualified Workspace Trainer</td>
<td></td>
<td>After completing this lesson, you will be able to employ strategies for enhancing your personal and professional development as a workspace trainer.</td>
<td>TO</td>
</tr>
<tr>
<td></td>
<td>What is an IDC Apprentice?</td>
<td>Differentiate between your role and responsibilities as a workplace trainer and as an apprentice in the IDC.</td>
<td>EO</td>
</tr>
<tr>
<td></td>
<td>▪ Common elements of training programs, including terminology and basic approach at the command, department, and divisional levels.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>▪ Instructional Delivery Continuum</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>▪ Apprentice Level</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>▪ Practice Items</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>▪ Activity: Analyze the Command Training Structure</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>What is Team Dimensional Training (TDT)?</td>
<td>Describe the TDT cycle.</td>
<td>EO</td>
</tr>
<tr>
<td></td>
<td>▪ Definition of TDT</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>▪ The TDT Cycle</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>▪ Practice Items</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lesson Title</td>
<td>Topic Outline</td>
<td>Objective</td>
<td>Objective level</td>
</tr>
<tr>
<td>------------------------------</td>
<td>-------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>-----------------</td>
</tr>
</tbody>
</table>
| The Primary Trainer/Apprentice Relationship | • Definition and example of a learning coach  
• Purpose of the apprentice/learning coach relationship  
• Benefits of the apprentice/learning coach relationship  
• Practice Items  
• Activity: Interview your primary trainer | Describe the primary trainer/apprentice relationship. | EO              |
| What is Self-assessment?     | • Recognizing what you know and don’t know  
• Recognizing when you’ve done something wrong  
• Knowing when to ask for help  
• Practice Items  
• Activity: Assess your knowledge of IDC topics | Perform a self-assessment. | EO              |
| What is an Individual Development Plan (IDP)? | • Definition of IDP  
• Purpose of IDP  
• Use of an IDP to manage professional development, including tracking performance and setting goals  
• Practice Items  
• Activity: Develop and review your IDP | Use your IDP to manage your professional development. | EO              |
| What is Time Management?     | • Procrastination  
• Setting priorities  
• Time management strategies  
• Benefits of time management  
• Setting goals  
• Practice Items | Describe time management | EO              |
<p>| IDC Trainee Responsibilities | • Take initiative for your | Describe your responsibilities as an IDC apprentice trainee | EO              |</p>
<table>
<thead>
<tr>
<th>Lesson Title</th>
<th>Topic Outline</th>
<th>Objective</th>
<th>Objective level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>own learning and ultimate qualification.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>▪ Seek out and interact with learning coach and peers</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>▪ Utilize the tools and resources available</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>▪ Take advantage of learning opportunities</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>▪ Take the initiative to become technically proficient.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>▪ Practice Items</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Each topic may or may not have a learner assessment. Figure 2.5 hypothetically shows the Apprentice Trainer Course if it was designed as a “traditional” course. Assume this hypothetical “traditional” course was designed for Apprentice Trainees to give them detailed information about all aspects of becoming an Apprentice Trainer.

**NOTE:** The example below shows only two lessons and three topics for each lesson of the hypothetical “traditional” Apprentice Trainer Course.
In Figure 2.5 there are three topics in each lesson, each represented by a different color scheme. In the format presented, assume that in order to pass the topic, the learner would have to complete the entire subordinate learning objectives. As structured, an Apprentice Trainee who wants to learn specific information about the characteristics of team dimensional training would have to complete, at a minimum, the entire lesson on “What is Team Dimensional Training?” to see information on The Primary Trainer/Apprentice Relationship. Likewise, if the trainee wanted to learn about “What are the Barriers to Communication?” she would have to see, at a minimum, both the entire What is Effective Communication? and Sending the Message. This limits the ability of learners to access only the content they desire or the crucial objectives and limits the reusability of the instructional materials.

6.8.5. Designing ELOs from Existing Instructional Material
Navy training content exists that has been designed and delivered as instructor-led training (ILT). Most likely some of this content will be identified during analysis to convert to SCORM-conformant ILE materials using Navy-SCORM and this guide. When tasked with converting legacy ILT to SCORM-conformant NCOM content, it is essential to analyze the existing content to ensure the
content is instructionally sound in its current form before trying to convert it to either e-learning or NCOM. The easiest way to do this is through the process of content “reverse engineering.” Additional considerations for designing ELOs as new instructional materials are addressed in Designing ELOs for New Instructional Materials.

6.8.5.1. Evaluate the Existing Content

Does the content teach the stated objectives? You may find, after thoughtful and unbiased evaluation, that the objectives are unrelated to the content, or the content does not teach the required objectives. If this occurs, you should determine which if any of the following you need to do:

- Add content to teach the existing objectives
- Remove the irrelevant content
- Re-design the organization of the content

6.8.5.2. Identify the ELOs

Once you’ve identified the target audience(s)—typically given to you in the GFI/M—you can begin to decide how the content should be “divided” into individual ELOs to make it optimally reusable while still meeting the needs of the audience for whom it was originally intended. When you look at your existing ILT materials, you may find one topic repeated throughout the course, lesson, or module. Determine if there is a better way to group the materials so that all aspects of one topic are presented together. In ILT, the instructor does all the sequencing and customization of the content as she presents it; in the Navy ILE, all the material needs to be thorough, accurate, well-designed, and well-written before it is presented to the learner, so think carefully about the best way to group, or regroup, what you already have. More often than not, you will be able to assume that you can maintain the existing structure of your content. If your content needs to be restructured, either for instructional reasons or to adhere to SCORM and Navy-SCORM refer to section Designing ELOs for New Instructional Materials and
Content Sequencing before attempting to identify your ELOs. The content structure diagram you create may require modifications or unique ELO structures to achieve the instructional outcomes you desire.

Assume you are working with the hypothetical “traditional” Apprentice Trainer Course depicted in Figure 2.5. Both SCORM and Navy-SCORM say an ELO should be context neutral and should stand-alone. In order to accomplish this with the Apprentice Trainer Course, you could structure the content outside of the context of an Apprentice Trainer.

Figure 2.5 shows the individual objectives from the Apprentice Trainer Course (from Figure 2.6) divided into individual ELOs (yellow boxes), rather than created as comprehensive topics then aggregated into TLOs (green boxes). These diagrams are not intended to show the structure of the content, but rather to show an example of dividing existing content and lessons into individual pieces that will become ELOs.

Figure 2.6: TLOs created from the existing course depicted in Figure 2.5

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In this format, some of your ELOs may be too large and the content too comprehensive to meet the needs of an audience Apprentice Trainees. For
example, the ELO called *What is Effective Communication?* might include *What is effective Communication?* as well as instruction on *Sending the Message, What are Barriers to Communication?, What is Active Listening?* and *What is Feedback?* These topics could possibly reach a wider and different audience across various communities of practice. Review the content very carefully to determine if they can be broken down into several other enabling objectives. Often the topics covered in a ELO such as *What are Barriers to Communication?* can become enabling objectives that you could design as smaller ELOs, thereby making them more reusable. To add additional objectives, follow the process described in the NLOS specification.

So that you can quickly identify the difference between SCORM components, all of the diagrams in this guide have been created in corresponding colors. Yellow boxes represent ELOs. The green boxes above now represent what had been lessons in Figure 2.6; these boxes are now aggregations of content—TLOs. The red box, previously representing the course, now represents a Learning Object Aggregation.

6.8.5.3. Identify the TLOs

Each topic in each lesson of the Apprentice Trainer Course was identified as an ELO. As you can see in Figure 2.6, the ELOs identified to address the lesson objectives were grouped into three TLOs. The Apprentice Trainer Course actually has seven Lessons (Figure 2.6, and Table 2.2 show only three of the seven lessons for example sake). Therefore, there would be seven TLOs for this course, each TLO containing multiple ELOs representing the lesson topics for the course (see Table 2.2 for three of the seven lessons and their association to TLOs and ELOs). This example is just one way that the course could be organized.

Table 2.2: TLOs with Associative ELOs for the Apprentice Trainer Course

<table>
<thead>
<tr>
<th>TLO</th>
<th>Lesson: Becoming a Qualified Workspace Trainer</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELO</td>
<td>What is an IDC Apprentice?</td>
</tr>
<tr>
<td>ELO</td>
<td>What is Team Dimensional Training?</td>
</tr>
<tr>
<td>ELO</td>
<td>The Primary Trainer/Apprentice Relationship</td>
</tr>
<tr>
<td>ELO</td>
<td>What is Self-assessment?</td>
</tr>
<tr>
<td>ELO</td>
<td>What is an Individual Development Plan (IDP)?</td>
</tr>
<tr>
<td>ELO</td>
<td>What is Time Management?</td>
</tr>
<tr>
<td>ELO</td>
<td>IDC Trainee Responsibilities</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TLO</th>
<th>Lesson: Effective Communication</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELO</td>
<td>What is Effective Communication?</td>
</tr>
<tr>
<td>ELO</td>
<td>Sending the Message</td>
</tr>
<tr>
<td>ELO</td>
<td>What are barriers to communication?</td>
</tr>
<tr>
<td>ELO</td>
<td>What is active listening?</td>
</tr>
<tr>
<td>ELO</td>
<td>What is feedback?</td>
</tr>
</tbody>
</table>
Remember that the ELOs shown in Figure 2.6 and Table 2.2 could become enabling objectives that you could design as smaller ELOs—aggregated into a TLO—thereby making them more reusable. It depends upon the instructional design intent and the amount of content. Assume the topic content in *What are Barriers to Communication?* (See Table 2.1: EOs Identified For One Lesson Of The Apprentice Trainer Course) does have numerous enabling objectives. Figure 2.7 shows how you could further divide that topic content into ELOs that correspond to the enabling objectives. Each ELO in the diagram represents one EO. The ELOs can now be sequenced in any manner desired by the instructional designer.
Content Sequencing, shows numerous ways you can structure the content from this example.

6.8.6. Designing ELOs for New Instructional Materials

It may appear easier to design new ILE instructional materials in accordance with Navy-SCORM rather than repurpose existing materials for NCOM. However, the repurposing process has one advantage: you know the scope of the task since you already know what the content is, how deep the content delves into the subject matter, and how the content was intended to be structured. When designing new ILE content with the NCOM, it will be very important to set some parameters for your design or development team.

Once you've determined the instructional strategy you think is most relevant to your learners, you can decide how many ELOs you will need, what content the ELOs will address, etc. You can do this in a way that will make the individual ELOs optimally reusable while still meeting the needs of the audience for whom you are designing the material. Review the guidelines in Designing ELOs from Existing Instructional Material, for more considerations about identifying your ELOs, and then follow the remainder of the development process outlined in that section.
6.9. Assessment Strategy

6.9.1. General Assessment Strategy

The assessment strategy is integral to the overall instructional design and is intended to serve as a guide for IDs as they select instructional design models and make decisions concerning instructional and assessment strategies.

Assessments make inferences regarding what learners know or can do. These inferences can be used to make decisions about (a) students, (b) curricula and programs, and (c) educational policy (Nitko, 2004; Pellegrino, Chudowsky, & Glaser, 2001). Within the context of ILE, the term, Assessment, will be used with measurement of the learner and performance. The term, Evaluation, will address measure of effectiveness of curricula, programs, or policy. Despite the various contexts for assessment, one common principle is that assessment always relies on the process of reasoning from evidence (Pellegrino, Chudowsky, & Glaser, 2001). Decisions about assessment (e.g., what questions to ask, what tasks must be performed) all seek to provide sufficient evidence that a learner has achieved the intended outcome.

Assessment plays a critical role in the design and development of learning activities and instruction. As previously stated in this document, most instructional design models begin with the development of learning objectives or descriptions of intended learning outcomes. At the time the learning objectives and outcomes are developed, the ID must decide how the learner will demonstrate attainment of each objective or outcome.

Assessment provides the means for making that determination. Decisions about what to assess and how to assess will not be afterthoughts. Although assessments often take place after instruction has been completed, the development of assessments should be part of the initial design process (Pellegrino, Chudowsky, & Glaser, 2001).

The ID must consider many factors, including the intended purpose of the assessment, the target audience, and the content. These factors will influence the specifications for each assessment, including the format and medium. The Question & Test Interoperability (QTI) specification describes a basic structure for the representation of question (item) and test (assessment) data and their corresponding results reports. The structure utilized in the specification promotes the capability of sharing, exchanging, and re-using data.
Just as new technologies offer opportunities for learners to interact with content, they also offer opportunities to demonstrate understanding or skills in new ways. Assessment items need not be limited to multiple-choice questions, but should include responses to simulations, concept maps and open-ended questions. Innovative items can provide high levels of task complexity and interactivity while also reducing the likelihood of guessing.

6.9.2. Assessment Design Decisions
During the planning stages, the ID is faced with several decisions affecting assessments. This section raises several key questions to be considered.

6.9.2.1. What is the intended purpose?
Assessments serve multiple purposes. Assessment instruments can diagnose learner strengths and weaknesses, prescribe sequencing or alternatives, measure prerequisite knowledge, provide feedback on progress, assign rankings, measure performance, or certify mastery.

The purpose of an assessment should be identified during analysis and design of instruction. The same items can be used to assess student understanding for various purposes. A simple way to illustrate the different purposes is to examine when assessment is given and the types of inferences that can be made based on the learner’s performance. Separate types of assessments can be designed for different purposes (e.g., diagnosing student strengths, certification). The same assessment items can be used for different purposes but the reporting (e.g., to the learner, to the instructor) and the inferences made will differ (Baker, Aschbacher, Niemi, & Sato, 1992).
Table 2.3, Types of Assessments and Purposes, provides a summary of basic purposes for assessment and typical inferences made from each type of assessment.

Table 2.3: Types of Assessments and Purposes

<table>
<thead>
<tr>
<th>When Administered</th>
<th>Purpose</th>
<th>Typical Examples</th>
<th>Typical inferences based on performance</th>
</tr>
</thead>
</table>
| Prior to instruction | Prescriptive or Diagnostic | Pretest                   | Has the student already achieved the intended learning outcomes?  
|                    |                       |                           | Does the student have the prerequisite skills needed to begin the instruction? |
| During Instruction | Formative Progress    | Embedded question Practice test Self-assessment Quiz Module/Lesson Test | Is the student achieving the intended outcome?  
|                    |                       |                           | Is remediation needed?  
|                    |                       |                           | Where/when should remediation occur? |
| After Instruction is completed | Performance Measure | Posttest Exams PQS Board | To what extent has the student achieved the learning outcomes?  
|                    |                       |                           | Has the student met the expected standard? (criterion-referenced) |
|                    |                       |                           | How does the student rank relative to others? (norm-referenced) |
|                    |                       |                           | Has a learning intervention been effective? |
6.9.2.2. Performance Standards

An assessment plan also provides information about the standards to which learner performance will be compared. To demonstrate attainment of the learning outcome, must a student correctly answer 80% of the questions on a test? Must a learner accurately describe each of steps that must be taken to secure a site? What actions must a learner take to satisfy learning objectives?

The standard is often set as a specific score or number correct on a test. Determining the accuracy of a multiple choice or matching item is typically straight forward and evidenced when the learner selects what is coded as the correct response. Determining the standard for an open-ended question or performance task requires the development of rubrics. A rubric may be a checklist or a specific breakdown of points to be awarded for each element included or the quality of the response.

To determine performance standards a modification of the Ebel method developed by SkillsNET, will be used.


Requirements for using this method include job analysis survey information that is obtained using the SkillsNET Job Task Analysis system. This survey information includes frequency and criticality ratings on each task, sub-task, unique knowledge, and tool. Based on these ratings, learning objectives will be placed in the Performance Standard matrix (see Table 2.4) to determine level of performance standard required. Modifying conditions such as level of expertise needed, time constraints for performance, etc. will adjust the placement of the learning objectives within the performance standard matrix. Modifying conditions include:

- Platform
- Level of expertise
- Weather/environment conditions
- Battle/normative conditions
- Time pressure
- Stress level
- Group/individual level
- Changing equipment / tools
- Quality of work/service produced
- Quantity of work/service produced
As a result of the placement of the learning objectives, the standard level (high, medium-high, medium, low-medium, and low standards) will be obtained and converted into more concrete standards including checklists and required scores on performance measures.

- High standard = 100% Success rate
- Medium-High Standard = 90% Success rate
- Medium Standard = 80% Success rate
- Low-Medium standard = 70% Success rate
- Low standard = 60% Success rate

Table 2.4: Performance Standards Matrix

<table>
<thead>
<tr>
<th>Criticality</th>
<th>Once per year or more often</th>
<th>More than once per month</th>
<th>More than once per week</th>
<th>Daily</th>
<th>Several times per day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minor Consequences</td>
<td>Low</td>
<td>Low</td>
<td>Low-Medium</td>
<td>Medium</td>
<td>Medium-High</td>
</tr>
<tr>
<td>Moderate Consequences</td>
<td>Low</td>
<td>Low-Medium</td>
<td>Medium</td>
<td>Medium-High</td>
<td>High</td>
</tr>
<tr>
<td>Serious Consequences</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium-High</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>Critical Consequences</td>
<td>Medium</td>
<td>Medium-High</td>
<td>Medium-High</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>Catastrophic Consequences</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td></td>
</tr>
</tbody>
</table>

Catastrophic
6.9.2.3. **What Evidence Demonstrates Attainment of Intended Performance/Learning Outcome?**

Will the student demonstrate knowledge by answering questions or by applying knowledge in a real-world or simulated setting with performance observed by experts? The assessment plan identifies the knowledge and behaviors (e.g., cognitive, motor, verbal, social, and affective/attitudinal) that must be attained and which indicators will best demonstrate attainment of the intended outcomes. An assessment may be a single item (e.g., a question or task) or it may be a collection of items (questions, tasks, performance on a simulation). Jonassen and Tessmer (1996) provide an extensive listing of outcomes and ways to assess them.

6.9.3. **Assessment Items and Assessment Instruments**

The term assessment often refers to the actual instrument or test designed to obtain information, whether a written test for determining what a student knows or a performance test requiring a student to demonstrate skills.

6.9.3.1. **Assessment Items**

Each individual question or task we ask the student to address is an assessment item. This item can stand alone within the instructional design of the course (e.g., a knowledge- or self-check during instruction or a question to test mastery at the end of the course). Assessment items can be developed in various formats, including closed-choice (e.g., multiple choice, matching) open-ended (e.g., fill-in, essay), and real or simulated performance tasks. See Table 2.5: Learning Outcomes and Assessment Types, for suggestions.

6.9.3.2. **Assessment Instruments**

Assessment instrument refers to items that are grouped together to form tests, quizzes, exams, or simulations. The designer must distinguish between recorded and unrecorded assessment instruments. Recorded instruments will be scored in an LMS. Unrecorded assessment instruments (typically self-checks or self-assessments) will provide feedback to the learner only and scores will not be reported.
6.9.4. Aligned with Learning Outcomes

Current learning science research includes assessment as one of the important elements affecting how people learn. Based on the How People Learn (HPL) reports, Bransford (2001) describes assessment as one of the lenses through which environments should be analyzed to facilitate learning. Using assessments in this manner means more than frequent testing. Learning environments should “provide multiple opportunities to make learners’ thinking visible, provide them with feedback and offer opportunities for them to revise and learn about their own learning” (Bransford, 2001, p. 1). Feedback and the opportunity to learn from it foster the development of metacognitive as well as cognitive and performance skills. Decisions about the kind of feedback and when it should be given must be made during the design phases.

The intended learning outcome should drive decisions relating to the instructional strategy and the assessment strategy. For example, if the learner is expected to solve ill-structured problems, the instructional strategy should facilitate development of those skills. The assessment strategy should provide opportunities for the learner to demonstrate attainment of those skills.

An assessment instrument might ask the learner to act as a first responder to a chemical disaster, solve the complex problem of determining the number of helicopters needed for a mission given specified conditions, or create a concept map to describe the policy ramifications of an action. If the learner is expected to evaluate resources and select appropriate information, the assessment may be dynamic in order to provide varied resources. If the learner is expected to respond with appropriate air traffic control commands when given certain cues, instructional strategies should provide strategies and practice for developing rapid responses. Likewise, the assessment strategy should require precise and rapid responses. Assessments may also include hands-on tasks that are not computer driven.
Table 2.5: Learning Outcomes and Assessment Types, identifies several types of assessments that can be used to assess learning outcomes.

Table 2.5: Learning Outcomes and Assessment Types

<table>
<thead>
<tr>
<th>LEARNING OUTCOMES</th>
<th>ASSESSMENT TYPES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive</td>
<td>• PQS • Practicum • Oral Board • Scenario • Simulation • Reporting • Writing Sample • Essay • Sample Work Product • Knowledge Check • Multiple Choice • True/False • Matching • Concept Mapping • Completion • Rank/Order (Sequencing) • Brief/Presentation</td>
</tr>
<tr>
<td>Motor</td>
<td>• Structured On-Demand Task • Projects • Portfolios/Jacket • Experiment • Oral Presentation • Simulation • Scenario • Demonstration • Checklist • PQS • Rating Scale • Observation (demonstration, simulation, workplace )</td>
</tr>
<tr>
<td>Verbal</td>
<td>SkillsNET - Under Development</td>
</tr>
<tr>
<td>Social</td>
<td>SkillsNET - Under Development</td>
</tr>
<tr>
<td>Affective/Attitudinal</td>
<td>• Questionnaire • Observation • Simulation • Scenario • Moral Dilemmas • Reflective Writing • Presentation</td>
</tr>
</tbody>
</table>
6.9.5. Feedback
Feedback is an important element in the learning process. The assessment strategy should include opportunities for learners to learn from their performance. In guidelines for developing good assessments, the Advanced Distributed Learning (ADL) states that tests given during instruction should provide feedback and motivation to the learner. Information obtained should indicate the degree to which the learner is achieving the intended skills, and content domains (Advanced Distributed Learning, 2003). Research further suggests that learners benefit by receiving feedback on their performance, guidance about how to improve, and training in self-assessment (Pellegrino, Chudowsky, & Glaser, 2001).

6.9.6. Remediation
Assessment results can identify knowledge or performance gaps in need of remediation. The ID determines the type of remediation the learner will receive and the methodology. Remediation in the ILE may (a) direct the learner to additional instructional materials or learning experiences; (b) instruct the learner to repeat certain portions of instruction; or c) suggest equivalent or alternative methods of learning. These distinctions have direct implications for content organization and content sequencing.

6.9.7. Aggregating Assessments
Navy-SCORM addresses issues related to the SCORM Content Aggregation Model (CAM). SCORM does not handle assessment issues via the CAM specification. At high levels of planning, however, IDs do consider how assessment content (i.e., assessment instruments) will be aggregated and sequenced. Therefore, this section provides high level guidance to IDs concerning options for aggregating and sequencing assessment instruments (e.g., how to plan for pretests or remediation).

Many of the functions of testing are addressed through the Run-time Environment (RTE) of SCORM. These include assessment behaviors, data tracking, item analysis, and random selection of test questions from item banks. These are issues that must be addressed within the context of the content runtime programming, the LMS environment and perhaps the LCMS.
6.10. Summary

6.10.1. Designing Content for the ILE

- Base the design of the content on instructional theory
- Clearly define terminal and enabling learning objects
- Identify the appropriate assessment methods
PART THREE - CONTENT DEVELOPMENT

The Navy-SCORM provides the flexibility to design instructionally sound and effective performance-based ILE learning activities that meet the specific needs of the target audience. Once the instructional design is complete (including the organization of the content), selection of instructional and assessment strategies, and delivery platform the design must be sequenced. It is important that the intent of the instructional design follows through during development and that in the process of development the intent of the instructional design is not compromised. Hence, in order to ensure the success of Navy ILE learning activities it is imperative that the ID collaboratively works with the developer/programmer during the development processes to ensure that the instructional design is properly interpreted and implemented.

7.0 APPLYING THE SCORM API TO NCOM

Content inside an ELO can be highly customized to a particular learner by using the SCORM Application Programming Interface (API) provided by an LCMS. For example, an ELO can use the API to get the learner’s name and insert it into the text so a learner might see “Welcome to the Apprentice Trainer Course, Malika” when she logs in. An ELO can also use the API to determine if the learner has seen a particular assessment ELO before and how she scored on previous attempts. Based on this information, the LCMS could then present different materials to the learner or deliver a different test.

The most common use of the API is to record a learner’s score on a test in an ELO and then record if the ELO was passed. The LMS stores all this information for use later in the course and for the learner’s supervisor to see how well the learner did in the course. The API is the only way to track a learner’s progress in a course delivered via an LMS.

The ID, and the developer/programmer must work closely together to ensure that the IDs design intent regarding the content organization, learner’s navigation, and access to content is correctly interpreted in the production process. It is the programmer’s responsibility to implement the API to achieve the intent of the instructional design. It is also the programmer’s responsibility to educate the ID regarding what is allowed and not allowed according to SCORM and the API specifications. Working together they can produce effective and efficient ILE materials.
7.1. Content Sequencing

Because Navy-SCORM is a SCORM 2004-based model and development of all ILE content must adhere to both NCOM and SCORM, the following discussion references the SCORM 2004 sequencing rules and guidelines. It is important to remember the one-to-one correlation that Navy-SCORM has with SCORM 2004 (see Figure 3.1: SCORM and NCOM Hierarchies). Hence, within this section the terms SCO and ELO, aggregation and TLO, and root aggregation and Learning Object Aggregation are used interchangeably.

<table>
<thead>
<tr>
<th>SCORM</th>
<th>NCOM</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Root Aggregation</td>
<td>- Learning Object Aggregation</td>
</tr>
<tr>
<td>- Aggregation</td>
<td>- Terminal Learning Object (TLO)</td>
</tr>
<tr>
<td>- Sharable Content Object (SCO)</td>
<td>- Enabling Learning Object (ELO)</td>
</tr>
<tr>
<td>- Asset (with metadata)</td>
<td>- Asset</td>
</tr>
</tbody>
</table>

Figure 3.1: SCORM and NCOM Hierarchies

In traditional multimedia and CBT (Computer Based Training), branching enabled (or sometimes forced) learners to move from one piece of content to another relatively seamlessly. Learners may or may not have known they were moving from one lesson to another or from one module to another. This was possible because robust authoring systems gave IDs nearly limitless programming options for structuring and branching their content.

The sequencing functionality within a lesson or between lessons, shown within the yellow box in 3.2, was hard-coded, rather than based on a linear or an adaptive model.
In the early versions of SCORM, it was not possible to sequence content in an interoperable manner. SCORM-conformant content was presented to the learner, typically as a table of contents, and learners could select the content they wanted to see. Figure 3.3 shows a SCORM organization and several SCOs (ELOs). Learners could select any SCO (represented by the yellow boxes). IDs found this aspect of SCORM 1.2 frustrating, since in many instances they wanted to ensure that learners would receive certain content in the order they prescribed.

To overcome this limitation, IDs created very large SCOs (by making several CBT lessons like the yellow box in Figure 3.2 into SCOs like the ones shown as yellow boxes in Figure 3.3.) Alternatively, IDs used the sequencing functionality provided by their in-house LMS. Neither solution worked well. Since the goals of SCORM include interoperability and content reusability, hard-coding functionality within or between lessons made complying with the SCORM guidelines impossible:

1. Content was not interoperable when hard-coded sequencing rules were present or when sequencing rules were defined using one LMS’s proprietary functionality because the sequencing functionality of one LMS could not be read by another LMS.
2. Content could not be reused when individual SCOs relied directly on other SCOs for their sequencing. Hard-coding SCOs results in one SCO “looking for” another SCO that may or may not be present. Hard-coding also limits the ability to create new or custom content structures from the same instructional materials, since each time a new structure is desired, the code attached to each individual SCO has to be updated.

7.1.1. Sequencing Functionality in SCORM 2004

SCORM 2004 prescribes nearly all functionality that occurs outside of the SCO/ELO itself. With the inclusion of the sequencing functionality in SCORM 2004, IDs have the capability to describe and prescribe the manner in which learners receive individual pieces of content from the LMS. Since the NCOM is a SCORM-based model it conforms with the SCORM sequencing functionality and guidelines.

The individual pieces of tracked content the learner receives are sharable content objects (SCOs)—ELOs in the NCOM. SCORM does not permit one SCO/ELO to “call” or access another SCO/ELO directly. The LMS controls the movement of the learner from SCO/ELO to SCO/ELO with inter-SCO/ELO sequencing as specified by SCORM 2004 Sequencing & Navigation. The LMS interprets all of the “branching” of the content based on the S&N information which captures the behaviors defined by the ID and input by a programmer. The resulting sequencing rules get stored in the
LMS as part of the manifest. This allows the same set of SCOs/ELOs to be sequenced in many different ways, depending upon the ID who structures the content and the learner to whom the content will be delivered.

It is the inter-SCO (inter-ELO) sequencing that allows the ID to specify what is presented to the learner, when it is presented, and the attributes or functions the SCOs/ELOs entail. Inter-SCO (inter-ELO) sequencing is also how SCORM allows IDs to monitor and record the learner’s choices and performance. All of this functionality occurs outside of the SCO/ELO itself, as shown in Figure 3.6, so that content can be sequenced in an interoperable manner, unconstrained by coding within the SCOs/ELOs.

Intra-SCO (intra-ELO) branching (the hard-coded navigation occurring inside an individual SCO/ELO is not tied to the LMS or to the content package, so it does not constitute SCORM sequencing nor is it required to adhere to SCORM sequencing guidelines. As a result, intra-SCO (intra-ELO) branching is not tracked by the LMS, so there is no way to report the learner’s progress on individual aspects of the SCO/ELO via the LMS. However, a comprehensive score for the learner’s performance on the SCO/ELO as a whole may be reported to and stored in the LMS. The scores reported to the LMS include passed/failed or a normative score between -1 and +1. Note that IDs can combine intra-SCO (intra-ELO) branching and inter-SCO (intra-ELO) sequencing to create the most effective learning experiences for learners.

### 7.1.2. Preparing to Sequence Your Content

The instructional techniques you traditionally employ may have to change slightly as you create SCORM-conformant instruction. Since the sequencing of the content is now being controlled by the LMS (which will generally be programmed by someone other than the ID), you must carefully specify the actions and behaviors you desire for each ELO and each TLO, all the way back to the Learning Object Aggregation. If you fail to do this, the actions and behaviors of your content will be the default values defined by SCORM, which may not result in the type of learning experience you had planned or desired.

Since the NCOM adheres to the SCORM sequencing that is based on an activity tree structure, specifying the actions and behaviors you want for your learner requires the creation of a content structure diagram. To do this, return to the example from Identify the ELOs, where existing content was divided into ELOs (see Figure ). The ELOs that were identified in Figure 3.5: ELOs organized for sequencing have now been partially organized with labels as Figure 3.6
Figure 3.5: ELOs organized for sequencing
Remember that in “Identify the ELOs” you carefully scrutinized the Effective Communication ELOs you had identified and decided that some of them should be divided even further (see Figure 3.5 and Figure ). Those ELOs will also have to be grouped before you can sequence them.

Once you have defined your ELOs, and considered some high-level groupings for them (TLOs or a Learning Object Aggregation), you can begin the process of determining the content structure diagram onto which you will apply content sequencing rules. The sequencing rules (generated by your developer/programmer) will apply the behaviors you describe for your instructional materials to ensure the instructional integrity of your content.

7.1.3. Understanding Sequencing Terminology

Some terms you may have used to signify a specific function of instruction may have different meanings in SCORM when you sequence your content. This requires careful use of these words, keeping in mind their definitions within the context of SCORM sequencing. One example is the word “objective” (OBJ). In traditional instructional design, an objective is used to measure the attainment of a knowledge, skill, or ability in accordance with a predefined behavior, a prescribed condition, and an achievement standard.

In SCORM, the objective (OBJ) refers to a convenient way that a SCO/ELO can pass MasteryStatus parameters to the LMS. There are two types of MasteryStatus parameters: PassFail and NormalizedScore. You determine the criteria the ELO will use to report all the objectives' PassFail or NormalizedScore values, which will be passed to the LMS. PassFail simply represents whether the ELO was passed or failed. NormalizedScore reports a value for an OBJ to any decimal value between -1 and +1. With either of these parameters, you can choose to set their values based on a response to a single question, a complete assessment, or simply whether the ELO has actually been viewed. Each ELO can set or read multiple objectives, and a single objective can be set by or read by multiple ELOs.

Other terms with different meanings in SCORM include complete and satisfied. Traditional uses of these words would mean the learner had seen all of the content related to a given topic. For an ELO that uses the Application Programming Interface
(API), you can decide the criteria that must be met for an ELO to be considered either complete and /or satisfied. For an ELO that does not use the API (a “non-communicative ELO”), the LMS will automatically set the ELO to complete as soon as the learner starts the ELO. As a consequence, complete for a non-communicative ELO does not necessarily mean that the learner saw any or all of the instructional material in the ELO. For example, the learner may have only seen the first screen of content and then closed the ELO, thus marking the ELO complete. If you want to, or are required to, ensure the learner actually sees all of the content, then create ELOs with Sequencing and Navigation that provide intuitively obvious spanning of multiple screens or do not have multiple assets.
7.1.4. Simplifying Content Sequencing

So that you do not have to devise a sequencing strategy from scratch for each lesson and learning experience you develop, this document provides several sequencing examples that describe potential behaviors of ELOs according to various instructional design strategies. Refer to Appendix H for these useful examples. The examples are designed to assist you in structuring your NCOM content to conform with SCORM sequencing guidelines. Since the NCOM is a SCORM-based model it conforms with the SCORM sequencing functionality and guidelines.

The instances of the sequencing examples used as working examples in this document can be adapted to suit the needs of your desired learning outcomes. While the content design examples provided for discussion purposes in this section may show a limited number of HTML assets (pages) within the applied sequencing templates, there is no arbitrary limit to the numbers of HTML pages, Flash files, raw media files, etc., that may be included as assets in your individual instances of the sequencing templates.

In addition, any example or combination of examples can be “overlaid” on or combined with another example, creating a more complex instructional strategy for a course or a lesson. Combining the examples provided here will give you viable sequencing models that you can adapt to meet your particular training and educational requirements for ILE content. Examples that show several models for more complex instructional strategies are also provided in the appendix. Depending upon how you apply behaviors to the structures, you can achieve a variety of outcomes.

These examples are not intended to be exhaustive, but they should help you begin to identify new ways in which you can construct SCORM-conformant ILE content while adhering to sequencing guidelines, and the true intent of SCORM and the NCOM: creating R3, interoperable, durable, and accessible instructional materials.
Table 3.1 provides a summary of the sequencing examples and models that can be found in Appendix H.

### Table 3.1: Summary of Sequencing Examples and Models

<table>
<thead>
<tr>
<th>Example or Model</th>
<th>Description</th>
<th>Rule Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example 1</td>
<td>Single TLOs with a Single Asset</td>
<td>1</td>
</tr>
<tr>
<td>Example 2</td>
<td>Single ELO with Multiple Assets</td>
<td>1</td>
</tr>
<tr>
<td>Example 3</td>
<td>The Black Box; single ELO with multiple assets and complex internal structure</td>
<td>1</td>
</tr>
<tr>
<td>Example 4</td>
<td>Multiple ELOs with Assets</td>
<td>2</td>
</tr>
<tr>
<td>Example 5</td>
<td>Remediating Using Objectives</td>
<td>2</td>
</tr>
<tr>
<td>Example 6</td>
<td>Pre- and Post-Test Sequencing</td>
<td>1</td>
</tr>
<tr>
<td>Example 7</td>
<td>Pre- and Post-Test Sequencing (2)</td>
<td>1</td>
</tr>
<tr>
<td>Example 8</td>
<td>Remediating Using Objectives (2)</td>
<td>1</td>
</tr>
<tr>
<td>Example 9</td>
<td>Basic Three-way Branching</td>
<td>2</td>
</tr>
<tr>
<td>Example 10</td>
<td>Pre- and Post-Test Sequencing with New Content for Remediation</td>
<td>1</td>
</tr>
<tr>
<td>Model 1</td>
<td>Remediating Multiple TLOs</td>
<td>2</td>
</tr>
<tr>
<td>Model 2</td>
<td>Mastery Testing Multiple TLOs</td>
<td>1</td>
</tr>
<tr>
<td>Model 3</td>
<td>Pre- and Post-Test Sequencing with TLOs</td>
<td>1</td>
</tr>
<tr>
<td>Model 4</td>
<td>Traditional CBT Branching with Multiple Decisions</td>
<td>1</td>
</tr>
<tr>
<td>Model 5</td>
<td>Customized Learning Using Three-Way Branching</td>
<td>1</td>
</tr>
</tbody>
</table>
7.2. ILE Content Metadata Requirements

To meet the Navy’s short and long term plans and strategy for the ILE, the metadata approach is structured around an information-centric methodology. This methodology is the foundation of the ILE-ISA architecture that is a Services Oriented Architecture conforming to the DoD’s Global Information Grid (GIG) initiative. A major component of this architecture is the definition of metadata for many aspects of the system and content, as well as the physical and logical components to store metadata and execute software actions using metadata.

The description provided in this section is a summary of the ILE-ISA metadata architecture, and the specification of metadata standards that must be followed for all ILE content design, development, and deployment. A complete description of the metadata registry and schema architecture and standards is described in full in the Navy ILE Content Metadata Guide for Development and Delivery.

7.2.1. Architecture Overview

Metadata is data about data. It provides additional information on context and characteristics of data and information items. Following this definition, we can describe the source of data, both human and machine, as well as time-sensitive issues like expiration of approval or legal standing. In addition, we can describe how the data is intended to be used, as well as the key business processes associated with the data and metadata. Consequently, an organized framework of definitions is needed to effectively identify, manage, and use metadata within the ILE.

The ILE metadata architecture uses distinct schema types and within each schema there are three primary categories of metadata elements. Every schema will have a different proportion of these three categories of elements, but all are typically included in a schema regardless of the type of schema. These metadata element categories are:

- **Administrative**: Describes the characteristics of the entity relating to what it is and where it came from as in a library’s card catalog, e.g. author, title, date, security, etc.

- **Subject Matter**: Describes the topic of the entity or what it is about, such as METOC forecasting, Sonar LOFARGRAM analysis, physics, etc.

- **Process**: Describes the process state or attributes of a process such as being edited, approved for publication, student is taking a course, etc.
These schema and metadata element types represent the necessary metadata structure for content to be identified and distributed based upon Sailor specific data, including identified tasks, skills, knowledge levels, and other applicable information. The combination of the three schema types provides an integrated description of ILE components and content that allows the ILE to deliver learning content uniquely addressing the individual needs of each Sailor. This metadata architecture is the glue that binds the ILE and ensures that it is a scalable framework accommodating emerging technologies, changes in strategic goals, and required adaptations of content and methods.

Development and configuration management activities are dependent upon the content schema elements and their affiliated metadata. This section describes the required schemas for all ILE content and defines their metadata elements, both mandatory and optional.

In an effort to maintain alignment with accepted standards, the content schema specification uses SCORM 2004 as its foundation. While SCORM 2004 is a highly optimized reference model for object-based content, it lacks certain specific definitions that are critical to the ILE. So the Navy has used the extensibility of the SCORM 2004 model to build upon its core schema using Navy required metadata elements and allowed values. This extension does not alter the basic structure or rule basis of SCORM 2004 since it uses the existing SCORM method for extensions (section 9 of reference model, Classification). This customized version is named Navy-SCORM which will be used throughout the specification series and within this document. In addition, SCORM is based on the IEEE Learning Object Metadata (LOM) specification which has a broader set of metadata element value spaces. If not otherwise stated in SCORM, these LOM value spaces will be used as the base set for each element in the Content schema as appropriate.
7.2.2. Content Schema Elements

There are three main ILE content objects:

- **Asset**: Per the SCORM 2004 specification, an asset is a file of learning content and the base component of a SCO. This file can be a text file, image, or other multi-media item in one of the allowed file formats specified elsewhere in this document (e.g. pdf, doc, ppt, htm, etc).

- **Terminal Learning Object (TLO)**: Per Navy definition, the TLO serves as the smallest aggregation of content necessary to satisfy a specific Terminal Learning Objective.

- **Enabling Learning Object (ELO)**: Per Navy definition, the ELO serves as the smallest aggregation of content necessary to satisfy a specific Enabling Learning Objective. The Navy ELO is equal to the Sharable Content Object (SCO). Per SCORM 2004 conventions, a SCO represents the smallest *Navigable and tracked* piece of content addressed within the ILE. It is at the SCO level that a large percentage of content sharing occurs.

![Figure 3.7 Content Element Terminologies](image)

Figure 3.7 Content Element Terminologies
7.2.2.1. Navy-SCORM Extensions

The key extensions in Navy-SCORM involve domain specific definitions of subject matter and business process characteristics. These specific definitions are addressed through the application of accepted taxonomies of allowed values for the CLASSIFICATION element in the SCORM 2004 schema.

Refer to the Navy ILE Content Metadata Guide for Development and Delivery for details and guidance on Navy metadata.

7.3. Summary

7.3.1. Developing Content for ILE

- Apply content sequencing to accomplish desired content outcomes.

Content developed in accordance with this document shall conform to the general ADL SCORM 2004 Conformance Requirements. Additional conformance requirements specific to the Navy ILE are currently under development.
PART FOUR – CONTENT DEPLOYMENT

8.0 DEVELOPER RESPONSIBILITY

8.1. Testing

The sponsoring Navy activity is responsible for ensuring ILE conformance for all learning or knowledge materials intended to run from or within the ILE. Currently the testing process is determined by one of two classes of content development:

1. Externally developed
2. ILE internally developed

For content developed outside the ILE, unless stated otherwise in individual orders, a representative sample of all content will be tested using the ADL Test Suite (available at http://www.adlnet.org). All content submitted for hosting within the Navy ILE must be accompanied by an electronic version of the ADL Test Suite Log files. These three log files will provide the results for the Sharable Content Object (SCO) Run-Time Environment Conformance Test, the Meta-data Conformance Test, and the Content Package Conformance Test.

For content developed within the ILE using embedded authoring or assembling tools, resultant learning materials are native to the ILE and may be assumed to be in accordance with run time requirements. Content may be exported to SCORM standards if the need arises. Importantly, media assets must be in accordance with Navy Marine Corps Intranet requirements and learning object structure and functionality must meet SCO definitions provided in this document. A complete verification of the technical functionality and interoperability of the content will be conducted before submitting to the Navy for final acceptance. For more information on the ILE content testing and content deployment processes, visit the ILE Support Center: https://ile-support.nko.navy.mil

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

8.2. Content Packaging

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

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

1. A manifest that lists all of the resources or assets you want to include in the package, the content structure you created (called the organization), the sequencing and navigation rules, and references to all of the metadata for the ELOs, the TLOs, and the package itself
2. All of the actual ELO and asset files for the content package

Preparing your content package is an excellent time to organize all the files you’ve used during the development process, including your ELO and TLO design specifications. Delete or move any incomplete or unused materials, confirm all file names adhere to your naming conventions, and verify that all required metadata fields are complete. Once you’ve organized all of the files, ensure that the programmer can access them with relative ease. Depending on your process, use either a common file server or a CD-R.

Once the programmer has all of the necessary files, the programmer will create a manifest with your base TLO and sequencing rules and will store your metadata in the format required for SCORM. Finally, the programmer will create the package with the manifest and all of your ELO content files. Figure 5: The Object Relationship illustrates the parts of a content package. Once the package is ready, you can, and will, test the package the using the ADL Test Suite (available at http://www.adlnet.org ). All content submitted for hosting within the Navy ILE must be accompanied by an electronic version of the ADL Test Suite Log files. These three log files will provide the results for theSharable Content Object (SCO) Run-Time Environment Conformance Test, the Metadata Conformance Test, and the Content Package Conformance Test.
Content Package

Manifest
(XML document)

```xml
<?xml version="1.0" encoding="UTF-8" standalone="no"?>
<metadata>
  <schema>ADL RIORM</schema>
  <schemaversion>1.2</schemaversion>
  <lom xmlns="http://www.imsglobal.org/imsd_rootv1p2">
  </lom>
  <manifest identifier="Apprentice_Trainer_Course"/>
  <organizations default="xp_man0_toc1">}
```

Organization
Including the structure with sequencing behaviors/rules

RIOs
All the physical files needed for this package

Metadata

Content Package
CD-ROM
Apprentice Trainer Course

Figure 4.1: Parts of the Content Package
8.2.1. Manifest Properties
A well-formed and valid manifest must be verified before a content package is submitted for hosting. IMS has updated the Content Packaging Schema to support the Final Recommendation of the W3C XML Schema specification. Currently, several commercial tools support Schema validation including: Xerces, XML Authority, XML Spy, and Oracle parsers. A visible course title element must exist within the manifest.

The resources described in the manifest are physical assets such as web pages, media files, text files, assessment objects, or other pieces of data in file form. Resources may also include assets that are outside the Package but available through a URL, or collections of resources described by (sub) Manifests. The combination of resources is generally categorized as "content". Each resource may be described in a <resource> element within a manifest's XML. This element includes a list of all the assets required to use the resource, and listing of resources is necessary to ensure content interoperability. The files included in the Package are listed as <file> elements within such <resource> elements. For more information, refer to the IMS Content Packaging Best Practice Guide http://www.imsglobal.org.

8.3. Content Submission Method
Content is provided via FTP (File Transfer Protocol), CD-R or DVD as specified in individual delivery orders. In either case, SCORM content will be delivered as a conformant content package. For more information on the Content Packaging Conformance Requirements, refer to http://www.adlnet.org/ For more information on submitting content, refer to the ILE Support Center: https://ile-support.nko.navy.mil

8.3.1. Deliverables
Content submitted for hosting on ILE will contain the following:

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

For more information please see the deliverables listed at the ILE Support Center under the "hosting" tab.

8.3.2. Directions for Completing the Content Submission Form
The Integrated Learning Environment (ILE) Support Team personnel use the technical support contact information submitted to assign unresolved content problems. Before
content is submitted for hosting within the ILE it is the government sponsor's responsibility to ensure the content provided conforms with ILE technical guidelines and all applicable Department of Defense (DOD), Department of Navy (DON), Navy Marine Corps Intranet (NMCI), or higher echelon's requirements such as accessibility or mobile code risk.

Please reference for more information regarding content submission guidelines.

- **General Information**
  - **Full Content Title**: Provide the full title and complete spelling of all acronyms.
  - **Content Identification Number**: If applicable, provide the Course Identification Number (CIN) or other identifier assigned.
  - **Content Type**: For fully developed courses, select 'Complete Course' from the drop down menu. For one or more learning objects and/or modules that stand alone and could be aggregated into larger contexts, select 'Learning Object(s)' from the drop down menu. For resource packages consisting of only assets and meta data, select 'Learning Resource(s)' from the drop down menu.
  - **Submission Type**: Select 'Initial Submission' if this is the first time the content is being submitted for hosting within the ILE. Select 'New Version' if the content was previously hosted on ILE or is presently hosted within the ILE and the content submitted is an update to an existing course (e.g. content subject matter, structure, or sequence has changed). Select 'Additional Version' if the content is being submitted as a separate instance of an existing version (e.g. Navy version of the content was already submitted, and this is the USMC version). Select 'Replacement Version' if the content was is presently hosted within the ILE and the content submitted is an update to an existing course (e.g. content subject matter, structure, or sequence is the same, but the content required technical fixes or other corrections, etc.).
  - **Content Version**: Provide the version number of the content (e.g. initial submissions would start with 1.0; updates and revisions would continue at 1.x; new versions will be sequential 2.0, 3.0, etc.)
  - **Instructional Hours**: Provide the estimated instructional hours for completion of the content.
  - **Continuing Education Units**: If applicable, provide the total CEUs assigned. Continuing Education Units were established to quantify continuing education and training activities.
  - **Objectives**: List all of the learning objectives the content satisfies.
  - **Prerequisites**: Provide any curriculum activities (e.g. formal classroom training, web-based courses, etc.) to be completed before experiencing this content.
  - **Target Audience**: Select the target audience to which the content is directed. If the target audience is not listed here, please add your target audience in the
'other' text field below the list. Select multiple items from the list by left-clicking the mouse + SHIFT or left-clicking + CTRL.

- **Content Category**: Select the content category from the list. If the category desired is not listed here, suggest a new category in the 'other' text field below the list. Select multiple items from the list by left-clicking the mouse + SHIFT or left-clicking + CTRL.

#### Technical Information

- **Submission Method**: Content may be submitted via HTTP (Hyper Text Transfer Protocol) or FTP (File Transfer Protocol) to expedite testing. However, the final deliverable must include a CD (Compact Disc) copy.

- **Minimum System Requirements**: Specify content compatibility with operating systems and browsers. Specify content requirements for web technologies utilized during development, authoring tools, and any plug-ins required at runtime. Select multiple items from the list by left-clicking the mouse + SHIFT or left-clicking + CTRL.

#### Functional Requirements

- **Content Format**: Select the content delivery format from the list. For generic web-based content, select other from the list and specify. Generic web-based content can be tracked through the ILE with a prompt that allows the user to determine the completion status.

- **Total Learning Objects**: Select the total number of learning objects (e.g. ELOs, TLOs, manifests, etc.) from the list.

- **Total Content Objects**: Select the total number of Learning Objects (e.g. SCOs, ELOs, TLOs, Assignable Units, etc.) from the list.

- **Total Scoring Objects**: Select the total number of scoring objects (e.g. Any SCOs or Assignable Units that set a raw score such as Assessments, Quizzes, Tests, etc.) from the list. An answer key is required for all assessments and must be included with each content submission package.

- **Completion Requirements (Roll up)**: The process of determining the tracking status of a parent activity based on the tracking status of the child is supported by SCORM 2004 and ILE NCOM. There may be different methods to determine if a student has completed a course or not. The ILE has the ability to provide configuration options at the course level in order for the LMS to determine the appropriate completion status to set on a course transcript.

- **Completion Threshold**: This value allows the ILE administrator to set a completion threshold. SCORM 2004 supports multiple logic choices for course completion.

- **Bookmarking**: For each session, in accordance with SCORM 2004.

#### Conformance & Validation

- **Content Certification**: Certification is independent testing that provides consumers of distributed learning products and content with the assurance
that certified products have successfully implemented the SCORM 2004. For some highly desirable, commercial off the shelf media, content will be conformant with Aviation Industry CBT Committee (AICC) standard or earlier Sharable Content Object Reference Model (SCORM) specifications. The AICC certifies training products that conform with AICC Guidelines and Recommendations (AGR’s) via its independent test labs.

- **Conformance Level:** (AICC or SCORM Content Only) Select the highest conformance level supported by any of the content being submitted.

- **Content Package Type:** (SCORM Content Only) Select the type of content package being submitted. Aggregation Packages are considered to be courses or content that is intended to be tracked. Resource Packages are packages consisting of assets that may be used to populate the ILE learning content repository.

- **Content Package Conformance:** (SCORM Content Only) Ensure that all SCORM content packages submitted are conformant. Non-conformant SCORM content packages are not acceptable and may be returned. Select 'ADLCP-PIF1' if the content has been certified. Select 'PIF Not Certified' if the content was placed into a Packaging Interchange File, but isn't certified by ADL. Select 'Non-PIF' if the content wasn't placed into a Packaging Interchange File.

- **Meta Data:** All content will conform to SCORM 2004 Learning Object Metadata (IEEE 1484.12.1-2002)

- **Course Meta Data:** Ensure that course description meta data is provided. For non-SCORM content, provide metadata to meet SCORM 2004 LOM.

- **Section 508 Accessibility Conformance Level:** Select the level of conformance (refer to http://www.w3c.org for conformance levels). All content should at a minimum meet all Priority 1 Checkpoints identified in W3C Web Accessibility Guidelines version 1.0. If content providers cannot meet all Priority 1 Checkpoints, they should provide written documentation identifying those checkpoints they were able to implement. For non-accessible content, select 'none satisfied.' A written waiver detailing the "undue burden" is required for all non-accessible content.

- **Accessibility Validation:** Select the Accessibility validation tools used. Select multiple items from the list by left-clicking the mouse + SHIFT or left-clicking + CTRL.

- **Validity Testing:** Select the level of web standards testing performed (refer to http://www.w3c.org). Select multiple items from the list by left-clicking the mouse + SHIFT or left-clicking + CTRL.

- **Interoperability Testing:** Select the level of interoperability testing performed prior to submission. Select multiple items from the list by left-clicking the mouse + SHIFT or left-clicking + CTRL.
Security Information

- Security Classification: Top Secret content will not be hosted within the ILE. Secret, Confidential, For Official Use Only (FOUO) content may be hosted within the SIPRNET site. Only unclassified content can be hosted within the ILE.

- Content Segmentation: Specify content access by segment (currently available to everyone).

- Mobile Code Signed: Mobile code content must be signed prior to submission for hosting within the ILE. Developers should review and refer to the following guides for building content destined to run in the ILE: DISA Mobile code FAQs and the Developer’s Guide for Using Mobile Code Technologies in Department of Defense and Intelligence Community Information Systems.

- Mobile Code Risk: If any object certificates were signed, specify the mobile code risk level.

8.4. Summary

8.4.1. Deploying Content

- Test all externally developed content using ADL test suites
- Validate rich media and other assets are NMCI conformant
- Package the content based on SCORM 2004 requirements
- Complete the Content Submission Form
PART FIVE - REFERENCES

9.0 REFERENCES


Merrill, M. D. (1997). Instructional Transaction Theory: An Instructional Design Model Based on Knowledge Objects. In R. D. Tennyson, F. Schott, N. Seel & S. Dijkstra (Eds.), Instructional


SCORM XML Controlling Document - SCORM CAM Version 1.3 Sequencing Extensions XML XSD Version 1.0

SCORM XML Controlling Document - SCORM CAM Version 1.3 Content Packaging Extensions XML XSD Version

SCORM 2004 Photoshop Examples Version 1.1

Sharable Content Object Reference Model (SCORM) 2004 2nd Edition
SCORM 2004 Conformance Requirements Version 1.1

SCORM 2004 Sequencing Test Case Content Package Examples Version 1.1

SCORM 2004 Conformance Test Suite Version 1.3.1 (Self Test)

SCORM 2004 Sample Run-Time Environment Version 1.3.

Sharable Content Object Reference Model (SCORM) 2004 2nd Edition Addendum

10.0 APPENDIX A: GLOSSARY

Below is a glossary of terms to assist you when reading this document.

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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</thead>
</table>
| 5VM          | 5 Vector model—defines the parameters around which a Sailor’s personal and professional development is designed. The 5 Vectors are:  
  ➢ Professional Development  
  ➢ Personal Development  
  ➢ Leadership  
  ➢ Certifications & Qualifications  
  ➢ Performance |
<p>| Ability      | Enduring attributes of the individual that influence performance and enable the performance of tasks.                                                                                                          |
| ADL          | The Advanced Distributed Learning (ADL) Initiative—collaborative effort between government, industry and academia. Its goal is to establish a new distributed learning environment that permits the interoperability of learning tools and course content. |
| Aggregation  | Content Aggregation is the process of aggregating resources (SCO/ELOs) into a defined structure (content structure) to build a learning event. An aggregation is a grouping of related ELOs, along with the rules that control the presentation of the grouped material to the learner. A learning event can be constructed recursively; hence a content structure has the shape of a tree, with ELOs/SCOs forming the leaves and aggregations (TLOs) representing the nodes. |
| API          | Application Programming Interface                                                                                                                                                                         |
| Asset        | A single media element or text element (e.g. an image, audio file, or html file) that can be delivered to a Web client.                                                                                         |
| Assessment   | The process used to systematically evaluate a learner’s skill or knowledge level (ASTD).                                                                                                                       |
| Post Assessment | Any activity designed to be taken after a learning event to confirm that a learner has mastered either the enabling objective at the IO level or the terminal objective at the LCO level. |</p>
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assesment instruments</td>
<td>Items that are grouped together to form tests, quizzes, exams, or simulations for the purpose of assessment.</td>
</tr>
<tr>
<td>Assessment item</td>
<td>Each individual question or task the student is asked to address for assessment purposes.</td>
</tr>
<tr>
<td>CBT</td>
<td>Computer Based Training</td>
</tr>
<tr>
<td>CMI</td>
<td>Computer Managed Instruction</td>
</tr>
<tr>
<td>Cognitive Apprenticeship</td>
<td>Model where experts and novices interact while focusing on a realistic, job-related task to develop the learner’s essential cognitive skills.</td>
</tr>
<tr>
<td>Community of practice</td>
<td>A self-organized, deliberate collaboration of people who share common practices, interests or aims and want to advance their knowledge. When the community proves useful to its members over time, they may formalize their status by adopting a group name and a regular system of interchange. <a href="http://www.sims.berkeley.edu/courses/is213/s99/Projects/P9/web_site/glossary.htm">www.sims.berkeley.edu/courses/is213/s99/Projects/P9/web_site/glossary.htm</a></td>
</tr>
<tr>
<td>Concept maps</td>
<td>A graph that represents knowledge, with nodes representing concepts and arrows representing relations between the concepts.</td>
</tr>
<tr>
<td>Content repository</td>
<td>Storage facility for digital objects and files made searchable by using metadata.</td>
</tr>
<tr>
<td>Enabling objective (EO)</td>
<td>Smaller objective that forms a part of a terminal objective. In our model one ELO addresses each enabling objective.</td>
</tr>
<tr>
<td>ELO</td>
<td>Enabling Learning Object—a collection of one or more Assets with instructional treatment applied to satisfy one and only one Enabling Objective.</td>
</tr>
<tr>
<td>GFI/M</td>
<td>Government Furnished Information/Material—materials provided to contracted designers and developers for the creation of ILE content</td>
</tr>
<tr>
<td>HPSM</td>
<td>Human Performance System Model—cyclical four step process of navy training: Define requirements Define solutions Develop components Execute and measure</td>
</tr>
<tr>
<td>ID</td>
<td>Instructional Designer—one who analyzes instructional problems and designs their solutions</td>
</tr>
<tr>
<td>IDC</td>
<td>Instruction Delivery Continuum—new framework for the delivery of instructional material for the purposes of Navy training.</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
</tr>
<tr>
<td>--------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>IDP</td>
<td>Individual Development Plan—A document that includes an assessment of current skills, and a timeline and sources for development to achieve future goals. Outlines the way in which the employee will develop the knowledge, skills, and abilities needed to meet changing organizational needs and environmental demands and/or prepare to achieve future career goals (<a href="http://www.goer.state.ny.us/workforce/glossary.html">www.goer.state.ny.us/workforce/glossary.html</a>).</td>
</tr>
<tr>
<td>ILE</td>
<td>Integrated Learning Environment—The Navy Integrated Learning Environment has been established to provide the technical and administrative infrastructure for the acquisition, development, storage, maintenance, and distribution of learning content.</td>
</tr>
<tr>
<td>IMS</td>
<td>Worldwide non-profit organization which develops and promotes the adoption of open technical specifications for interoperable learning technology</td>
</tr>
<tr>
<td>Instructional Strategy</td>
<td>All materials, methods, activities, and assessments chosen to support a specific learning goal.</td>
</tr>
<tr>
<td>ISD</td>
<td>Instructional Systems Design—an arrangement of resources and procedures so as to promote learning</td>
</tr>
<tr>
<td>JTA</td>
<td>Job Task Analysis - Is the standardized process that examines a specific job to identify all the responsibilities and task requirements of a job in an organization. It is a systematic procedure used by Industrial and Organizational Psychologist, Human Resource, or Personnel Managers to describe important aspects of the job regardless of the person in the job.</td>
</tr>
<tr>
<td>Learner-centric</td>
<td>Learning designs which allow the learner to have control of the learning experience by making choices as to what will be learned, the order of material presentation, and/or the method of delivery, and which ideally support a wide range of learning needs or styles; also, learning designs which adjust the presentation materials in response to the learner's knowledge or skill level.</td>
</tr>
<tr>
<td>Learning event</td>
<td>Any event or activity planned with the goal of learners acquiring new knowledge, gaining or improving skills or abilities, and/or changing behaviors or attitudes. A learning event will include either an enabling or a terminal objective.</td>
</tr>
<tr>
<td>Learning Object</td>
<td>&quot;Any digital resource that can be used to mediate learning.” (Wiley and Edwards, 2002)</td>
</tr>
</tbody>
</table>
See also SCORM, LOM. |
<p>| Mental Models | Representations in the mind of real or imaginary situations. (Craik, 1943). |
| Metacognition | The process of monitoring and controlling our cognitive processes, or the process of thinking about thinking (Schwartz &amp; Perfect, 2002) |</p>
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metadata</td>
<td>Descriptive information about a piece of data that is not usually visible to the user for “purposes of description, administration, legal requirements, technical functionality, use and usage, and preservation (Getty).” Metadata is designed to help locate, organize, access, and use data effectively.</td>
</tr>
<tr>
<td>Metatag</td>
<td>Identifies metadata.</td>
</tr>
<tr>
<td>NMETL</td>
<td>Naval Mission Essential Task List</td>
</tr>
<tr>
<td>NCOM</td>
<td>Navy Content Object Model—a reusable object model having a primary goal to maximize the reuse, repurpose and reference (R3) value of objects.</td>
</tr>
<tr>
<td>OJT</td>
<td>On the Job Training.</td>
</tr>
<tr>
<td>Performance-based outcomes</td>
<td>Learner outcomes that are observable with demonstrated objectives or behaviors that are based on standards.</td>
</tr>
<tr>
<td>PQS</td>
<td>Personnel Qualification Standards—a compilation of the minimum knowledge and skills that an individual must demonstrate in order to qualify for watch standing or perform other specific routine duties necessary for the safety, security, or proper operation of a ship, aircraft, or support system.</td>
</tr>
<tr>
<td>R3</td>
<td>Reuse, Repurpose, and Reference—overarching tri-fold goal for learning objects within the Navy ILE</td>
</tr>
<tr>
<td>Reuse</td>
<td>The reuse of an existing learning object in a new context without any modification to its instructional treatment, context, or content, and is able to “stand-alone.” It can be used across communities for many different learners.</td>
</tr>
<tr>
<td>Repurpose</td>
<td>The reuse of an existing learning object in a new context after modifying its instructional treatment, context, or content.</td>
</tr>
<tr>
<td>Reference</td>
<td>A validated information source in the form of a learning object for generating ideas or simply as a resource in the similar manner that one would use a reference in a traditional development effort.</td>
</tr>
<tr>
<td>Repository</td>
<td>See content repository.</td>
</tr>
<tr>
<td>RIT</td>
<td>Revolution in Training</td>
</tr>
<tr>
<td>SCO</td>
<td>A Shareable Content Object within SCORM. Generally equivalent to a ELO.</td>
</tr>
<tr>
<td>SCORM (2004)</td>
<td>The Sharable Content Object Reference Model (SCORM 2004) defines a Web-based learning &quot;Content Aggregation Model&quot; and &quot;Run-Time Environment&quot; for learning objects. The SCORM is a collection of specifications adapted from multiple sources to provide a comprehensive suite of e-learning capabilities that enable interoperability, accessibility and reusability of Web-based learning content.</td>
</tr>
<tr>
<td>SCORM CAM</td>
<td>SCORM Content Aggregation Model—describes the assembly, description, and packaging of content as SCORM Assets, SCOs, and higher aggregations. This task is accomplished through the creation of XML documents according to the SCORM meta-data requirements (LOM).</td>
</tr>
<tr>
<td><strong>SCORM LOM</strong></td>
<td>SCORM Learning Object Meta-Data (LOM)—inline XML specification for the description of aggregations of content as well as individual media. LOM metadata provides the means for the identification retrieval and subsequent reuse of content.</td>
</tr>
<tr>
<td><strong>SCORM RTE</strong></td>
<td>SCORM Run-time Environment—technical specifications in SCORM for the content launch process, standardized communication between content and LMSs and standardized data model elements used for passing information relevant to the learner’s experience with the content.</td>
</tr>
<tr>
<td><strong>SCORM SN</strong></td>
<td>SCORM Sequencing and Navigation (SN)—describes how SCORM-conformant content may be sequenced to the learner through a set of learner or system-initiated navigation events.</td>
</tr>
<tr>
<td><strong>Sequencing</strong></td>
<td>Describes and prescribes the manner in which the learner receives content.</td>
</tr>
<tr>
<td><strong>Skill</strong></td>
<td>Developed capacities that facilitate learning or the more rapid acquisition of knowledge or that facilitate performance of activities.</td>
</tr>
<tr>
<td><strong>SkillObject</strong></td>
<td>A re-usable detailed description of what people do in accomplishing work. A SkillObject contains logically grouped knowledge, skills, abilities, tools and tasks (2-10) that are required to successfully perform a job.</td>
</tr>
<tr>
<td><strong>SME</strong></td>
<td>Subject Matter Expert—a person who helps to formulate or verifies domain-specific instructional content in his or her area of expertise.</td>
</tr>
<tr>
<td><strong>Task</strong></td>
<td>The most specific level of behavior in a job that describes the performance of a meaningful job function in terms of a specific action applied to a particular object. The behavior must be observable, have a definite beginning and end, and result in a completed work action or a measurable work product (either the performance can be observed or the results of the performance can be seen and measured).</td>
</tr>
<tr>
<td><strong>Task Force EXCEL (TFE)</strong></td>
<td>The Task Force for Excellence through Commitment to Education and Learning (EXCEL)—body in charge of overseeing the implementation of the pilot programs designed enhance and strengthen the Navy’s training and education structure.</td>
</tr>
<tr>
<td><strong>TLO</strong></td>
<td>Terminal Learning Object—a collection of one or more ELOs which satisfy one and only one Terminal Objective.</td>
</tr>
<tr>
<td><strong>Terminal objective</strong></td>
<td>Desired final outcome (e.g., knowledge or performance-based) of the designed instruction/learning experience. Made up of enabling objectives.</td>
</tr>
<tr>
<td><strong>TO</strong></td>
<td>See terminal objective.</td>
</tr>
<tr>
<td><strong>Unique Knowledge</strong></td>
<td>The enduring information including processes, procedures, or intellectual capital that are not transitory or temporary and are required to perform the SkillObject™. SkillsNET is mainly interested in the Unique Knowledge that is associated with the tasks that are central to the STARs job.</td>
</tr>
<tr>
<td><strong>WBT</strong></td>
<td>Web-based Training</td>
</tr>
<tr>
<td>XML</td>
<td>Extensible Markup Language—universal format for exchanging structured documents and data on the Web. XML uses HTML-like tags to delimit bits of data, but unlike HTML, leaves interpretation of that data to the applications that read it.</td>
</tr>
</tbody>
</table>
10.1. APPENDIX B: Additional Resources

10.1.1. SCORM Resources for Instructional Designers

For complete and explicit information on implementation of the SCORM CAM, the SCORM RTE, and the SCORM SN IDs and developers should consult the ADL Web site www.adlnet.org to download and review The SCORM Implementation Guide (IG): A Step by Step Approach. The SCORM IG is written specifically for IDs responsible for SCORM implementations. The SCORM IG document is available in PDF format on the ADL Website via the ADL Resource Center. It can be found within the "SCORM" pull-down menu under the heading "Guidelines."

Additionally, IDs and content developers should consult the Carnegie Mellon Learning Systems Architecture Lab at http://www.lsal.cmu.edu/lsal/expertise/projects/developersguide/ to download the SCORM Best Practices Guide for Content Developers. Specifically, IDs and content developers should completely read and understand this guide prior to beginning the ISD process. This will allow IDs and content developers to design and develop content using many different sequencing options that are conformant with the SCORM 2004 standards.
10.2. APPENDIX D: Instructional Design and Assessment Strategy for the Apprentice Trainer Course

Because the Apprentice Trainer Course is part of the larger Instructional Delivery Continuum (IDC), the instructional design of the Apprentice Trainer Course was done in conjunction with the design of the IDC. The designer used information from a job task analysis to fully understand the job requirements of the trainee. In the case of the Apprentice Trainer Course, the designer wrote objectives based on the results of the job task analysis. As a result of understanding the job requirements, the objectives, the target audience, and the learning environment, the following instructional design was developed:

The instructional design of the Apprentice Trainer Course will be based on guided discovery architecture. Throughout the continuum participants will engage in situations (sometimes simulated and sometimes real) in which they create and implement a solution, experience the consequences of their choices, reflect on the results, and revise their approach to instruction. This design architecture will help participants build the appropriate mental models necessary to become exceptional instructors and managers of training.

Participants will engage in a variety of learning activities where they will process information in light of their expanding knowledge base and experiences. Providing appropriate support scaffolding is a critical component of guided discovery architecture. IDC participants will find support in a variety of elements including a combination of web-based instruction (WBT), required readings and other professional activities, practice exercises with feedback in actual performance settings, a process of self-assessment to encourage continuous improvement, and interaction with other participants in the course and the IDC. Trainees will be guided by a training mentor, a senior trainer who, by sharing their own experiences and by supporting or challenging the underlying beliefs of the participant in the context of each learning experience, assists participants in generating meaningful relationships between the concepts and principles they are learning and their experiences in training.

The delivery of the Apprentice Trainer Course will be a combination of self-paced web-based training (WBT), on-the-job training, and communication within their community of practice. The WBT will be designed with practical application in mind. The WBT will not simply convey information to students. It will encourage students to think about practical application of these concepts as they engage in their own practice. A menu of practice exercises appropriate for the apprentice level will be provided to accommodate the variety of operational environments in which students will be learning. The WBT will also present students with practical problems that they can use as a vehicle to discuss learning issues with experienced instructors at their command or other continuum participants via email or other web-mediated communication. To further encourage interaction within the participant’s professional community and increase the transfer of
learning, learning and practice will, whenever possible, occur within the operational environment where the student has a requirement to apply these new skills.

An important professional aspect of the IDC is the development of the reflective practitioner. This means the student is always evaluating his or her own progress. An Individual Development Plan (IDP) will facilitate the development of this skill as well as the development of the participant. Core competencies from the job task analysis will be identified in the IDP, so participants have a tool to self-assess their strengths and weaknesses and help them set realistic goals throughout the continuum. As they evaluate their progress and set goals, they will identify appropriate knowledge and experiences they need to meet their developmental goals. Training mentors will assist in the IDP process.

As part of the assessment strategy, a Practice is included at the end of each topic throughout the WBT. However, Practices are not just to assess student knowledge, but to challenge students to think about how they would apply what they are learning to a situation. This will help students to make the information they are learning meaningful to them in terms of the job they will be performing. In addition to Practices, there are Skill Tests throughout the Apprentice Trainer Course that identify specific competencies being tested, the tasks the student must complete with required mentor review and sign off, and the final skill that will be demonstrated. Students are evaluated by their mentors using an evaluation sheet. Performance is informally assessed throughout the course through practical exercises where students demonstrate skills they are learning, receiving naturalistic feedback from their own students and from their mentors. A final knowledge test is administered when the student feels they have mastered the course.

The instructional strategy includes the organization of the content by Lessons and Topics and objectives written for each. These appear in the Table 2.1: EOs Identified For One Lesson Of The Apprentice Trainer Course.
10.3. APPENDIX E: Instructional Design Theories

10.3.1. Conditions-based Theories
While there is no one learning taxonomy that has been thoroughly tested and accepted in the instructional design community, Gagne’s Conditions-based Theory (different types of learning requires different types of conditions) is often used as a basis for other instructional design theories. Essentially, the Conditions-based Theory assumes that there are different types of learning and learning outcomes that can be classified and described in discrete groups primarily distinguished by the cognitive requirements of the learning and learning outcomes placed on the learner. These requirements are usually reflected in the learning objectives and can be supported by discrete instructional methods. The job of the ID is to determine the goals of instruction, categorize goals by outcome category, and select strategies that have been suggested as being effective for the category of learning outcome. These theories serve a critical foundational function in determining the overall design and more specifically, the approaches to address individual objectives within a learner-centered design.

10.3.2. Gagne’s Five Categories of Learning Outcomes
Gagne (1988) identified five categories of learning outcomes. These outcomes represent different learning capabilities, intellectual skills, verbal information, cognitive strategy, attitudes, and motor skills. Gagne argues that there is a difference in how each outcome should be taught, particularly in terms of the kind and amount of practice required and the role of meaningful context. Gagne and Glaser (1987, in Ragan & Smith, 2004) suggest different external learning conditions be designed for the different types of learning. For example, learning intellectual skills requires learning conditions that promote retrieval of prior knowledge, guidance, demonstration of application by students, feedback to student on student performance, and periodic review of the information. Verbal information requires conditions that require students to retrieve context, allow students to demonstrate they have constructed new knowledge, and provides feedback on the students’ performance. Cognitive strategies call for retrieval of context of meaningful information, increasingly difficult novel problem situations, student demonstration of their problem solutions, and feedback to students (Ragan & Smith, 2004).

10.3.3. Bloom’s Taxonomy
Bloom’s taxonomy is an early example of a conditions-based design approach and one which most IDs are familiar with. Bloom identifies three types of learning: cognitive, affective, and psychomotor. Within each is a taxonomy of learning. The cognitive taxonomy is probably the most recognizable. Cognitive learning can be categorized in the following levels: knowledge, comprehension, application, analysis, synthesis, and evaluation. Each level describes the cognitive processing that is required of the student and instructional activities should be selected according to the level at which learning has been identified. For example, if students must apply content they are learning, then activities are built into instruction that require the learner to use the content in different ways (e.g., solving practical problems or completing a practical exercise).
10.3.4. Merrill’s Component Display Theory

Merrill uses content by performance matrix to classify learning outcomes. There are four content types in the matrix (facts, concepts, principles, and procedures) and three levels of performance (remember, use, and find), making twelve distinct categories of objectives. This matrix allows the ID to determine what level of performance is required for each level of content. Component Display theory also classifies presentation forms as primary or secondary. There are four Primary presentation forms—rules, examples, recall, and practice. Secondary presentation forms generally expand on the primary presentation form and include prerequisites, objectives, helps, and feedback. A combination of primary and secondary presentation forms provides the best mix to ensure the acquisition of the skills and knowledge available to meet each component in the matrix.

10.3.5. Learner-centered Approaches

The basis of learner-centered approaches is constructivist thinking which says that learners construct their own meaning by interpreting new experiences in context of the learning environment, what they already know, and their prior experiences. General constructivist instructional design guidelines include:

- Learning activities promote active construction of knowledge.
- Learning is situated in a relevant and realistic context for the learner.
- Different perspectives on the same issues should be presented to the learner for consideration. The same information should be provided in different contexts.
- Feedback is essential between the learner and the instructor and between learners through cooperation and collaborative activities.

Constructivist approaches are learner-centered and require the ID to create a learning event where learners interact with the content in a meaningful way to help them construct a mental model of the content. By focusing the instructional event on the process of learning rather than the product (frequently some measure of what the learner has learned), cognitive processing of the content is encouraged. Mayer (1999) identifies three primary cognitive processes the learner needs to engage in: selecting the relevant information, organizing the information, and integrating the information into existing knowledge structures.

There are many ways to engage the learner in these cognitive processing activities. Mayer (1999, p. 154) suggests the following instructional methods to engage the learner in selecting the appropriate material:

- Font changes to show organization and highlight important points
- Questions and objectives to focus attention
- Summary paragraphs prior to a reading

To help students organize material Mayer (1999, p. 154) suggests:

- Outlines
- Headings
- Text structure
Pointing words
Clearly identifying steps

To help students integrate material Mayer (1999, p. 155) suggests
- Advance organizers
- Illustrations and animations
- Worked-out examples
- Elaborative questions

In a constructivist learning environment, coaching and scaffolding to support learner construction of understanding is essential. Jonassen (1999) suggests that scaffolding can be integrated into instruction through the use of:
- Information resources,
- Collaboration tools,
- Consideration of familiar and related cases,
- Tools to facilitate problem solving (e.g., help learners represent or organize the problem or help them automate some aspects of the solution),
- Providing hints and cues,
- Tutorials,
- Providing advice from experts, and
- Guiding questions

Two examples of learner-centered designs are problem-centered designs and cognitive apprenticeship. Both are briefly explained below.

10.3.6. Problem-centered Designs

Generally, problem-based learning requires presenting the problem scenario, forming teams (if possible), providing support for the teams’ efforts, and reflecting on the results of the individuals’ and teams’ efforts, etc. Problem-based learning is a constructivist approach in that students construct understanding as they solve the problem. The problem and how students solve the problem drive the learning. Merrill (2002) describes four phases of effective problem-centered instruction that should be incorporated into the design:

- Activation of prior experience
- Demonstration of skills
- Application of skills
- Integration of these skills into real-world activities

Problem-based learning centers problems that are relevant and realistic to learners. All learning occurs in the context of solving this problem. The selected problem should be at an appropriate level of difficulty for the learner and subsequent problems should build in difficulty and complexity. As instruction is designed, activities must be included to promote the acquisition of essential foundational knowledge if necessary (e.g., through tutorials and demonstrations).
Reflection on the processes used by the learner is an essential part of a problem-based learning strategy (Reigeluth and Moore, 1999). Learners need to reflect on the learning process: consider the effectiveness of the problem solving process they used, how this process could be improved, how other students solved the problem and the advantages and disadvantages of those approaches, and how expert problem solvers have approached the problem. This can be accomplished by asking learners to: (Jonassen, 1999)

- list and explain their assumptions
- list and explain their problem solving strategies
- explain how and why they used a tool to solve the problem
- explain alternative responses and why these responses were not selected
- rate how confident they are in their responses

Merrill (2002) goes further to suggest principles of instruction to follow when using a problem-centered approach. Merrill presents these principles in the form of questions IDs can ask themselves as the instructional event is being designed. If the answer to these questions is “yes”, then learning (and performance) is likely being promoted by the problem-based design (Merrill, 2002, p. 40):

- Is the content presented in the context of real-world problems? Are learners shown the problem, engaged at the task as well as the operation level, and involved in the progression of problems?
- Does the content attempt to activate relevant prior knowledge or experience? Are learners directed to recall relevant past experience or provided relevant experience? Are they encouraged to use some organized structure?
- Does the content demonstrate what is to be learned rather than merely telling information about what is to be learner? Are the demonstrations consistent with the instructional goals? Is learner guidance employed? Do media enhance learning?
- Do learners have an opportunity to apply their newly acquired knowledge or skill? Is the application consistent with the instructional goals, and does in involve a varied sequence of problems with feedback? Are learners provided with gradually diminished coaching?
- Does the content provide techniques that encourage learners to integrate (transfer) the new knowledge or skill into their everyday life? Do learners have an opportunity to publicly demonstrate their new knowledge? reflect on their new knowledge, and create new ways to use their new knowledge?

10.3.7. Cognitive Apprenticeship

Cognitive apprenticeship capitalizes on the age-old apprenticeship model to promote learning in the cognitive domain. Essentially, experts and novices interact while focused on completing a realistic, job-related task to develop essential cognitive skills. Collins et al. (1989, p. 456) define cognitive apprenticeship as “learning-through-guided-experience on cognitive and metacognitive, rather than physical, skills and processes.” There are several cognitive apprenticeship models that exist, but most share the
following features (Biehler & Snowman, 1977; Clark, 1998; Hackbarth, 1996; Woolfolk, 1998).

- Many learning activities are problem-centered.
- Problems are presented in a real-world context.
- Students observe experienced personnel model job behaviors.
- Student learning is supported through mentors or coaches.
- Support to learners gradually fades as learners become more competent and proficient.
- Students continually articulate what they are learning.
- Students reflect on their progress toward developing expert-like cognitive structures.
- Students observe and make their own errors in the real world environment and receive naturalistic feedback.

These features suggest that a blending of methods (beyond computer-based) be incorporated into a cognitive apprenticeship design including:

- Learners shadow Subject Matter Experts (SMEs) during their normal work routine
- SMEs articulate their thinking to learners as they solve a problem
- Learners use a checklist to identify specific behaviors, steps, or tasks, as they observe a SME completing a task
- Learners perform a task under instruction, being allowed to succeed or fail as appropriate (and safe) to gain naturalistic feedback
- Learners talk to several SMEs to gain their perspective on solving a real-world problem.
- Learners discuss what they are learning with a SME

Other constructivist based design theories include anchored instruction (Bransford et al., 1990), Goal-Based Scenario’s (Schank, Fano, Bell, & Jona, 1993), and the Four Component Instructional Design Model (van Merriënboer, 1997). No one theory is the best choice all the time, IDs must ask themselves when does each theory work best and what theory, or combination of, is appropriate for the instructional event being designed, taking into account all of the variables affecting instructional design decisions (e.g., audience, learning location, content, and requirements of the job).

10.3.7.1. Performance-based Approach

Regardless of the instructional design theory (or theories) employed, the resulting instructional design should emphasize a performance-based approach. Of course, the reason for training is to better prepare learners for their jobs. This requires that IDs go beyond helping the learner to acquire knowledge, and address job performance requirements. There is likely to be a wealth of knowledge learners must know to do their jobs, but they must learn the knowledge in the context of performance. How will the learner use this information? Why do they need to know this? How does it help them do their jobs better? How can job performance be integrated into the instruction?
To integrate job performance issues into the design of the instructional solution, performance objectives must be carefully written to go beyond just the information learners need to do their jobs. Ideally, performance objectives will be based on the tasks of a job. IDs are trained to write objectives based on the information learners must acquire (which is usually based on a job task analysis) and create instruction to make sure learners get that information (Mager, 1997). Often, the “performance” part of a “performance objective” requires the student to answer a test question correctly.

However, IDs have to take performance farther than simply selecting the correct answer on a test. Performance should address job performance. How will the student use the information they are learning? How will they apply it on the job? How will we know they can apply it correctly on the job? The answers to these questions must be reflected in the design of the learning solution created for the Navy’s Integrated Learning Environment.

For example, an OS may be able to perform calculations to plot the ship’s course on a maneuvering board, but they also need to understand how what they are doing works in relation to the other jobs on the bridge. The OS receives information from several stations and must report information to several stations. Teaching situational awareness is much different than teaching how to perform calculations. And, how is this aspect of performance tested? All learning activities should support this approach. Another example is the use of gaming. If a game is integrated into the learning event, then the cognitive processing required to play the game should mirror those required by the job.

The ID must find ways to integrate job-specific tasks into the design of the learning event. Not everything must be learned on the computer. Activities can be designed to get the student away from the computer and actually applying the information they have just learned. A practical exercise takes students into the operational environment where they can see how what they are learning is applied. For example, students may be asked to observe an evolution with the important aspects of the evolution pointed out to them, complete a procedure under instruction, or talk to an expert and get a tour or explanation of a specific procedure. In most Navy operational environments, there will be mentors to provide students with the required feedback on practical exercises, and the naturalistic feedback they receive while on the job is valuable. A practical problem is a short scenario that represents real-world situations students may not normally find themselves in, but are real enough that students should be prepared to solve. Practical problems provide students an opportunity to apply what they are learning in a problem situation where the answer is not always obvious and there may not be one single acceptable solution. Students should talk over their answers with experts or mentors in the respective fields to get feedback on their solutions, and they should probe experts for their approach to solving the problem.
10.4. APPENDIX F: Metacognitive Strategies

10.4.1. Instructional Methods for Promoting Better Metacognitive Skills

The following methods can be included into the instructional design of an Integrated Learning Environment (ILE) learning event to promote the development of metacognitive skills. Including this list in this document is not meant to imply that all methods must be used or that these are the only methods to choose from. There are many methods, and as with all instructional strategies and methods, their application is dependent on the learning situation. Information about the learners, performance requirements, and learning environment should all be considered when selecting methods to promote metacognitive skills.

- Help students focus their attention on important elements. Use highlights, bullets and other features to highlight important points.
- Students create a graphic organizer for themselves (or it could be provided to them) to help structure topics and subtopics or organize information for effective and efficient storage and retrieval.
- Students engage in activities that enable them to process information in a deep and meaningful way. Students should process the information in a manner that is consistent with the way they will process it on the job. For example, if they need to apply the concept of hydraulics in many different situations a problem solving exercise requiring that understanding may be more appropriate than a game to see if they can spell the word correctly. These activities are particularly important for novices or students with poor metacognitive skills.
- Students compare the new information to what they already know – how is it alike or different? How does this change what they know and what they are doing on the job?
- Students describe their problem solving process. Have them compare their process to that of a student who used a different process.
- Students solve a problem then compare their problem solving process to that of an expert.
- Students create outlines, flow charts, or summaries of portions of the content.
- Students put meaning of the content into their own words (e.g., paraphrase).
- Encourage students to create a mnemonic for specific information.
- Provide opportunities for student to check their understanding of the material in ways other than the end of unit tests. Pre-tests are particularly important in helping students assess their knowledge, make good decisions about what material to study, and create appropriate learning goals prior to study.
- Students consider what they learned from the activity (e.g., how they might use what they learned in their jobs) and articulate it to a mentor or fellow student.
- Provide students with an Individual Development Plan (IDP) to help them evaluate their progress and set goals. It is Important for students to learn to identify a goal, intentionally implement a strategy to meet that goal, monitor progress toward the goal, and recognize when they have achieved the goal.
10.4.2. Learner Control

Learners’ metacognitive skills should be considered when making decisions regarding the strategy for learner control of an instructional event. Learners may control how fast they progress through instruction, the path they take through the learning event, or what support tools they decide to access. Learners generally prefer to have full control over their instructional options but often don’t make good judgments about their instructional needs (Schnackenberg, Sullivan, Leader, and Jones, 1998 as cited in Clark, 2003). Learners who are new to the content and/or have poor metacognitive skills have more difficulty in high learner-controlled learning environments than learners with good metacognitive skills. (Clark, 2003).

Decisions concerning the navigational design of a learning event can greatly impact the success of the instruction. Although learners report more satisfaction when they maintain control, it is important for the ID to consider all of the tradeoffs of learner control, including the prior knowledge and metacognitive skills of the target learners, the cost of designing learner-controlled instruction, and the criticality of the skills being taught.

Clark (2003) makes the following recommendations regarding design for learner control:

- Use learner control for learners with extensive prior knowledge or good metacognitive skills and/or in lessons or courses that are advanced rather than introductory (learners will have more knowledge of the content in advanced lessons).
- Design the default navigation to lead to important instructional elements, otherwise, learners may decide to skip them.
- Advise learners on how to proceed based on their responses to test questions to help learners make effective instructional decisions.
- Use links sparingly to supplement a lesson. Links should not be an essential instructional element, as learners may decide not to access them. Also, limit the number of links. Having to select a link and relate the information to the main content may increase learners’ cognitive load and negatively impact learning.
- Allow learners to control the pacing of instruction.
- Use course maps to provide an overview and orient learners.
10.5. APPENDIX G: Characteristics of Good Assessment Practices

10.5.1. Characteristics of Good Assessment Practices

Within the NCOM the connection between learning events and assessment must be aligned so that instruction can be customized for the learner and support flexibility of sharable content objects. The following overarching characteristics guide the development of all types of assessments for the NCOM. Assessments should:

- Be ongoing and integral to the instructional process
- Measure intended outcome, competencies, or mission capabilities
- Be consistent with the learning system and performance goals
- Utilize what we know about the science of learning
  - Develop deep foundation of factual knowledge and strong conceptual frameworks
  - Promote transfer of learning
  - Promote development of mental models
- Provide feedback to learner, instructor, supervisor, course/content manager
- Use methods that match the objectives or intended learning outcomes.
  - Use multiple methods and technologies to emulate or approximate desired performance
  - Select from the array of strategies and methodologies to support the intended outcome
  - Optimize available strategies and techniques to provide feedback
- View technology as an enabler, not a focus
- Incorporate strategies to assess Individuals and teams
- Promote development of metacognitive skills by providing learners with information to facilitate self-monitoring and self-regulation (e.g., strategies to guide learners in examining their processes for problem solving or their strategies for achieving goals).
- Represent essential elements of domain in question (e.g., concepts, definitions, and principles that indicate the learner understands or can apply content).
- Contain adequate sampling of items or tasks that are representative of the content domain to be assessed.

(Based on Gronlund, 1988; Donovan, Bransford, & Pellegrino, 2000; Nitko, 1996; Pellegrino, Chudowsky, & Glaser, 2001).
10.6. APPENDIX H: NCOM Examples of Model of Content Sequencing

Each example section includes an introduction of the example, a content structure diagram representing the example, and the instructional strategy and sequencing rules for the example. The rules are presented in both non-technical language (called Behavior to describe what you want the learner to experience) and technical language (called Sharable Content Object Reference Model (SCORM) Function to describe what will be coded to enable the behavior).

(IDs) can follow the Behaviors in the examples provided, and developers and programmers can follow the SCORM Functions to program the sequencing commands specified by the ID. In some instances, the SCORM Function says “No Unique SCORM Function” for the programmers. This occurs because the ID specifies a behavior that is either internal to the Enabling Learning Object (ELO) or is not impacted by SCORM. Several examples include multiple applications of the rules so you will understand that identical content structure diagrams (or courses, lessons, etc.) can be sequenced in numerous ways.

In this document and in the sequencing rules, we refer to halting the learning in training and requiring manual intervention by the instructor. You might want to use this type of an instructional strategy if you need to prevent the learner from seeing additional content because they require face-to-face interaction with an instructor to ensure they have grasped the material, need assistance beyond that which is available in the remaining content, or will be unable to understand the remaining content without a strong understanding of the content they have completed.

You can accomplish this by creating rules that result in the learner being prevented from seeing any ELO. The way in which manual intervention is implemented will vary by LMS; it is not specified by SCORM, so ensure that you carefully test this functionality before using it.
10.7. **Sequencing Examples**

10.7.1. **Example 1: Single ELO**

This is the most basic Navy Content Object Model (NCOM) structure. A Learning Object Aggregation contains a single Terminal Learning Object (TLO). The ELO may be any size and have any amount of intra-ELO branching or an assessment. This ELO contains one Asset.

![Diagram of Learning Object Aggregation, ELO, and Asset]

---

**Example 1 Rules:**

<table>
<thead>
<tr>
<th>Behavior</th>
<th>SCORM Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>To complete the Learning Object Aggregation, the learner must complete the ELO.</td>
<td>Learning Object Aggregation Rollup: If All Satisfied, satisfied.</td>
</tr>
</tbody>
</table>

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10.7.2. Example 2: ELO with Assets

This example represents an ELO composed of multiple “pages” of assets. The ELO in this example might represent a course comprised of several lessons and an assessment. If you have no instructional requirement to track the learner’s performance in each of the individual lessons (the Assets), then creating your lessons as Assets within a single ELO may meet all of your reusability needs. Within this ELO, the presentation of the Assets does not impact SCORM in any way.

<table>
<thead>
<tr>
<th>Example 2 Rules:</th>
<th>SCORM Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behavior</td>
<td></td>
</tr>
<tr>
<td>To complete the Learning Object Aggregation, the learner must complete the ELO.</td>
<td>Learning Object Aggregation Rollup: If All Satisfied, satisfied.</td>
</tr>
<tr>
<td>To complete the ELO, the learner must complete the assessment in Asset-4 within the ELO.</td>
<td>No SCORM function</td>
</tr>
</tbody>
</table>

---

**EXAMPLE 2:**

![Diagram of ELO with Assets](image)

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10.7.3. Example 3: The Black Box

Example 3 contains no sequencing. It is a single ELO with intra-ELO branching. The intra-ELO branching may be as complex or as simple as the ID defines. With this type of intra-ELO branching, the LMS does not know what happens inside the ELO. This means the LMS cannot track or report the learner’s progress through the content. While this is an effective way to control the learner’s instructional experience, it does not permit the flexibility SCORM seeks to provide.

EXAMPLE 3: The Black Box

![Diagram of Learning Object Aggregation]

All remediation occurs as intraELO branching so there is no impact to interELO sequencing.

This example could be viewed as a CBT lesson packaged as a single ELO. None of the behaviors occurring inside the “black box” is tracked by the LMS. To complete the “lesson,” the learner must receive a score of 100% on the assessment. The learner is remediated from the missed question to the corresponding asset (if Q-1 is missed, the learner remediates to Asset-1, etc.). The learner is allowed two attempts. If the learner fails attempt two, the learner receives the correct answer, and the ELO is marked as passed. Again, this example does not require SCORM sequencing, so these behaviors are not described in the table below.
<table>
<thead>
<tr>
<th>Behavior</th>
<th>SCORM Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>To complete the Learning Object Aggregation, the learner must complete the ELO.</td>
<td>Learning Object Aggregation Rollup: If All Satisfied, satisfied.</td>
</tr>
</tbody>
</table>
10.7.4. Example 4: Multiple ELOs with Assets

You can view an ELO, a TLO, or a Learning Object Aggregation as any “traditional” instructional design component such as a lesson, a module, a unit, a segment, or a course. As a result, you could use Example 4, or any other example in this guide, in several different ways. Example 4 shows two ELOs in Learning Object Aggregation. Here are some of the ways you could interpret the content structure diagram in Example 4:

- Two assessed learning objectives (the ELOs) in a lesson (Learning Object Aggregation)
- Two assessed segments (the ELOs) in a lesson (Learning Object Aggregation)
- Two assessed lessons (the ELOs) in a module (Learning Object Aggregation)
- Two assessed modules (the ELOs) in a course (Learning Object Aggregation)
- Two assessed lessons (the ELOs) in a course (Learning Object Aggregation)
- Two assessed units (the ELOs) in a course (Learning Object Aggregation)

ELO-2 in Example 4 is identical to the ELO in Example 2, showing how these examples can be overlaid to create additional functionality or complexity in a given structure. So, with the ability to “equate” SCORM structures to the traditional instructional design components you are accustomed to working with, and the ability to overlay the examples in this guide, you can essentially create limitless structures of your own.

The rules provided in Application A of Example 4 provide designer-controlled learning while the rules in Application B allow for more learner control of the experience. The set of rules you choose to apply to any example will depend on the learner experience you are trying to create as well as the tracking and training documentation requirements you have.
Example 4 Rules *(Application A)*:

<table>
<thead>
<tr>
<th>Behavior</th>
<th>SCORM Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>To complete the Learning Object Aggregation, the learner must complete ELO-1 and ELO 2</td>
<td>Learning Object Aggregation Rollup: If All Satisfied, satisfied.</td>
</tr>
<tr>
<td>To complete each ELO, the learner must complete the assessments within the ELOs.</td>
<td><em>No SCORM function</em></td>
</tr>
<tr>
<td>The learner cannot start ELO -2 until ELO -1 is complete.</td>
<td>ELO-1: Choice=false; Flow=true</td>
</tr>
<tr>
<td>The learner can return to ELO -1 from ELO -2 at any time.</td>
<td>Learning Object Aggregation: Forward Only=false</td>
</tr>
</tbody>
</table>

Example 4 Rules *(Application B)*:

<table>
<thead>
<tr>
<th>Behavior</th>
<th>SCORM Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>To complete the Learning Object Aggregation, the learner must complete ELO-1 and ELO-2</td>
<td>Learning Object Aggregation Rollup: If All Satisfied, satisfied.</td>
</tr>
<tr>
<td>To complete each ELO, the learner must complete the assessments within the ELOs.</td>
<td><em>No SCORM function</em></td>
</tr>
<tr>
<td>The learner can view the ELOs in any order.</td>
<td>Learning Object Aggregation: Choice=true; Flow=true</td>
</tr>
</tbody>
</table>
10.7.5. Example 5: Remediating Using Objectives

Example 5 presents a sequencing option for learner remediation when you have multiple instructional ELOs. This inter-ELO remediation is tracked by the LMS using objectives (OBJ). The test for this structure exists as a single ELO with two test items (the Assets). The post-test (ELO-3) uses objectives to link each test item to its corresponding instructional ELO. Based upon the learner’s response to the test item, the objectives for that item is set to passed or failed. For failed objectives, the LMS shows the learner the list of corresponding instructional ELO and the learner can select the ELO to view the remediation.

Suppose the learner fails OBJ-1 and passes OBJ-2. Once the post-test in ELO-3 is complete, the LMS would show the learner the ELOs that should be seen again in order for the learner to retake the post-test. In this example, the learner would only see ELO-1 (the ELO corresponding to OBJ-1) listed in the LMS since the learner passed the objective for ELO-2. The learner should then select ELO-1 to complete the remediation and retake the post-test. In the rules, we allowed the learner two attempts to complete this Learning Object Aggregation. Once the learner passes ELO-3, the Learning Object Aggregation is complete. See Example 5 Rules (Application A) for specific details.

EXAMPLE 5: Remediating Using Objectives

![Diagram showing Learning Object Aggregation with ELOs and Objectives]

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Example 5 Rules (Application A):

<table>
<thead>
<tr>
<th>Behavior</th>
<th>SCORM Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>To complete the Learning Object Aggregation, the learner must pass the</td>
<td>Learning Object Aggregation Rollup: If All Satisfied, satisfied.</td>
</tr>
<tr>
<td>post-test in ELO-3.</td>
<td>ELO-1: isRolledup=false</td>
</tr>
<tr>
<td></td>
<td>ELO-2: isRolledup=false</td>
</tr>
<tr>
<td></td>
<td>ELO-3: isRolledup=true</td>
</tr>
<tr>
<td>The learner must complete ELO-1 before attempting ELO-2. The learner</td>
<td>Learning Object Aggregation:</td>
</tr>
<tr>
<td>must complete ELO-2 before attempting ELO-3.</td>
<td>Choice=false; Flow=true</td>
</tr>
<tr>
<td>To complete ELO-3, both objectives must be passed.</td>
<td>No unique SCORM function</td>
</tr>
<tr>
<td>If the learner fails OBJ-1 in ELO-3, then present ELO-1.</td>
<td>ELO-3: set OBJ-1</td>
</tr>
<tr>
<td></td>
<td>ELO-1: skip if OBJ-1 satisfied</td>
</tr>
<tr>
<td>If the learner fails OBJ-2 in ELO-3, then present ELO-2.</td>
<td>ELO-3: set OBJ-2</td>
</tr>
<tr>
<td></td>
<td>ELO-2: skip if OBJ-2 satisfied</td>
</tr>
<tr>
<td>Allow two attempts for ELO-1, ELO-2, and ELO-3.</td>
<td>ELO-1, ELO-2, ELO-3: Attempt Limit=2</td>
</tr>
<tr>
<td>If the learner fails ELO-3 on attempt 2, the learner is halted in</td>
<td>No unique SCORM function</td>
</tr>
<tr>
<td>training and requires manual intervention.</td>
<td></td>
</tr>
</tbody>
</table>

Some examples can be applied in different ways using different behaviors. In Example 5 Rules (Application B), we’ve given the learner more control over the learning experience. The learner now has the choice to view the content in any order. The learner could even complete the post-test in ELO-3 without first viewing ELOs 1 and 2. The objectives and remediation work the same way in Application B as they do in Application A; however, the learner is now permitted as many attempts as needed to pass the post-test in ELO-3. The table below, Example 5 Rules (Application B), has specific details.

Example 5 Rules (Application B):

<table>
<thead>
<tr>
<th>Behavior</th>
<th>SCORM Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>To complete the Learning Object Aggregation, the learner must pass the</td>
<td>Learning Object Aggregation Rollup: If All Satisfied, satisfied.</td>
</tr>
<tr>
<td>post-test in ELO-3.</td>
<td>ELO-1: isRolledup=false</td>
</tr>
<tr>
<td></td>
<td>ELO-2: isRolledup=false</td>
</tr>
<tr>
<td></td>
<td>ELO-3: isRolledup=true</td>
</tr>
<tr>
<td>The learner can complete the ELOs in any order.</td>
<td>Learning Object Aggregation:</td>
</tr>
<tr>
<td></td>
<td>Choice=true; Flow=true</td>
</tr>
<tr>
<td>If the learner fails OBJ-1 in ELO-3, then present ELO-1.</td>
<td>ELO-3: set OBJ-1</td>
</tr>
<tr>
<td></td>
<td>ELO-3: skip if OBJ-1 satisfied</td>
</tr>
<tr>
<td>If the learner fails OBJ-2 in ELO-3, then present ELO-2.</td>
<td>ELO-3: set OBJ-2</td>
</tr>
<tr>
<td></td>
<td>ELO-2: skip if OBJ-2 satisfied</td>
</tr>
<tr>
<td>Allow as many attempts as needed to complete ELO-3.</td>
<td>No unique SCORM function</td>
</tr>
</tbody>
</table>
10.7.6. Example 6: Pre- and Post-Test Sequencing

This example presents sequencing option for pre- and post-tests of learner knowledge or skills. The pre- and post-tests for this structure exist as individual ELOs. Each post-test item is an individual asset. The testing ELOs are linked to objectives that correspond to test items within the ELOs. Based upon the learner’s response to the pre-test item, the OBJ is either set to passed or failed. When the pre-test in ELO-1 is completed, the LMS shows the learner the ELOs corresponding to the missed test questions so the learner can complete the instruction before taking the post-test.

Suppose the learner passes both pre-test items in ELO-1. OBJ-1 and OBJ-2 would be set to passed. The learner then has the choice to either skip or complete the instructional ELO (ELO-2 and ELO-3). However, the learner is required to pass the post-test, so once the pre-test objectives (OBJ-1 and OBJ-2) are passed, the post-test (ELO-4) becomes available to the learner.

Suppose the learner passes both pre-test items in ELO-1. OBJ-1 and OBJ-2 would be set to passed. The learner then has the choice to either skip or complete the instructional ELO (ELO-2 and ELO-3). However, the learner is required to pass the post-test, so once the pre-test objectives (OBJ-1 and OBJ-2) are passed, the post-test (ELO-4) becomes available to the learner.

To further expand upon the use of objectives in this example, suppose the learner fails a pre-test item in ELO-1. OBJ-1 (used as a variable) would be set to failed, and the LMS would show the learner ELO-1 (the corresponding instruction). Once the learner completed the instructional content in ELO-1, the learner would be able to take the post-test.
### Example 6 Rules:

<table>
<thead>
<tr>
<th>Behavior</th>
<th>SCORM Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>To complete the Learning Object Aggregation, the learner must pass the post-test in ELO-4.</td>
<td>Learning Object Aggregation Rollup: If All Satisfied, satisfied. ELO-1: isRolledup=false ELO-2: isRolledup=false ELO-3: isRolledup=false ELO-4: isRolledup=true</td>
</tr>
<tr>
<td>The learner must complete the pre-test in ELO-1 before attempting ELO-2 or ELO-3.</td>
<td>Learning Object Aggregation: Choice=false; Flow=true</td>
</tr>
<tr>
<td>The learner can return to ELO-1 from ELO-2 at any time.</td>
<td>Learning Object Aggregation: Forward Only=false</td>
</tr>
<tr>
<td>If the learner fails OBJ-1 in ELO-1, then present ELO-2.</td>
<td>ELO-1: set OBJ-1 ELO-2: skip if OBJ-1 satisfied</td>
</tr>
<tr>
<td>If the learner fails OBJ-2 in ELO-1, then present ELO-3.</td>
<td>ELO-1: set OBJ-2 ELO-3: skip if OBJ-2 satisfied</td>
</tr>
<tr>
<td>To complete ELO-4, both test items must be passed.</td>
<td>No unique SCORM function</td>
</tr>
<tr>
<td>If the learner fails ELO-4, then the learner is halted in training and requires manual intervention.</td>
<td>No unique SCORM function</td>
</tr>
</tbody>
</table>
10.7.7. Example 7: Pre- and Post-Test Sequencing (2)

Example 7 shows a simple way to construct a pre- and post-test "course" (the Learning Object Aggregation) without remediation. The pre-test sets the objectives (OBJ-3 and OBJ-4) to passed or failed depending upon the learner's response to the individual test items. If you assume the learner fails OBJ-3 in the pre-test, then the learner would be presented with a list in the LMS showing ELO-3. The learner would select ELO-3 to view the instruction that was not passed in the pre-test. The rules for the diagram require the learner to master the post-test by passing both OBJ-1 and OBJ-2.

**EXAMPLE 7: Pre- and Post-Test Sequencing (2)**

<table>
<thead>
<tr>
<th>Learning Object Aggregation</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELO-1 Pre-Test</td>
</tr>
<tr>
<td>TLO-B</td>
</tr>
<tr>
<td>ELO-2 Post-Test</td>
</tr>
<tr>
<td>ELO-3</td>
</tr>
<tr>
<td>ELO-4</td>
</tr>
</tbody>
</table>

**Objectives**

- OBJ-1
- OBJ-2
- OBJ-3
- OBJ-4

NOTE: Not all links between ELOs and objectives are shown here.

---

**Example 7 Rules:**

<table>
<thead>
<tr>
<th>Behavior</th>
<th>SCORM Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>To complete the Learning Object Aggregation, the learner must pass the post-test in ELO-2.</td>
<td>Learning Object Aggregation Rollup: If All Satisfied, satisfied. ELO-1: isRolledUp=false TLO-B: isRolledUp=false ELO-2: isRolledUp=true</td>
</tr>
<tr>
<td>The learner must complete the pre-test in ELO-1 before attempting TLO B or ELO-2.</td>
<td>ELO-1: Choice=false; Flow=true TLO-B: Choice=true; Flow=true; Forward Only=false</td>
</tr>
<tr>
<td>The learner can return to ELO-3 from ELO-4 at any time.</td>
<td>TLO-B: Choice=true; Flow=true; Forward Only=false</td>
</tr>
<tr>
<td>If the learner fails OBJ-3 in ELO-1, then present ELO-3.</td>
<td>ELO-1: set OBJ-3 ELO-3: skip if OBJ-3 satisfied</td>
</tr>
<tr>
<td>If the learner fails OBJ-4 in ELO-1, then present ELO-4.</td>
<td>ELO-1: set OBJ-4 ELO-4: skip if OBJ-4 satisfied</td>
</tr>
<tr>
<td>The learner cannot return to ELO-1 or ELO-2 once TLO-B is attempted.</td>
<td>Learning Object Aggregation: Flow=true; Forward-Only=true; Choice=false</td>
</tr>
<tr>
<td>To complete ELO-2, OBJ-1 and OBJ-2 must be passed.</td>
<td>No unique SCORM function</td>
</tr>
<tr>
<td>If the learner fails OBJ-1 or OBJ-2, then the learner is halted in training and requires manual intervention.</td>
<td>No unique SCORM function</td>
</tr>
</tbody>
</table>

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### 10.7.8. Example 8: Remediating Using Objectives (2)

Example 8 allows you to control when the learner can access the post-test. In this example, the learner cannot attempt the post-test in ELO-3 until the instruction in TLO-1 is complete. If the learner fails either objective in the post-test, the learner will be remediated to the corresponding instructional materials in TLO-1.

**EXAMPLE 8: Remediating Using Objectives (2)**

![Diagram showing Learning Object Aggregation, TLO, ELO-1, ELO-2, ELO-3 Post-Test, OBJ1, OBJ2, and rules for SCORM functions]

---

**Example 8 Rules:**

<table>
<thead>
<tr>
<th>Behavior</th>
<th>SCORM Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>To complete the Learning Object Aggregation, the learner must pass the post-test in ELO-3.</td>
<td>Learning Object Aggregation Rollup: If All Satisfied, satisfied. TLO-1: isRolledup=false ELO-3: isRolledup=true</td>
</tr>
<tr>
<td>The learner must complete TLO-1 before attempting ELO-3.</td>
<td>Learning Object Aggregation: Flow=true</td>
</tr>
<tr>
<td>The learner can return to ELO-1 from ELO-2 at any time.</td>
<td>TLO-1: Forward Only=false</td>
</tr>
<tr>
<td>To complete ELO-3, both objectives must be passed.</td>
<td>No unique SCORM function</td>
</tr>
<tr>
<td>If the learner fails OBJ-1 in ELO-3, then present ELO-1.</td>
<td>ELO-3: set OBJ-1 ELO-1: skip if OBJ-1 satisfied</td>
</tr>
<tr>
<td>If the learner fails OBJ-2 in ELO-3, then present ELO-2.</td>
<td>ELO-3: set OBJ-2 ELO-2: skip if OBJ-2 satisfied</td>
</tr>
<tr>
<td>Allow two attempts for ELO-1, ELO-2, and ELO-3.</td>
<td>ELO-1, ELO-2, ELO-3: Attempt Limit=2</td>
</tr>
<tr>
<td>If the learner fails ELO-3 on the second attempt, then halt the learner in training and require manual intervention.</td>
<td>No unique SCORM function</td>
</tr>
</tbody>
</table>
10.7.9. Example 9: Basic Three-Way Branching

Example 9 shows how you can use simple sequencing rules to accomplish basic adaptive inter-ELO sequencing that is similar to the branching you might have used in traditional CBT lessons. Based upon the learner's choice or decision, represented as a normalized score between –1 and +1, the learner would be directed to another ELO.

Suppose your “course” (the Learning Object Aggregation) is an adaptive scenario that teaches customer service skills. ELO-1 is the introductory scenario. After reading or viewing the scenario (ELO-1), the learner must make a decision about how to handle the situation with a particular customer. The learner chooses Choice B, which sets the ELO score for ELO-1 to 0.5. Based on the 0.5 ELO score, the learner is directed to ELO-3 for further instruction. This example could be replicated to create as many learner decision points as you desire. For more information on replicating the example, see Model 4. The rules for Example 9 (Applications A and B) have the same behaviors, but show two alternatives for programming the behaviors.

**Example 9 Rules (Application A):**

<table>
<thead>
<tr>
<th>Behavior</th>
<th>SCORM Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>To complete the Learning Object Aggregation, the learner must pass two ELOs (ELO-1 and the one other ELO that is chosen by the sequencer). Rule 2 will ensure that ELO-1 is one of the two that is completed.</td>
<td>Learning Object Aggregation: Completed if at least two children completed</td>
</tr>
<tr>
<td>The learner must do ELO-1 first.</td>
<td>Learning Object Aggregation: Flow=true; Forward Only=true</td>
</tr>
<tr>
<td>Based on the learner’s performance on the pre-test, branch to only one of the other three ELOs.</td>
<td>Learning Object Aggregation: Choice=false ELO-1: set OBJ-1 ELO-2: skip if OBJ-1.score &gt; 0 ELO-3: skip if OBJ-1.score &lt; 0.5 or OBJ-1.score &gt; 0.5 ELO-4: skip if OBJ-1.score &lt; 1</td>
</tr>
</tbody>
</table>
Example 9 Rules *(Application B)*:

<table>
<thead>
<tr>
<th>Behavior</th>
<th>SCORM Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>To complete the Learning Object Aggregation, the learner must pass two</td>
<td>Learning Object Aggregation: At least two completed,</td>
</tr>
<tr>
<td>ELOs (ELO-1 and the one other ELO that is chosen by the sequencer).</td>
<td>completed</td>
</tr>
<tr>
<td>The learner must do ELO-1 first.</td>
<td>Learning Object Aggregation: Flow=true; Forward Only=true</td>
</tr>
</tbody>
</table>
| Based on the learner’s performance on the pre-test, branch to only one of the other three ELOs. | Learning Object Aggregation: Choice=false
ELO-1: set OBJ-2, OBJ-3, OBJ-4
ELO-2: skip if OBJ-2 satisfied
ELO-3: skip if OBJ-3 satisfied
ELO-4: skip if OBJ-4 satisfied |
**10.7.10. Example 10: Pre- and Post-Test Sequencing with New Content for Remediation**

Example 10 provides a more complex pre- and post-test structure that enables learners to remediate to content that is hidden until needed for remediation. Both the pre- and post-tests are required. Based on the learner’s responses to the pre-test in ELO-A, OBJ-1 and OBJ-2 will be set to *passed* or *failed*. Assume the learner fails OBJ-2. A typical LMS will then show ELO-2 on a list. The learner will choose ELO-2 and then take a post-test (ELO-C) to ensure they understand the content from both ELOs 1 and 2. If the learner passes both OBJ-3 and OBJ-4 from ELO-C, then the learner will complete TLO-B, thereby completing the Learning Object Aggregation.

Assume the learner failed OBJ-4 in ELO-C. The LMS will present the learner with ELO-4. ELO-4 contains new instructional material (remediation) that is an enhancement of the content from ELO-2. Since the learner initially struggled with the content, and the learner is required to master the content, the learner must now pass the post-test in ELO-B to complete the Learning Object Aggregation. If the learner fails ELO-B, then the learner will be halted in training according to these rules. (You could also structure the rules such that the learner passed after a defined number of attempts.) If the learner passes the post-test in ELO-B, then the Learning Object Aggregation is considered complete.

**EXAMPLE 10: Pre- and Post-Test Sequencing With New Content for Remediation**
Example 10 Rules:

<table>
<thead>
<tr>
<th>Behavior</th>
<th>SCORM Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>To complete the Learning Object Aggregation, the learner must pass the post-test in ELO-C <strong>OR</strong> the post-test in ELO-B.</td>
<td>Learning Object Aggregation: Satisfied if one child satisfied ELO-A: isRolledUp=false ELO-B: isRolledUp=true</td>
</tr>
<tr>
<td>The learner must complete the pre-test in ELO-A before attempting TLO-A. The learner cannot return to the Pre-Test from TLO-A.</td>
<td>Learning Object Aggregation: Choice=false; Flow=true; Forward Only=true</td>
</tr>
<tr>
<td>If the learner fails OBJ-1 in ELO-A, then present ELO-1.</td>
<td>ELO-A: set OBJ-1 ELO-1: skip if OBJ-1 satisfied</td>
</tr>
<tr>
<td>If the learner fails OBJ-2 in ELO-A, then present ELO-2.</td>
<td>ELO-A: set OBJ-2 ELO-2: skip if OBJ-2 satisfied</td>
</tr>
<tr>
<td>The learner can return to ELO-1 from ELO-2 at any time.</td>
<td>Learning Object Aggregation: Choice=true; Flow=true; Forward Only=false</td>
</tr>
<tr>
<td>To complete TLO-A, ELO-C must be passed.</td>
<td>ELO-1: isRolledUp=false ELO-2: isRolledUp=false TLO-A Rollup: If All Satisfied, satisfied.</td>
</tr>
<tr>
<td>The learner will skip TLO-B if TLO-A is passed.</td>
<td>TLO-B: skip if OBJ-1 satisfied and OBJ-2 satisfied</td>
</tr>
<tr>
<td>If the learner fails OBJ-3 in ELO-C, then present ELO-3.</td>
<td>ELO-C: set OBJ-3 ELO-3: skip if OBJ-3 satisfied</td>
</tr>
<tr>
<td>If the learner fails OBJ-4 in ELO-C, then present ELO-4.</td>
<td>ELO-C: set OBJ-4 ELO-4: skip if OBJ-4 satisfied</td>
</tr>
<tr>
<td>If the learner fails ELO-B, then the learner is halted in training and requires manual intervention.</td>
<td><strong>No unique SCORM function</strong></td>
</tr>
</tbody>
</table>
10.8. Building Instructional Models from the Examples

Any example or combination of examples can be “overlaid” on or combined with other examples, creating increasingly complex instructional strategies for courses or lessons. The models that follow show unique combinations of the examples presented in the previous section. The models show the reusability of the examples by labeling each as an instance of an example. In addition, the rules for each model specify from which example, as well as which application of the example, they were obtained. Depending upon how you apply behaviors and rules to the structures, you can achieve a variety of outcomes. These examples and models will provide you with viable sequencing options you can adapt to meet your particular training and educational requirements. For very complex instructional strategies, you can also apply any model or combination of models to another model as was done with the examples.

10.8.1. Model 1: Remediating Multiple TLOs

Model 1 represents two instances of Example 5 and once instance of Example 4. Example 4 contains two ELOs in a Learning Object Aggregation. For Model 1, the two ELOs are replaced by TLO-A and TLO-B that now represent the Learning Object Aggregation from Example 5. Each TLO contains three ELOs, one of which is a post-test. The inter-ELO remediation for each TLO is tracked by the LMS using objectives (OBJs) as global variables.

Each post-test item is linked to an OBJ. Based upon the learner’s response to the test item; the OBJ is either set to passed or failed. In this example, suppose the learner fails a test item in ELO-3. OBJ-1 would be set to failed and the LMS would show the learner ELO-1, the ELO that corresponds to OBJ-1. If the learner passes both test items in ELO-3, then the objectives would be set to passed, and the learner would proceed to TLO-B.
This guide shows two possible applications for Model 1, since each example used to create the model had two possible applications. However, the applications could be combined in any fashion resulting in several more applications for this one model. Suppose you want to create a “course” (the Learning Object Aggregation) with two units (TLO-A and TLO-B) each containing two lessons and a post-test (the ELOs). You want the learner to be remediated on a lesson-by-lesson basis, so you create test items tied to their corresponding instruction by objectives. If the learner fails one of the modules, the learner will not be able to complete the course without manual intervention. The rules for Model 1, Application A apply.

### Model 1 Rules (Application A):

<table>
<thead>
<tr>
<th>Behavior</th>
<th>SCORM Function</th>
<th>FROM Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>To complete the Learning Object Aggregation, the learner must complete TLO-A and TLO-B.</td>
<td>Learning Object Aggregation Rollup: If All Satisfied, satisfied</td>
<td>4 (A)</td>
</tr>
<tr>
<td>The learner cannot start TLO-B until TLO-A is complete.</td>
<td>TLO-A: Choice=false; Flow=true</td>
<td>4 (A)</td>
</tr>
<tr>
<td>To complete TLO-A, the learner must pass the post-test in ELO-3.</td>
<td>TLO-A Rollup: If All Satisfied, satisfied ELO-1: isRolledUp=false ELO-2: isRolledUp=false ELO-3: isRolledUp=true</td>
<td>5 (A)</td>
</tr>
<tr>
<td>The learner must complete ELO-1 before attempting ELO-2. The learner must complete ELO-2 before</td>
<td>TLO-A: Choice=false; Flow=true</td>
<td>5 (A)</td>
</tr>
</tbody>
</table>
Now, suppose you want to use discovery learning to teach the learner how to start a gas turbine engine. You want to slightly restrict the learner’s control because the content includes two types of learning. Assume TLO-A presents knowledge-based information about the gas turbine engine and tests the learner’s knowledge of the components. Assume TLO-B shows two different procedures for starting the gas turbine engine (ELO-4 and ELO-5). The learner can select the TLOs in any order, since they can start the gas turbine engine before completing the basic instruction, but the learner has to see both TLOs in order to complete the course.

In TLO-A, the learner can select the presentation order of the ELOs or take the post-test in TLO-A at any time because the order in which the materials are presented is not crucial to understanding the instruction. Since TLO-B teaches a procedure, the learner must see the procedures in a predefined order, so ELO-4 is presented before ELO-5 and ELO-5 before ELO-6 (the post-test simulation). The rules for Model 1, Application B apply to this example.
### Model 1 Rules (Application B):

<table>
<thead>
<tr>
<th>Description</th>
<th>Details</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>To complete TLO-A, the learner must pass the post-test in ELO-3.</td>
<td>TLO-A Rollup: If All Satisfied, satisfied</td>
<td>5 (B)</td>
</tr>
<tr>
<td></td>
<td>ELO-1: isRolledup=false</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ELO-2: isRolledup=false</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ELO-3: isRolledup=true</td>
<td></td>
</tr>
<tr>
<td>The learner can complete the ELOs in any order.</td>
<td>TLO-A: Choice=true; Flow=true</td>
<td>5 (B)</td>
</tr>
<tr>
<td>If the learner fails OBJ-1 in ELO-3, then present ELO-1.</td>
<td>ELO-3: set OBJ-1</td>
<td>5 (B)</td>
</tr>
<tr>
<td></td>
<td>ELO-1: skip if OBJ-1 satisfied</td>
<td></td>
</tr>
<tr>
<td>If the learner fails OBJ-2 in ELO-3, then present ELO-2.</td>
<td>ELO-3: set OBJ-2</td>
<td>5 (B)</td>
</tr>
<tr>
<td></td>
<td>ELO-2: skip if OBJ-2 satisfied</td>
<td></td>
</tr>
<tr>
<td>Allow as many attempts as needed to complete ELO-3.</td>
<td>No unique SCORM function</td>
<td>5 (B)</td>
</tr>
<tr>
<td>To complete TLO-B, the learner must pass the post-test in ELO-6.</td>
<td>TLO-B Rollup: If All Satisfied, satisfied</td>
<td>5 (A)</td>
</tr>
<tr>
<td></td>
<td>ELO-4: isRolledup=false</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ELO-5: isRolledup=false</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ELO-6: isRolledup=true</td>
<td></td>
</tr>
<tr>
<td>The learner must complete ELO-4 before attempting ELO-5. The learner must</td>
<td>Learning Object Aggregation:</td>
<td>5 (A)</td>
</tr>
<tr>
<td>complete ELO-5 before attempting ELO-6.</td>
<td>Choice=false; Flow=true</td>
<td></td>
</tr>
<tr>
<td>To complete ELO-6, both objectives must be passed.</td>
<td>No unique SCORM function</td>
<td>5 (A)</td>
</tr>
<tr>
<td>If the learner fails OBJ-3 in ELO-6, then present ELO-4.</td>
<td>ELO-6: set OBJ-3</td>
<td>5 (A)</td>
</tr>
<tr>
<td></td>
<td>ELO-4: skip if OBJ-3 satisfied</td>
<td></td>
</tr>
<tr>
<td>If the learner fails OBJ-4 in ELO-6, then present ELO-5.</td>
<td>ELO-6: set OBJ-4</td>
<td>5 (A)</td>
</tr>
<tr>
<td></td>
<td>ELO-5: skip if OBJ-4 satisfied</td>
<td></td>
</tr>
<tr>
<td>Allow two attempts for ELO-4, ELO-5, and ELO-6.</td>
<td>ELO-4, ELO-5, ELO-6: Attempt Limit=2</td>
<td>5 (A)</td>
</tr>
<tr>
<td>If the learner fails ELO-6 on attempt 2, the learner is halted in training</td>
<td>No unique SCORM function</td>
<td>5 (A)</td>
</tr>
<tr>
<td>and requires manual intervention.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
10.8.2. Model 2: Mastery Testing Multiple TLOs

Model 2 demonstrates how Examples 4 and 5 can be combined into multiple assessed TLOs with a mastery test (ELO-F) for the entire Learning Object Aggregation. The links to objectives for remediation within TLOs 1, 2, and 3 are not shown in this model, but they are identical to those shown in Example 5.

**MODEL 2: Mastery Testing Multiple TLOs**

Suppose you wanted to create a course (the Learning Object Aggregation) with several critical lessons (TLOs 1 – 3). Each lesson builds upon the instruction of the previous lesson, so the lessons must be completed in order. Each of the lessons has several objectives (the ELOs) that are tested and remediated independently. You decide to allow the learner two attempts in each lesson to pass the post-test by providing remediation between the attempts. If the learner successfully passes each of the lessons (thereby completing TLO-A), then you allow the learner to attempt the mastery test (ELO-F) in TLO-B. If the learner passes the mastery test, then you consider the course complete. However, since each of the lessons are critical, if the learner cannot pass one of the lessons (TLOs 1 – 3) after two attempts, you decide they should be automatically halted in training and require manual intervention to proceed. The rules for Model 2 would apply.

<table>
<thead>
<tr>
<th>Model 2 Rules:</th>
<th>SCORM Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>To complete the Learning Object Aggregation, the learner must pass the mastery test (ELO-F) in TLO-B.</td>
<td>Learning Object Aggregation Rollup: If All Satisfied, satisfied TLO-A: isRolledup=false TLO-B: isRolledup=true</td>
</tr>
</tbody>
</table>

NOTE: Links to objectives within TLOs 1, 2, and 3 are not shown. Refer to Examples 2 and 5 for specific details.
<table>
<thead>
<tr>
<th>Model 2 Rules:</th>
<th>Learning Object Aggregation:</th>
<th>5 (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The learner must complete TLO-A before attempting TLO-B.</td>
<td>Learning Object Aggregation:</td>
<td>5 (A)</td>
</tr>
<tr>
<td>To complete TLO-A, the learner must complete TLO-1, TLO-2, and TLO-3 in order.</td>
<td>TLO A: Choice=false; Flow=true</td>
<td>4 (A)</td>
</tr>
<tr>
<td>To complete TLO-1, the learner must pass the post-test in ELO-A.</td>
<td>TLO-1 Rollup: If All Satisfied, satisfied</td>
<td>5 (A)</td>
</tr>
<tr>
<td>The learner must complete ELO-1 before attempting ELO-2.</td>
<td>ELO-1: isRolledup=false</td>
<td></td>
</tr>
<tr>
<td>The learner must complete ELO-2 before attempting ELO-A.</td>
<td>ELO-2: isRolledup=false</td>
<td></td>
</tr>
<tr>
<td>The learner can return to ELO-1 from ELO-2 at any time.</td>
<td>ELO-A: isRolledup=true</td>
<td></td>
</tr>
<tr>
<td>If the learner fails OBJ-1 in ELO-A, then present ELO-1.</td>
<td>ELO-A: set OBJ-1</td>
<td>5 (A)</td>
</tr>
<tr>
<td>If the learner fails OBJ-2 in ELO-A, then present ELO-2.</td>
<td>ELO-A: set OBJ-2</td>
<td>5 (A)</td>
</tr>
<tr>
<td>Allow two attempts for ELO-1, ELO-2, and ELO-A.</td>
<td>ELO-2: skip if OBJ-2 satisfied</td>
<td>5 (A)</td>
</tr>
<tr>
<td>If the learner fails ELO-A on attempt 2, the learner is halted in training and requires manual intervention.</td>
<td>No unique SCORM function</td>
<td>5 (A)</td>
</tr>
<tr>
<td>The learner must complete TLO-a before attempting ELO-C.</td>
<td>ELO-A: isRolledup=true</td>
<td></td>
</tr>
<tr>
<td>The learner cannot return to ELO-3 once ELO-D is attempted.</td>
<td>ELO-B: isRolledup=false</td>
<td></td>
</tr>
<tr>
<td>The learner cannot return to ELO-1 or ELO-2 once TLO-a is attempted.</td>
<td>No unique SCORM function</td>
<td></td>
</tr>
<tr>
<td>To complete TLO-2, the learner must pass the post-test in ELO-D.</td>
<td>TLO-2 Rollup: If All Satisfied, satisfied</td>
<td>5 (A)</td>
</tr>
<tr>
<td>The learner must complete TLO-a before attempting ELO-C.</td>
<td>ELO-3: isRolledup=false</td>
<td></td>
</tr>
<tr>
<td>The learner cannot return to ELO-4 from ELO-5 at any time.</td>
<td>ELO-3: ELO-D: Attempt Limit=2</td>
<td>5 (A)</td>
</tr>
<tr>
<td>If the learner fails OBJ-3 in ELO-D, then present ELO-3.</td>
<td>ELO-D: set OBJ-3</td>
<td>5 (A)</td>
</tr>
<tr>
<td>Allow two attempts for ELO-3 and ELO-D.</td>
<td>ELO-3: skip if OBJ-3 satisfied</td>
<td>5 (A)</td>
</tr>
<tr>
<td>If the learner fails ELO-D on attempt 2, the learner is halted in training and requires manual intervention.</td>
<td>No unique SCORM function</td>
<td>5 (A)</td>
</tr>
<tr>
<td>To complete TLO-3, the learner must pass the post-test in ELO-C.</td>
<td>TLO-3 Rollup: If All Satisfied, satisfied</td>
<td>8 (A)</td>
</tr>
<tr>
<td>The learner must complete TLO-a before attempting ELO-C.</td>
<td>TLO-a: isRolledup=true</td>
<td></td>
</tr>
<tr>
<td>The learner can return to ELO-4 from ELO-5 at any time.</td>
<td>ELO-C: set OBJ-4</td>
<td>8 (A)</td>
</tr>
<tr>
<td>If the learner fails OBJ-4 in ELO-C, then present ELO-4.</td>
<td>ELO-C: set OBJ-5</td>
<td>8 (A)</td>
</tr>
<tr>
<td>If the learner fails OBJ-5 in ELO-C, then present ELO-5.</td>
<td>ELO-4, ELO-5, ELO-C: Attempt Limit=2</td>
<td>8 (A)</td>
</tr>
<tr>
<td>Allow two attempts for ELO-4, ELO-5, and ELO-C.</td>
<td>No unique SCORM function</td>
<td>8 (A)</td>
</tr>
<tr>
<td>If the learner fails ELO-C on attempt 2, the learner is halted in training and requires manual intervention.</td>
<td>No unique SCORM function</td>
<td>8 (A)</td>
</tr>
</tbody>
</table>
10.8.3. Model 3: Pre- and Post-Test Sequencing with TLOs

Model 3 is a combination of Examples 5 and 6. In this model, a single ELO from Example 6 was replaced with the Learning Object Aggregation from Example 5. That Learning Object Aggregation is now TLO-B.
10.8.4. Model 4: Assigning Competencies

Suppose you need to create a course (the Learning Object Aggregation) that assigns competencies (knowledge, skills, or abilities) to the learner upon successful completion.

Model 4: Traditional CBT Branching with Multiple Decisions

NOTE: In this model, the learner always sees a yellow RIO at each layer in the tree because content can only be contained in a FLO and not in an TLO.

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10.8.5. Model 5: Customized Learning Using Three-Way Branching

This model shows how the initial level of Model 4 (or Example 9) can be used to customize learning experiences by presenting learners with a series of choices about who they are, what they do, or what they know. The choices for this type of customization would be predefined learner roles, positions, or competencies.

Using the Apprentice Trainer example presented in Model 4, the learner could select Becoming a Qualified Workplace Trainer, Effective Communication, or The Learning Experience. Based on the role the learner selects in ELO-1, TLO-1, TLO-2, and TLO-3 would represent different content structures for the three different lessons. Model 5 could remain three-way branching examples (as show in Model 4) or it could become TLOs of the other examples presented in this guide, thereby giving each role a unique instructional strategy. For Model 5, we've shown the latter using other examples presented in this guide.

Let's assume TLO-1, shown in purple, contains the content for a Becoming a Qualified Workplace Trainer. TLO-1 is an instance of Example 7. It has a pre-test, content, and a post-test, since Apprentice Trainers may be required to see all activities in a strictly prescribed sequence and must show mastery of the content. TLO-2 is an instance of Example 4 that was designed specifically for Effective Communication. A Trainee might be able to choose the activities she wants to see, since she already has advanced product knowledge. TLO-3 was designed for The Learning Experience. It reuses the Example 9 for 3-way branching (like in Model 4) to question Trainees about their knowledge and to target areas where they need improvement.

Model 5: Customized Learning Using 3-Way Branching
Model 5 can be recreated for customized learning using any of the example or models in this guide. You can also create your own unique content structure.
10.9. APPENDIX I: SkillObject Graphics

10.9.1. The Object Relationship

The Object Relationship

Figure 5: The Object Relationship
10.9.2. Intelligent Training Network

Figure 6: Intelligent Training Network
Figure 7: SkillObject Metadata
Figure 8: Work-Sailor Gap
## 10.10. APPENDIX J: SkillsNET Taxonomies

### 10.10.1. The Taxonomy of Knowledge

<table>
<thead>
<tr>
<th>1. Administration and Management</th>
<th>a. Business Administration</th>
<th>e. Food Service and Lodging Management</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>b. Construction Management</td>
<td>f. Medical Service Management</td>
</tr>
<tr>
<td></td>
<td>c. Engineering</td>
<td>g. Public Administration</td>
</tr>
<tr>
<td></td>
<td>d. Mathematical and Sciences Management</td>
<td></td>
</tr>
<tr>
<td>2. Clerical</td>
<td>a. Banking Support</td>
<td>g. Medical Secretarial</td>
</tr>
<tr>
<td></td>
<td>b. Bookkeeping</td>
<td>h. Office Clerical</td>
</tr>
<tr>
<td></td>
<td>c. Computer Operations</td>
<td>i. Receptionist</td>
</tr>
<tr>
<td></td>
<td>d. Data Entry</td>
<td>j. Stenography</td>
</tr>
<tr>
<td></td>
<td>e. Health Unit Coordinating</td>
<td>k. Stock and Warehousing</td>
</tr>
<tr>
<td></td>
<td>f. Legal Secretarial</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b. Economics</td>
<td>d. Securities and Investments</td>
</tr>
<tr>
<td></td>
<td>b. Fashion and Apparel</td>
<td>g. Retailing and Wholesaling</td>
</tr>
<tr>
<td></td>
<td>c. Food Marketing</td>
<td>h. Vehicle Sales and Service</td>
</tr>
<tr>
<td></td>
<td>d. Insurance</td>
<td>i. Food Service</td>
</tr>
<tr>
<td></td>
<td>e. Purchasing</td>
<td></td>
</tr>
<tr>
<td>5. Customer and Personal Service</td>
<td>a. Barbering and Cosmetology</td>
<td>g. Hospitality Service</td>
</tr>
<tr>
<td></td>
<td>b. Bartending</td>
<td>h. Housekeeping and Custodial</td>
</tr>
<tr>
<td></td>
<td>c. Cashiering</td>
<td>i. Laundry and Dry Cleaning</td>
</tr>
<tr>
<td></td>
<td>d. Child Care and Home Management</td>
<td>j. Meat Cutting and Butchering</td>
</tr>
<tr>
<td></td>
<td>e. Flight Attending</td>
<td>k. Travel Service</td>
</tr>
<tr>
<td></td>
<td>f. Food Preparation</td>
<td></td>
</tr>
<tr>
<td>6. Personnel and Human Resources</td>
<td>a. Human Resources Management</td>
<td>d. Management Analysis</td>
</tr>
<tr>
<td></td>
<td>b. Interviewing and Hiring</td>
<td>e. Personnel Research</td>
</tr>
<tr>
<td></td>
<td>c. Labor Relations</td>
<td>f. Training</td>
</tr>
<tr>
<td>7. Production and Processing</td>
<td>a. Production</td>
<td>e. Metal Production and Processing</td>
</tr>
<tr>
<td></td>
<td>b. Processing and Production</td>
<td>f. Printing and Publishing</td>
</tr>
<tr>
<td></td>
<td>c. Furnishing Production</td>
<td>g. Quality Control and Inspection</td>
</tr>
<tr>
<td></td>
<td>d. Supervision</td>
<td></td>
</tr>
<tr>
<td>8. Food Production</td>
<td>a. Agricultural and Business Management</td>
<td>e. Crop Production</td>
</tr>
<tr>
<td></td>
<td>b. Agricultural Sciences</td>
<td>f. Fishing and Wildlife Management</td>
</tr>
<tr>
<td></td>
<td>c. Animal Husbandry and Production</td>
<td>g. Food Sciences</td>
</tr>
<tr>
<td></td>
<td>d. Animal Sciences</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b. Computer Science</td>
<td>e. Systems Analysis</td>
</tr>
<tr>
<td></td>
<td>c. Computer Technology</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b. Chemical Engineering</td>
<td>g. Mechanical Engineering</td>
</tr>
<tr>
<td></td>
<td>c. Civil Engineering</td>
<td>h. Mining, Petroleum, and Nuclear Engineering</td>
</tr>
<tr>
<td></td>
<td>d. Electrical Engineering</td>
<td>i. Surveying</td>
</tr>
<tr>
<td></td>
<td>e. Industrial Engineering</td>
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<tr>
<td></td>
<td>b. Drafting</td>
<td>e. Technical Theater Design</td>
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<tr>
<td></td>
<td>c. Industrial Design</td>
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</tr>
<tr>
<td>b. Aircraft Mechanics</td>
<td>15. Physics</td>
<td>c. Atmospheric Sciences and Meteorology</td>
</tr>
<tr>
<td>c. Appliance Repair</td>
<td>d. Automobile Mechanics</td>
<td>i. Optics and Acoustics</td>
</tr>
<tr>
<td>d. Construction and Building Inspections</td>
<td>e. Building Maintenance</td>
<td>e. General Physics</td>
</tr>
<tr>
<td>e. Construction Equipment Operations</td>
<td>j. Structural Metal</td>
<td></td>
</tr>
<tr>
<td>f. Engine Repair</td>
<td>g. Heavy Equipment Repair</td>
<td></td>
</tr>
<tr>
<td>g. Electrical Power</td>
<td>h. Instrument Repair</td>
<td></td>
</tr>
<tr>
<td>h. Painting and Paperhanging</td>
<td>i. Light Equipment Repair</td>
<td></td>
</tr>
<tr>
<td>i. Plumbing</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| b. Actuarial Sciences | e. Statistics |
| c. Applied Mathematics |

| 15. Physics | a. Astronomy | f. Geology |
| b. Astrophysics | g. Nuclear Physics |
| c. Atmospheric Sciences and Meteorology | h. Oceanography |
| d. Earth and Planetary Sciences | i. Optics and Acoustics |
| e. General Physics |

| b. Biochemistry | f. Physical and Theoretical Chemistry |
| c. Inorganic Chemistry | g. Polymer Chemistry |
| d. Medicinal and Pharmaceutical Chemistry | |

| b. Botany | g. Microbiology and Bacteriology |
| c. Cell and Molecular Biology | h. Nutritional Science |
| d. Ecology | i. Physiology |
| e. Genetics | j. Zoology |

| b. Cognitive Psychology | g. Industrial/Organizational Psychology |
| c. Community Psychology | h. Physiological/Biological Psychology |
| d. Counseling Psychology | i. Social Psychology |
| e. Developmental Psychology |

| 19. Sociology and Anthropology | a. Anthropology | d. Sociology |
| b. Criminology | e. Urban Affairs |
| c. Demography and Population |

| a. Chiropractic | f. Pharmacology |
| b. Community and Home Health | g. Psychiatric and Mental Health Counseling |
| c. Dentistry | h. Speech Pathology and Audiology |
| d. Medicine | i. Surgery |
| e. Nursing | j. Veterinary Medicine |

| b. Occupational Therapy | f. Speech Pathology and Audiology |
| c. Physical Therapy | g. Social Work |
| d. Psychiatric and Mental Health Counseling | h. Vocational Counseling |

| b. Instructional Design | g. Special Education |
| c. Pre-School Education | h. Adult and Continuing Education |
| d. Elementary Education | i. Professional Training |
| e. Secondary and Vocational Education |

<p>| 23. Education and Training | a. Editing | d. Journalistic Writing |
| b. English Literature | e. Linguistics |
| c. English Literature | |
| d. English Literature | e. Linguistics |</p>
<table>
<thead>
<tr>
<th>25. Foreign Languages</th>
<th>c. Creative Writing</th>
<th>f. Technical and Business Writing</th>
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</thead>
<tbody>
<tr>
<td>a. Foreign Language Interpretation</td>
<td>d. Linguistics</td>
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</tr>
<tr>
<td>b. Foreign Language Literature</td>
<td>e. Specific Languages</td>
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<tr>
<td>c. Foreign Language Translation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26. Fine Arts</td>
<td>a. Arts and Crafts</td>
<td>d. Film-Video Making and Cinematography</td>
</tr>
<tr>
<td>b. Dance</td>
<td>e. Music</td>
<td></td>
</tr>
<tr>
<td>c. Dramatic and Theatrical Arts</td>
<td>f. Photography</td>
<td></td>
</tr>
<tr>
<td>27. History and Archeology</td>
<td>a. African History</td>
<td>e. European History</td>
</tr>
<tr>
<td>b. American History</td>
<td>f. General History</td>
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<tr>
<td>c. Archeology</td>
<td>g. History of Science and Technology</td>
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<tr>
<td>d. Asian History</td>
<td></td>
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<tr>
<td>b. Missions and Missionary Studies</td>
<td>e. Religious Education</td>
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<tr>
<td>c. Pastoral Counseling</td>
<td>f. Theology</td>
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</tr>
<tr>
<td>b. Criminal Investigation</td>
<td>f. Police Patrol</td>
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</tr>
<tr>
<td>c. Fire Fighting</td>
<td>g. Security Services</td>
<td></td>
</tr>
<tr>
<td>d. Fire Inspection and Investigation</td>
<td></td>
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</tr>
<tr>
<td>b. Legal Representation</td>
<td>d. Political Science and Government</td>
<td></td>
</tr>
<tr>
<td>b. Electrical and Electronics Engineering</td>
<td>d. System Installation and Repair</td>
<td></td>
</tr>
<tr>
<td>32. Communications and Media</td>
<td>a. Archival Science</td>
<td>e. Printing and Publishing</td>
</tr>
<tr>
<td>b. Creative Writing</td>
<td>f. Radio and Television Broadcasting</td>
<td></td>
</tr>
<tr>
<td>c. Journalism</td>
<td>g. Technical and Business Writing</td>
<td></td>
</tr>
<tr>
<td>d. Library Science</td>
<td></td>
<td></td>
</tr>
<tr>
<td>33. Transportation</td>
<td>a. Airplane Piloting</td>
<td>d. Truck and Bus Transportation</td>
</tr>
<tr>
<td>b. Air Traffic Control</td>
<td>e. Water Transportation</td>
<td></td>
</tr>
<tr>
<td>c. Railroad Operations</td>
<td></td>
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</tbody>
</table>
### 10.10.2. The Taxonomy of Resources

<table>
<thead>
<tr>
<th></th>
<th>Policy Documents</th>
<th>1. Guiding Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>b. Doctrine</td>
</tr>
<tr>
<td></td>
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<td>c. Regulatory</td>
</tr>
<tr>
<td></td>
<td></td>
<td>d. Standards</td>
</tr>
<tr>
<td></td>
<td></td>
<td>e. Standard Operating Procedures</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2.</th>
<th>Technical Documents</th>
<th>a. Equipment Specific Manuals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>b. Computer Based</td>
</tr>
<tr>
<td></td>
<td></td>
<td>c. Blueprints</td>
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<td></td>
<td></td>
<td>d. Schematics</td>
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<tr>
<td></td>
<td></td>
<td>e. Procedural Manuals</td>
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<tr>
<td></td>
<td></td>
<td>f. Users Guides</td>
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<td></td>
<td></td>
<td>g. Maintenance Requirements</td>
</tr>
<tr>
<td></td>
<td></td>
<td>h. Checklists</td>
</tr>
<tr>
<td></td>
<td></td>
<td>i. Charts</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3.</th>
<th>Training Documents</th>
<th>a. Training Manuals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>b. Handbooks</td>
</tr>
<tr>
<td></td>
<td></td>
<td>c. Guidelines</td>
</tr>
</tbody>
</table>

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<thead>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>b. Personnel/Manpower</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5.</th>
<th>General Informational Documents</th>
<th>a. Handbooks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>b. Messages</td>
</tr>
<tr>
<td></td>
<td></td>
<td>c. Informational Manuals/Books</td>
</tr>
<tr>
<td></td>
<td></td>
<td>d. Websites</td>
</tr>
<tr>
<td></td>
<td></td>
<td>e. Plans</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>6.</th>
<th>Administrative Documentation</th>
<th>a. Administrative Manuals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>b. Forms</td>
</tr>
<tr>
<td></td>
<td></td>
<td>c. Records</td>
</tr>
<tr>
<td></td>
<td></td>
<td>d. Catalogs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>e. Qualifications</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>7.</th>
<th>External Organization</th>
<th>a. Military</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>b. Civilian</td>
</tr>
</tbody>
</table>
10.10.3. The Taxonomy of Skills

<table>
<thead>
<tr>
<th>Content Skills</th>
<th>Process Skills</th>
<th>Social Skills</th>
<th>Complex Problem Solving Skills</th>
<th>Technical Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understanding written sentences and paragraphs in work related documents.</td>
<td>Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.</td>
<td>Communicating effectively in writing as appropriate for the needs of the audience.</td>
<td>Talking to others to convey information effectively.</td>
<td>Using mathematics to solve problems.</td>
</tr>
<tr>
<td>Using scientific rules and methods to solve problems.</td>
<td>Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.</td>
<td>Understanding the implications of new information for both current and future problem-solving and decision-making.</td>
<td>Selecting and using training/instructional methods and procedures appropriate for the situation when learning or teaching new things.</td>
<td>Monitoring/assessing performance of yourself, other individuals, or organizations to make improvements or take corrective action.</td>
</tr>
<tr>
<td>Being aware of others’ reactions and understanding why they react as they do.</td>
<td>Adjusting actions in relation to others’ actions.</td>
<td>Persuading others to change their minds or behavior.</td>
<td>Bringing others together and trying to reconcile differences.</td>
<td>Teaching others how to do something.</td>
</tr>
<tr>
<td>Actively looking for ways to help people.</td>
<td>Identifying the nature of problems.</td>
<td>Knowing how to find information and identifying essential information.</td>
<td>Finding ways to structure or classify multiple pieces of information.</td>
<td>Reorganizing information to get a better approach to problems or tasks.</td>
</tr>
<tr>
<td>Generating a number of different approaches to problems.</td>
<td>Evaluating the likely success of an idea in relation to the demands of the situation.</td>
<td>Developing approaches for implementing an idea.</td>
<td>Observing &amp; evaluating the outcomes of a problem solution to identify lessons learned or redirect efforts.</td>
<td>Analyzing needs and product requirements to create a design.</td>
</tr>
<tr>
<td>Generating or adapting equipment and technology to serve user needs.</td>
<td>Determining the kind of tools and equipment needed to do a job.</td>
<td>Installing equipment, machines, wiring, or programs to meet specifications.</td>
<td>Writing computer programs for various purposes.</td>
<td>Conducting tests to determine whether equipment, software, or procedures are operating as expected.</td>
</tr>
<tr>
<td>Watching gauges, dials, or other indicators to make sure a machine is working properly.</td>
<td>Controlling operations of equipment or systems.</td>
<td>Inspecting and evaluating the quality of products.</td>
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</tr>
<tr>
<td><strong>Systems Skills</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>34. Equipment Maintenance</td>
<td>Performing routine maintenance on equipment and determining when and what kind of maintenance is needed.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35. Troubleshooting</td>
<td>Determining causes of operating errors and deciding what to do about it.</td>
<td></td>
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</tr>
<tr>
<td>36. Repairing</td>
<td>Repairing machines or systems using the needed tools.</td>
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<tr>
<td>37. Visioning</td>
<td>Developing an image of how a system should work under ideal conditions.</td>
<td></td>
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<tr>
<td>38. Systems Perceptions</td>
<td>Determining when important changes have occurred in a system or are likely to occur.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Identification of Downstream Consequences</strong></td>
<td>Determining the long-term outcomes of a change in operations.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>39. Identification of Key Causes</td>
<td>Identifying the things that must be changed to achieve a goal.</td>
<td></td>
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</tr>
<tr>
<td>40. Judgment and Decision Making</td>
<td>Considering the relative costs and benefits of potential actions to choose the most appropriate one.</td>
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</tr>
<tr>
<td>41. Systems Evaluation</td>
<td>Looking at many indicators of system performance, taking into account their accuracy.</td>
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<tr>
<td>42. <strong>Systems Evaluation</strong></td>
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</tr>
<tr>
<td><strong>Resource Management Skills</strong></td>
<td></td>
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<tr>
<td>43. Time Management</td>
<td>Managing one’s time and the time of others.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>44. Management of Financial Resources</td>
<td>Determining how money will be spent to get the work done, and accounting for these expenditures.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>45. Management of Material Resources</td>
<td>Obtaining and seeing to the appropriate use of equipment, facilities, and materials needed to do certain work.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>46. Management of Personnel Resources</td>
<td>Motivating, developing, and directing people as they work, identifying the best people for the job.</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
### 10.10.4. The Taxonomy of Abilities

<table>
<thead>
<tr>
<th>Verbal Abilities</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Oral Comprehension</td>
<td>The ability to listen to and understand information and ideas</td>
</tr>
<tr>
<td></td>
<td>presented through spoken words and sentences.</td>
</tr>
<tr>
<td>2. Written Comprehension</td>
<td>The ability to read and understand information and ideas presented in writing.</td>
</tr>
<tr>
<td>3. Oral Expression</td>
<td>The ability to communicate information and ideas in speaking so others will understand.</td>
</tr>
<tr>
<td>4. Written Expression</td>
<td>The ability to communicate information and ideas in writing so others will understand.</td>
</tr>
<tr>
<td>5. Fluency of Ideas</td>
<td>The ability to come up with a number of ideas about a topic (the number of ideas is important, not their quality, correctness, or creativity).</td>
</tr>
<tr>
<td>6. Originality</td>
<td>The ability to come up with unusual or clever ideas about a given topic or situation, or to develop creative ways to solve a problem.</td>
</tr>
<tr>
<td>7. Problem Sensitivity</td>
<td>The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Idea Generation and Reasoning Abilities</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>8. Deductive Reasoning</td>
<td>The ability to apply general rules to specific problems to produce answers that make sense.</td>
</tr>
<tr>
<td>9. Inductive Reasoning</td>
<td>The ability to combine pieces of information to form general rules or conclusions (includes finding a relationship among seemingly unrelated events).</td>
</tr>
<tr>
<td>10. Information Ordering</td>
<td>The ability to arrange things or actions in a certain order or pattern according to a specific rule or set of rules (e.g., patterns of numbers, letters, words, pictures, mathematical operations).</td>
</tr>
<tr>
<td>11. Category Flexibility</td>
<td>The ability to generate or use different sets of rules for combining or grouping things in different ways.</td>
</tr>
<tr>
<td>12. Mathematical Reasoning</td>
<td>The ability to choose the right mathematical methods or formulas to solve a problem.</td>
</tr>
<tr>
<td>13. Number Facility</td>
<td>The ability to add, subtract, multiply, or divide quickly and correctly.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Quantitative Abilities</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>14. Memorization</td>
<td>The ability to remember information such as words, numbers, pictures, and procedures.</td>
</tr>
<tr>
<td>15. Speed of Closure</td>
<td>The ability to quickly make sense of, combine, and organize information into meaningful patterns.</td>
</tr>
<tr>
<td>16. Flexibility of Closure</td>
<td>The ability to identify or detect a known pattern (a figure, object, word, or sound) that is hidden in other distracting material.</td>
</tr>
<tr>
<td>17. Perceptual Speed</td>
<td>The ability to quickly and accurately compare similarities and differences among sets of letters, numbers, objects, pictures, or patterns. The things to be compared may be presented at the same time or one after the other. This ability also includes comparing a presented object with a remembered object.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Perceptual Abilities</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>18. Spatial Orientation</td>
<td>The ability to know your location in relation to the environment or to know where other objects are in relation to you.</td>
</tr>
<tr>
<td>19. Visualization</td>
<td>The ability to imagine how something will look after it is moved around or when its parts are moved or rearranged.</td>
</tr>
<tr>
<td>20. Selective Attention</td>
<td>The ability to concentrate on a task over a period of time without being distracted.</td>
</tr>
<tr>
<td>21. Time Sharing</td>
<td>The ability to shift back and forth between two or more activities or sources of information (such as speech, sounds, touch, or other sources).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spatial Abilities</th>
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</tr>
</thead>
<tbody>
<tr>
<td>22. Arm-Hand steadiness</td>
<td>The ability to keep your hand and arm steady while moving your arm or while holding the arm and hand in one position.</td>
</tr>
<tr>
<td>Abilities</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>23. Manual Dexterity</td>
<td>The ability to quickly move your hand, your hand together with your arm, or your two hands to grasp, manipulate, or assemble objects.</td>
</tr>
<tr>
<td>24. Finger Dexterity</td>
<td>The ability to make precisely coordinated movements of the fingers of one or both hands to grasp, manipulate, or assemble very small objects.</td>
</tr>
</tbody>
</table>
10.11. APPENDIX K: SkillsNET Learning Objectives Overview

10.11.1. What is a Learning Objective?
The first step in designing training is developing a learning objective. A Learning Objective is a formal description of what a trainee should be able to do after training is completed. Therefore, a set of well-defined learning objectives serves as a roadmap for training designers and instructors who have to decide what is to be taught in the training program.

10.11.2. Purpose of Learning Objectives
- Convey training goals
- Provide framework for course content development
- Provide basis for assessing trainee achievement

10.11.3. Content of Learning Objectives
A Learning Objective includes three major characteristics:

**Desired terminal behavior.** A training objective starts with a verb that indicates the action that a trainee should be able to perform once training is completed. For example, record medical histories of patients.

**Conditions under which the behavior will be performed.** A training objective specifies the tools and equipment used while performing the task, physical and environmental conditions surrounding the task, as well as certain restrictions imposed on the trainee while performing the task. For example, assemble and fasten materials, using hand tools and wood screws, nails, dowel pins, or glue, to make framework or props.

**Criterion for acceptable performance.** The criterion indicates how well the trainee must be able to perform a particular task. It can include information on time necessary to perform a task, and quantity and/or quality of work produced. For example, take the temperature of five patients to within 0.1 degree of accuracy.

**Note:** Learning Objectives will differ based on how much information will be included in each of them. Generally, the tasks that are more complex and performed under non-normative conditions require more specific Learning Objectives. As a rule, the more specific a Learning Objective is, the easier it is for a training designer to develop an appropriate training program and choose the most effective training methods.
10.12. Learning Objectives Flow Chart

- **IDENTIFY JOB TO BE TRAINED**
  - e.g., BASIC INFANTRYMAN

- **IDENTIFY LEVEL / AIM**
  - e.g., APPRENTICE, JOURNEYMAN, MASTER

- **IDENTIFY TASKS, KNOWLEDGES, SKILLS, TOOLS, & RESOURCES**
  - **BASED ON:**
    - Importance
    - Consequence of error
    - Frequency
  - **SO:** Rifle maintenance
  - **TASK:** Assemble M16A2 rifles
  - **KNOW:** Mechanical
  - **SKILL:** Operation and control
  - **TOOLS:** None needed
  - **RESOU:** M16A2 manual

- **GROUP TKSTRs BY SKILLOBJECT**
  - **BASED ON:** Importance metric

- **CORE TASKS**
  - **CHARACTERISTICS:**
    - How long it takes to learn the task
    - With whom one coordinates
    - To whom one reports
    - Likely performance errors & remediation strategies

- **SUBTASKS**
  - **CONDITIONS:**
    - Platform
    - Weather/environment conditions (arctic, desert)
    - Battle/normative conditions
    - Time pressure
    - Stress level
    - Group or individual level
    - Changing equipment and/or tools
    - Quality and/or quantity of work or service produced

- **PROCEDURES**
  - **BASED ON:**
    - 1. Similarity of Job metric
    - 2. Key Capabilities Needed for Job metric
    - 3. Job Critical Skills metric
    - *If training Apprentice take training gap out of model. If training Journeyman or Master leave training gap in model

- **IDENTIFY TYPES OF OUTCOMES FOR EACH CORE TASK**
  - **BASED ON:**
    - O*NET SKILL/ABILITY LINKAGE TO TASKS

- **GENERATE LEARNING OBJECTIVES**
  - **BASED ON:**
    - Gagne, 1996; Gagne & Briggs, 1979; Gagne, Briggs & Wager, 1992
Learning Center Content Style Guide
Version 1.1

August 6, 2005

Prepared for
Naval Personnel Development Command
9549 Bainbridge Ave
Norfolk, VA

Prepared by
Submarine Learning Center
and
ILE Implementation Team

Distribution authorized to DoD and DoD contractors only. Requests for copies, changes, and additions, are welcomed and should be submitted to the ILE Content Team Lead, Jerry Best (Jerome.Best@navy.mil).

Unclassified
# 11.0 LIST OF EFFECTIVE PAGES

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12.0 CHANGE RECORD

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14.0 SECTION I – COMMON CURRICULUM ELEMENTS

14.1. General Information

The Integrated Learning Environment (ILE) is the means to deliver individually tailored, high quality learning to all who serve maximizing career development, and job performance.

The ILE establishes a training management and delivery capability in support of the Revolution in Training to provide the capability for My Learning Plan, My Learning Event, delivered My Way. This blended training approach includes instructor led training and interactive multimedia instruction (IMI), coupled with innovative learning technologies to provide the right mix of instructional strategies to transfer knowledge and skills essential for successful mission accomplishment. The ILE enables the Sailor to have a tailored learning plan, and a personalized course of instruction that recognizes what a Sailor knows, and what is needed. Blended training content development must address a variety of instructional delivery modes for “My Way” delivery. See Figure 1. The instructor, as mentor and facilitator, provides the role model, guidance, and subject matter expertise necessary to develop Sailors to their full potential to optimize team-based, joint operations.

Figure 9: Individualized Learning in the ILE
14.2. Phases of Development

Prior to developing learning content, the first step is to perform a job task analysis (JTA) which identifies the jobs and positions for every enlisted community in the Navy. This is necessary to ensure that common training is identified, and content design strategies can take advantage of reusable learning content. The JTA determines the logically grouped knowledge, skills, abilities, tools, tasks and resources (KSATTR). These logically grouped skills, called a SkillObject™, serve as the foundation for level 1 and level 2 data elements. Refer to Table 1.

The structure of level 1 data provides a connection between the occupational level data and level 2 data that describes training requirements.

| Definitions:¹ |
|---------------------------------|-------------------------------------------------|
| Critical Work Function          | Major responsibilities an individual must fulfill in order to achieve the major requirements of a job or a role. |
| SkillObject™                    | An occupational skill that is a re-usable detailed description of what people do in accomplishing work. A SkillObject™ contains logically grouped knowledge, skills, abilities, tools, resources, affective domain, and tasks (2-10) that are required to successfully perform a job. |
| Task                            | A duty that is essential and critical to the performance of the job. |
| Subtask                         | A group of concrete actions needed to accomplish a task. For example, if the task is “change a car engine’s oil”, the subtask would be “drain old oil from engine”. |

Table 3: Definitions of Term

Review Figure 2 for an illustration of the relationships among the JTA elements.

¹ SkillsNET™ Corporation definitions.
A Level 2 Training and Performance Improvement Analysis will determine the tasks that require training. While analyzing the tasks, consider the following:

- What needs to be learned?
- How will the target audience best learn the content of instruction?

---

2 The Human Performance Center will assist developers incorporate the science of learning into their training.
How will learning be transferred?
How will performance be measured?

After the tasks that require training intervention have been identified, a media analysis is performed to determine the most appropriate method for delivering training. This analysis involves a review of the tasks to consider factors ranging from characteristics of the target audience responsible for the task, the number of people responsible for the task, and the difficulty of the task. If the task has been taught through training intervention in the past, then the analysis will examine the way instruction was delivered by topic, to identify opportunities to reduce training time and reduce training costs through the application of training technologies.3

Lessons that are good candidates for IMI delivery generally have the following characteristics:

- Short duration lessons or can be reorganized into small lessons.
- Do not require the use of special training equipment.
- Do not require face-to-face interactions.
- Instructional content does not change too frequently.

The workflow of the project follows five basic steps: analysis, design, development, implement, and evaluation. This generalized framework of the instructional design process is called ADDIE, an acronym created from the names of each phase. Although ADDIE provides a general process, there are a number of ISD methodologies and models that may be used in the design of learning materials. Refer to Table 2 for Phases of Development.

**NOTE:** Although ADDIE is the current production model followed by most contractors and sponsors/training customers is proven and effective, it is not conducive to a data driven structured content object model for rapid production. Implementing a rapid prototyping and collaborative iterative design does not change the basic ISD paradigm but it does change how the paradigm is implemented. To augment the guidance provided in this document in support of the new ISD-ID paradigm refer to the Guidance for Navy Instructional Systems Design (ISD) and Instructional Design (ID) Processes 1553-ISD-1.

---

3 Several inventories exist to assist with media selection. For example, *A Systematic Approach to Media Selection* by William W. Lee and Diana Owens, an ASTD white paper may be useful. Citations for additional inventories are provided in the References section of this document.
The personnel involved during these five phases include:

- Project Lead
- Content Editors
- Developers
- Editorial Reviewers
- Graphic Designers
- Instructional System Designers (ISDs)
- Platform Administrators (PAs)
- Subject Matter Experts (SMEs)
- Contracting Officer’s Representative
- ILE Support Team Representative

### Phase 1: Analyze

<table>
<thead>
<tr>
<th>Identify skill object tasks to be developed (ISD and SME).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify content types and content use level based on tasks (ISD and SME). A thorough analysis of existing content (both inter-domain and cross-domain) for reuse, repurposing, or referencing may be warranted. Discuss content host requirements with ILE Support Team.</td>
</tr>
</tbody>
</table>

### Phase 2: Design

<table>
<thead>
<tr>
<th>Produce terminal and enabling learning objectives (ISD and SME).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design questions and instructional content sequence/layout/flow (ISD and SME).</td>
</tr>
<tr>
<td>Review design (ISD, Content Editor, and Editorial Reviewers). Complete content host submission form (see ILE web site).</td>
</tr>
</tbody>
</table>

### Phase 3: Develop

<table>
<thead>
<tr>
<th>Develop graphics (Graphic Artist).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop lesson for IMI or lesson plan and trainee guide for ILT (Developer).</td>
</tr>
<tr>
<td>Review content and graphics (ISD and Content Editor).</td>
</tr>
<tr>
<td>Make corrections (Developer).</td>
</tr>
<tr>
<td>Return to beginning of phase 3 for development of next lesson. Conduct content sample test in GAT (ILE Support Team Rep).</td>
</tr>
</tbody>
</table>
Phase 4

<table>
<thead>
<tr>
<th>Implement / Deploy</th>
<th>Evaluate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deploy and assign for IMI (PA) or prep course for</td>
<td>Deploy to the LMS upon approval (PA).</td>
</tr>
<tr>
<td>instructing for ILT (Instructor).</td>
<td></td>
</tr>
<tr>
<td>Pilot course (PA / Instructor)</td>
<td>Monitor course for necessary content changes</td>
</tr>
<tr>
<td>Pilot only required for new content.</td>
<td>(ISD and SME).</td>
</tr>
<tr>
<td>Corrections reviewed and incorporated (ISD, SME,</td>
<td>Return to phase 1 for next course (ISD and</td>
</tr>
<tr>
<td>Content Reviewer, Editorial Reviewer, and Developer).</td>
<td>SME).</td>
</tr>
</tbody>
</table>

Table 4: Phases of Development

The following organizational chart (Figure 3) diagrams the roles and responsibilities of the members within the team.

Figure 11: Project Team

14.2.1. Hierarchy
The following hierarchy shows the relationships (at the apprentice level) between job task analysis data, SCORM and Navy extensions to the SCORM in the current CD3 document,
and content development terminology (including Navy LCMS\textsuperscript{4}). In the future, the ILE application suite will include a module that formally maps these various hierarchies so that Centers can develop efficient and effective content. \textsuperscript{5} In the examples, the IMI lesson is designed for an hour of instruction, whereas the ILT lesson is designed for several days of instruction. Depending upon the Center’s guidance, the mapping of content may vary based on the nature and length of instruction. Refer to Table 3.

<table>
<thead>
<tr>
<th>OutStart Evolution\textsuperscript{6}</th>
<th>Navy SCORM\textsuperscript{7}</th>
<th>SCORM</th>
<th>JTA\textsuperscript{8}</th>
<th>IMI</th>
<th>IMI Example</th>
<th>ILT</th>
<th>ILT Example</th>
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</thead>
<tbody>
<tr>
<td>Course</td>
<td>Course</td>
<td>Course</td>
<td>Course</td>
<td>SECF\textsuperscript{9}</td>
<td>Combined A-School</td>
<td>Course</td>
<td>Maintain and Operate Auxiliary Systems</td>
</tr>
<tr>
<td>Module</td>
<td>Learning Object Aggregation</td>
<td>Root Aggregation</td>
<td>Critical Work Function</td>
<td>Block</td>
<td>Section Tracking</td>
<td>Course</td>
<td>Module</td>
</tr>
<tr>
<td>Learning Object</td>
<td>Terminal Learning Object (TLO)</td>
<td>Aggregation</td>
<td>Subtask</td>
<td>Lesson</td>
<td>Construction of the contact evaluation plot (CEP)</td>
<td>Section</td>
<td>Section</td>
</tr>
<tr>
<td>Topic</td>
<td>Enabling Learning Object (ELO)</td>
<td>Sharable Content Object</td>
<td>Specific knowledge associated with a subtask</td>
<td>Section (knowledge associated with a subtask)</td>
<td>Given different steps within the CEP procedure, the learner will be …</td>
<td>Topic</td>
<td>Topic</td>
</tr>
<tr>
<td>Groups</td>
<td>Asset Aggregation</td>
<td>Learn, Explore, Practice</td>
<td>Learn, Explore, Practice</td>
<td>Discussion Points</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elements</td>
<td>Assets</td>
<td>Elements</td>
<td>Introduction</td>
<td></td>
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</tr>
</tbody>
</table>

\textbf{Table 5: Hierarchy of Content Relationships}

\textsuperscript{4} An LCMS is a learning content development environment in which the IMI team can create, store, reuse, manage and deliver training from a central object repository.

\textsuperscript{5} The relationship among these hierarchies may vary based on the aggregation of skill objects, tasks, and subtasks that are structured around learner characteristics and instructional requirements.

\textsuperscript{6} This is an example of the OutStart Evolution\textsuperscript{®} platform structure. This structure may vary based on the IMI authoring system that is employed.

\textsuperscript{7} This is the acronym for Navy Shareable Content Object Reference Model.

\textsuperscript{8} This is the acronym for Job Task Analysis.

\textsuperscript{9} This is the acronym for Submarine Electronic Computer Field.
14.3. Lesson Structure

A lesson is a segment of instruction designed to teach one terminal learning objective\(^{10}\) and several supporting objectives, referred to as enabling learning objectives\(^{11}\). A lesson includes an introduction, pretest (optional), sections, summary, and lesson progress test. Sections may also include progress tests to facilitate reusability. Refer to Table 4.

<table>
<thead>
<tr>
<th>Lesson Structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lesson</td>
<td>Addresses a terminal learning objective.</td>
</tr>
<tr>
<td>Lesson Overview</td>
<td>Each lesson begins with an overview. Each overview consists of the following information: introduction, importance, learning objectives addressed, and the bibliography/references.</td>
</tr>
<tr>
<td>Lesson Pretest (Optional)</td>
<td>Pretests can be used as an advanced organizer, to bypass training, or to ensure mastery of prerequisite knowledge.</td>
</tr>
<tr>
<td>Section or Topic</td>
<td>Addresses an enabling learning objective. In IMI, instruction addresses steps in the attainment of knowledge. These steps are provided in the following groups: Learn, Explore, and Practice.</td>
</tr>
<tr>
<td>Summary</td>
<td>Provides a summary of information presented in the section and/or lesson and learning objectives addressed.</td>
</tr>
<tr>
<td>Section or Lesson Progress Test (may include practical exams for ILT)</td>
<td>Includes scored test questions, processes, or procedures required for meeting the terminal learning objective and enabling learning objectives. Determines successful completion of the lesson.</td>
</tr>
<tr>
<td>Module Test</td>
<td>Occurs after the completion of an entire module, or group of lessons. This is a comprehensive test that assesses terminal learning objectives and enabling learning objectives throughout the module.</td>
</tr>
</tbody>
</table>

Table 6: Lesson Structure

\(^{10}\) A terminal learning objective identifies what the learner must know or be able to apply at the completion of a lesson.

\(^{11}\) An enabling learning objective supports a terminal learning objective and identifies what the learner must know or be able to apply at the completion of a section.
14.4. Learning Objectives

The learning objectives for the training lessons are provided upon completion of the course analysis in accordance with the systems approach to training (SAT) process (see http://www.dtswg.org/Documents.htm, Military Handbook 29612-2A, Instructional Systems Development/Systems Approach to Training and Education (31 August 2001). However, flexibility should be allowed so that learning objectives may be modified during the analysis and design phase. It is possible that the SME and instructional designer may find that a learning objective does not meet the needs of the learner or requirements for instructional content development. The SAT process is an iterative instructional design process, and therefore, considers change as a possible occurrence during lesson creation.

Learning objectives consist of behaviors, conditions, and standards that define the performance required of learners. The behavior describes what the learner must be able to do to demonstrate achievement. The condition provides information about the circumstances that apply when this achievement is evaluated. The standard defines the acceptable performance of the behavior.

Learning objectives state behaviors, conditions, and standards. Enabling learning objectives are identified at the section level and must support the terminal learning objective. Enabling learning objectives are aggregated in the overview and summary of a lesson deployed in the LMS.

Provided are examples of learning objectives written for a lesson:

Example Terminal Learning Objective: Given plotting tools, the learner will construct the contact evaluation plot (CEP) and explain the steps within thirty minutes.

Example Enabling Learning Objective: Given different steps within the contact evaluation plot (CEP) procedure, the learner will be able to arrange the steps in the proper order by completing learning questions concerning the CEP.

In order to maintain content reusability, the learning objectives must be complete statements that include the behavior, condition, and standard. The learning objectives are entered as metadata for the section. Although this improves the utility of sections as searchable objects, this results in the redundancy of information that may be displayed in the introduction and summary of the wrapped lessons.

The learning objectives shown are examples only. Each Learning Center Training Directorate may have specific guidance on how to write learning objectives.
In the following example, the learning objective standard takes into account job performance requirements. In this example, the standard is written to 100% completeness or accuracy. The grading criteria for passing the lesson may be explained in the overview portion of the lesson.

Example Terminal Learning Objective: Given all of the required materials, demonstrate how to accurately construct and maintain a contact evaluation plot (CEP) in multiple surfaced and submerged scenarios.

**Note:** One enabling objective should address one section. However, depending on the size, content and structure of a section, more than one enabling objective may be included.
NOTE: Misalignment often starts from using objectives that are supportable by an instructor in a face-to-face environment but are too loose for an asynchronous self-pace methodology. To augment this section refer to Guidance for Navy Learning Objective Statements (NLOS) Specifications 1553-ISD-3. The purpose of this document is to identify the specifications needed to create, review, store, search, and maintain learning objects within the Navy’s Integrated Learning Environment (ILE). The document serves as the baseline required to advance the development of learning objectives and learning objective statements that will serve as a link between the SkillObjects™ and related work elements, the learning events, and the content.

Content Types
Based on the SAT review of the enabling learning objectives, the team categorizes the enabling learning objectives into concepts, facts, procedures, processes, and principles. The definitions for the content types are provided in Table 5 through Table 9.

Concept
Definition: A concept is a category that includes multiple examples. It comprises a group of objects, ideas, or events that are represented by a single word or term, and share common features.

Example: Given a CEP, the learner will categorize the CEP symbols into meaningful groups with no errors by completing learning questions concerning the CEP categories.

Facts
Definition: Facts are unique and specific information usually represented in the form of a statement.

Example: Given a CEP symbol, the learner will recall its meaning by completing learning questions concerning the CEP symbol.

Procedure
Definition: A procedure is a sequence of steps that are followed systematically to achieve a task or make a decision. A procedure contains directions or procedural tasks that are done in the same way every time.

Example: Given different steps within the CEP procedure, the learner will be able to arrange the steps in the proper order by completing learning questions concerning the CEP procedure.

Process
Definition: A process is a flow of events that identify how something works. Topics that list a chain of events that are performed by an organization usually represent a process.
Example: Given a target motion analysis task such as launching a successful attack, the learner will be able to identify the stages by completing learning questions concerning the task.

**Principle**

Definition: A principle consists of directions that outline guidelines for action in which people must adapt the rules to various situations. Principles typically require a person to make decisions when applying them. Tasks that are completed in different ways each time by applying the guidelines usually represent principles.

Example: Given a tactical situation, the learner will apply the guidelines for action with no error by completing learning questions concerning the situation.
14.5. **Content Use Level**

After the enabling learning objectives are categorized into content types, the “content use level” for each enabling learning objective is determined.

Content use level, or mastery level, is the degree of recognition and performance that a learner is expected to display after completing training at the section level. There are two levels of use, or mastery levels, that may apply to the five content types.

**Remember Use Level**
The learner recognizes and recalls information. The instructional tactics used to convey the information require the learner to memorize information for short to long-term memory storage.

**Apply Use Level**
This level requires the learner apply information to accomplish some task or solve a novel problem. The learner must be given opportunities to practice applying the information properly or practice in solving similar and dissimilar problems that move the learner to higher levels of discrimination and problem solving ability. Thus, more complex tactics are appropriate and applicable to this use level. For example, this level may require hands-on interaction with technical training equipment. It may require the use of the actual piece of equipment or possibly a part task trainer, providing a real world model of the equipment in which learning involves physical movement, coordination, and use of motor skills. Development of these skills requires practice and is measured in terms of speed, precision, distance, procedures, or techniques in execution.

14.6. **Questions**

After the enabling learning objectives are categorized into content types and “content use levels”, questions can be developed. Use the following tables to determine the question types to employ based on the classification of each enabling learning objective.

<table>
<thead>
<tr>
<th>Concept</th>
<th>Content Use Level</th>
<th>Concept Content Type</th>
</tr>
</thead>
</table>
| Remember | Drag-and-Drop  
Identify (Hot Spot)  
Matching  
Multiple Choice-Multiple Answer  
Multiple Choice-Single Answer  
Short Answer (Fill in the Blank) |
| Apply | Drill & Practice  
Exercise  
Simulation |

*Table 7: Assessment Types Associated with the Concept Content Type*
Facts

<table>
<thead>
<tr>
<th>Content Use Level</th>
<th>Facts Content Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remember</td>
<td>Multiple Choice-Single Answer</td>
</tr>
<tr>
<td></td>
<td>Short Answer (Fill in the Blank)</td>
</tr>
<tr>
<td></td>
<td>Two-State</td>
</tr>
</tbody>
</table>

| Apply             | Not applicable                   |

Table 8: Assessment Types Associated with the Fact Content Type

Procedure

<table>
<thead>
<tr>
<th>Content Use Level</th>
<th>Procedure Content Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remember</td>
<td>Drag-and-Drop</td>
</tr>
<tr>
<td></td>
<td>Matching</td>
</tr>
<tr>
<td></td>
<td>Multiple Choice-Multiple Answer</td>
</tr>
<tr>
<td></td>
<td>Ordering</td>
</tr>
</tbody>
</table>

| Apply             | Case Study                       |
|                   | Essay                            |
|                   | Exercise                         |
|                   | Gaming                           |
|                   | Goal-Based Learning              |
|                   | Oral Board                       |
|                   | Simulation                       |

Table 9: Assessment Types Associated with the Procedure Content Type

Process

<table>
<thead>
<tr>
<th>Content Use Level</th>
<th>Process Content Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remember</td>
<td>Drag-and-Drop</td>
</tr>
<tr>
<td></td>
<td>Matching</td>
</tr>
<tr>
<td></td>
<td>Multiple Choice-Multiple Answer</td>
</tr>
<tr>
<td></td>
<td>Ordering</td>
</tr>
</tbody>
</table>

| Apply             | Case Study                     |
|                   | Essay                          |
|                   | Exercise                       |
|                   | Goal-Based Learning            |
|                   | Oral Board                     |
|                   | Simulation                     |

Table 10: Assessment Types Associated with the Process Content Type
Table 11: Assessment Types Associated with the Principle Content Type

14.6.1. Question Development for Remember Content Use Level

Questions developed for the “Remember content use level” should assess if a learner is able to recognize and recall information.

When designing questions to assess a learner on the recognition and recall of information for IMI or ILT consider the following general guidelines:

- State the test item clearly. Be specific yet concise. Do not assume that the learner knows the acronyms or the context of the question. Remember that questions can follow a section, or be included in a lesson progress test. Make sure that the question can stand on its own without additional explanation or instruction.
- Do not write questions that are unnecessarily difficult or easy. If the question is too difficult, then there will not be any discrimination among learners. Likewise, if the question is too easy, there will not be any discrimination value.
- Make sure the question requires comprehension and not recall when comprehension is being measured. For example, do not copy text directly from instruction that is easily identifiable.
- Avoid using negative phrases in the stem. If a negative phrase must be used, highlight it or underline it. NEVER use a negative phrase with negative options.
- Do not include a test item that compromises another test item. Questions that provide an answer to another question should be avoided.

Consider the following specific guidelines when designing each question type:

Drag-and-Drop and Matching

<table>
<thead>
<tr>
<th>Principle Content Use Level</th>
<th>Principle Content Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remember</td>
<td>Drag-and-Drop</td>
</tr>
<tr>
<td></td>
<td>Matching</td>
</tr>
<tr>
<td></td>
<td>Multiple Choice-Multiple Answer</td>
</tr>
<tr>
<td></td>
<td>Multiple Choice-Single Answer</td>
</tr>
<tr>
<td></td>
<td>Short Answer (Fill in the Blank)</td>
</tr>
<tr>
<td>Apply</td>
<td>Case Study</td>
</tr>
<tr>
<td></td>
<td>Drill &amp; Practice</td>
</tr>
<tr>
<td></td>
<td>Essay</td>
</tr>
<tr>
<td></td>
<td>Exercise</td>
</tr>
<tr>
<td></td>
<td>Goal-Based Learning</td>
</tr>
<tr>
<td></td>
<td>Oral Board</td>
</tr>
<tr>
<td></td>
<td>Simulation</td>
</tr>
</tbody>
</table>
The learner drags text (graphically generated) or graphic objects to the appropriate location on the screen. See Figure 4

1. This format provides answer choices that can be dragged to target areas on a base image.
2. When designing the base image, make sure that the base areas are similar in size. This prevents the learner from guessing as to where to place an element based only on size.

Match each component on the LOS diagram to the correct fire control symbol.

![Figure 4: Example Drag and Drop](image)

**Identify (Hotspot)**
The same image can be used to ask several questions. The image map requires the examinee to select a location on an image using a pointing device. This test format may be used in combination with multiple-choice options displayed on the map.

1. The question should indicate that the examinee must select an area on the map.
2. The image areas should be large enough that the examinee can pinpoint the area with a pointing device.

**Multiple Choice-Single Answer and Multiple Choice-Multiple Answers**
A properly developed multiple-choice test item can be challenging and objective consisting of a sound stem and balanced options.

1. Present in the interrogative format.
2. Use four answer options. More than four options takes too long to read and adds little value. Less than four options increases the effect of guessing.
However, multiple-choice questions may include up to five distractors when
the question is a multiple choice-multiple answer type.
3. Ensure that the options are not misleading.
4. Provide answer options in the same units of measurement.
5. Make options plausible.
6. Avoid the use of “all of the above” or “none of the above” as options. These
options can be easily eliminated if one option is either correct or incorrect.
They can also be meaningless if options are dynamically selected for display.
7. Make sure that the options follow the stem grammatically.
8. Avoid the use of qualifiers such as always, never, and sometimes for options.
9. The options should be punctuated the same. For example, do not capitalize
some options and not others; or end an option in a period while not doing so
for others. Only end an option with a period if it is a complete sentence and
only if all the options associated with the stem are complete sentences.
10. Use discretion when designing questions. If an acronym is frequently used as
the common term, then provide it only as an acronym in the body of the
question. If it is an uncommon term that can be confused with others, omit the
acronym and replace it with the complete term.

Ordering
Ordering requires learners to answer sequentially. The learner may order lists,
events, or steps. Consider requiring the learner to order significant steps within a
procedure. If there are more than seven steps that need to be put in order,
consider chunking the steps into meaningful units and composing the questions
into smaller units. Chunking the procedure into units that contain less than seven
steps will likely help the learner retain the order well after the assessment is
finished.

Short Answer (Fill in the Blank)
Short answers require one-word answers, brief narrative, numbers, or
abbreviations. The author should anticipate as many variants of spelling,
including misspelled words as possible. Consider using this type of question
technique only when it is a requirement for the examinee to recall the exact
spelling of the term.

Two-State
Two-state questions require one or two responses that can be objectively
graded. Make sure the stem is a complete statement.

14.6.2. Question Development for Apply Content Use Level
Apply “content use level” questions are used to assess a learner on the
performance of procedures taught during IMI or ILT. The learner may have
access to manuals during evaluation. When different actions or a series of
actions can accomplish the same task, a single preferred method should be
taught and evaluated.


**Case Study**
The instructional purpose of a case study is to present the learner with a real-life situation. Case studies are used to help the learner role-play handling situations of a similar nature.

**Drill and Practice**
Drill and practice is used to elicit the recall of performance-based activities. Practice is usually presented repetitively, changing the nature of the question and the proper method to reach the correct answer slightly each time.

**Essay**
Essays require the learner to articulate in written form a procedure, process, or principle. In essays, a learner must decide how to approach the problem, what information to use, and how to organize the answer.

1. Writing skills may influence the scoring.
2. Scoring is subjective.

**Exercise**
An exercise is a series of guided interactions. It requires the learner to perform tasks that involve the application of knowledge and skills in the content of an actual process or procedure. The outcome of an exercise should be the successful completion of the process or procedure. For example, a practical exam is typically an exercise.

1. The expected level of mastery is usually presented before exercise lessons or exercise lesson section(s) begin.
2. Exercises usually include an entire process or procedure from beginning to end.
3. Feedback should be included in an exercise to reveal the incorrect nature of individual learner responses.

**Gaming**
Games allow learners to experiment with subject matter in a way that should enhance the understanding of the steps, rules and judgments required by procedures and processes. Games are frequently used to motivate the learner and gain the learner's attention.

**Goal-Based Learning**
In goal-based learning, IMI simulates a work environment where learners are provided the opportunity to practice procedures. Learners are able to make the same choices they make in a real situation and learn from mistakes after they occur.

**Oral Board Assessment**
In oral boards, a learner must be able to articulate reasoning and answer follow-up questions. An advantage of oral questioning is its flexibility and adaptability that makes it possible to discover the learner’s level of knowledge and mental processes. For example, the evaluator can start with a hard question and then tailor it until the learner is able to sufficiently answer. This can reveal the deep and specialized knowledge that a learner can retrieve. Scheduling problems can occur when many learners need to be evaluated within a short time.

Simulation
If a multimedia simulation method is used, each graphic and each learner interaction must have the same look and feel as the real equipment or software, and wrong responses and interactions must be allowed.

14.7. Tests

NOTE: Refer to recent publication of Guidance for Navy ILE Assessments 1553-ISD-2. This document provides guidance for designing, developing, and implementing assessments within the confines of the ILE.

All questions are delivered and designed with reuse in mind. There is the possibility that an assessment may be delivered at several locations within the module, course, and lesson. Review the following standard testing types:

14.7.1. Pretest

Pretests can be used in the following ways:

- As an advanced organizer: The advanced organizer is a cognitive strategy that aids the learner in identifying the important portions of the instructional content so that attention is focused.
- To bypass training: This allows the learner to expedite training by passing mastered material. A pretest can be used for just-in-time training or refresher training in which time to learn is limited and may be tailored to the individual needs of the learner.
- To ensure mastery of prerequisite knowledge: This ensures that a learner has the knowledge and skills required to proceed with learning. If the learner does not have the prerequisite knowledge, feedback regarding mastery of previously taken training is provided and remediation may be required.14

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14 The skill objects will identify unique knowledge required for a learning event. The unique knowledge may be prerequisite knowledge. It must be reflected in
14.7.2. Practice Questions and Quizzes
Practice questions and quizzes are presented to sample learner understanding and maintain learner interest and involvement. Normally these questions appear at the end of each enabling learning objective and/or prior to beginning a new learning activity. Practice questions should provide the learner with immediate feedback, remediation, and the correct answer. At least two questions should be provided per section depending upon the content of the instruction. In IMI, the learner should be provided with two attempts to answer the question or perform the action correctly. For ILT, quizzes are typically used. The instructor provides feedback about the correctness of what the learners' have done and if incorrect, the nature of their mistake. Remediation states as a minimum:

- Correct Answer: "Correct," followed by an explanation of why the answer is correct.
- Incorrect Answer: "Incorrect." The screen indicates the learner's choice, places a "check" by the correct answer, and explains why the "corrected answer" is correct.

14.7.3. Section and Lesson Progress Test
Each section or lesson may conclude with a knowledge and/or performance-based progress test. The level at which a progress test happens will depend on the nature of the content covered. There should be at least 15 to 20 questions per progress test depending upon the content of instruction. Practical exams require the completion of a procedure or process requiring hands-on psychomotor skills.

A knowledge-based progress test is a segment of assessment designed to determine learner comprehension of one terminal learning objective and several supporting objectives referred to as enabling learning objectives. The following assessment hierarchy (Table 10) may exist within a progress test.

---

prerequisites for the section or lesson and may be tested to ensure that the learner may proceed with learning.
### Progress Test Structure

<table>
<thead>
<tr>
<th>Structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Progress Test (approximately 30 minutes)</td>
<td>Addresses comprehension of a terminal learning objective.</td>
</tr>
<tr>
<td>Progress Test Section (approximately 5 to 10 minutes)</td>
<td>Addresses comprehension of an enabling learning objective.</td>
</tr>
<tr>
<td>Test Question</td>
<td>Addresses comprehension of a facet of the enabling learning objective.</td>
</tr>
<tr>
<td>Progress Test Summary</td>
<td>Summary of learner performance and comprehension.</td>
</tr>
</tbody>
</table>

**Table 12: Progress Test Structure**

If a learner fails a section or lesson progress test, remediation and re-testing is as directed by an instructor or as directed by the LMS based on predetermined conditions. However, it is recommended that a progress test only be delivered to the learner two times. It is recommended that the passing score be at least 70% for a homogeneous test. Some tests may require a passing score of 100% to ensure mastery. Policy on passing scores is set by Center Training Directorates. Developers should consult with Learning Standards personnel for guidance.

### Module Test

A knowledge-based module test is a segment of assessment designed to determine learner comprehension of multiple terminal learning objectives and their respective enabling learning objectives. The test may comprise about 50 questions. The following assessment hierarchy (Table 11) may exist within a module test.

<table>
<thead>
<tr>
<th>Structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module Test (approximately one to two hours)</td>
<td>Addresses comprehension of multiple terminal learning objectives.</td>
</tr>
<tr>
<td>Module Test Section (approximately 5 to 10 minutes)</td>
<td>Addresses comprehension of a terminal learning objective and respective enabling learning objectives.</td>
</tr>
<tr>
<td>Test Questions</td>
<td>Addresses comprehension of enabling learning objectives and respective facets of each enabling learning objective.</td>
</tr>
<tr>
<td>Module Test Summary</td>
<td>Summary of learner performance and comprehension.</td>
</tr>
</tbody>
</table>

**Table 13: Module Test Structure**

If a learner fails a module test, remediation and re-testing is as directed by an instructor or as directed by the LMS based on predetermined conditions. However, it is recommended that a module test only be delivered to the learner...
two times. The passing score should be at least 70% for a homogeneous test. Some tests may require a passing score of 100% to ensure mastery. Policy on passing scores is set by Center Training Directorates. Developers should consult with Learning Standards personnel for guidance.

14.7.5. Computer-Delivered Assessment
A knowledge-based test that is delivered via the computer from the LMS or a test management system, may include certain conditions that affect the way the test is presented and scored. Determining how to construct assessment for computer-delivery will be based on several factors.

### Assigned Passing Score
This is entered as a percentage of correct answers needed by the learner in order to pass the assessment. If the score is reached, the learner may proceed to new learning activities as directed by the LMS or instructor. Policy on passing scores is set by Center Training Directorates. Developers should consult with Learning Standards personnel for guidance.

1. The passing score should be determined prior to question development and be based on the criteria defined in the learning objectives.
2. The passing score should be able to distinguish critical differences in the level and type of comprehension obtained by learners.
3. Consider providing information to the learner that identifies what a learner needs to learn to improve.
4. In order to assign the passing score, consider reviewing the test questions to determine how many, and which ones, a learner must be able to answer correctly in order to meet the requirements of the learning objectives.

### Duration
This indicates the length of time, in minutes, allotted to a learner to complete assessment.

1. Consider the reliability of computer response if the learners are required to take assessment within a certain length of time.
2. Only use a timed test if the criteria defined in the learning objectives require it.
3. Consider the variations of the learner population in terms of their reading speed and hand-eye coordination.

### Weights
This is a number that represents the value the assessment results will have in relation to other assessment scores.

1. The weight of a test question should be established to distinguish critical differences in the level and type of comprehension obtained by learners.
2. Higher weights should be assigned to test questions that provide strong evidence of learner understanding.

**Number of Tries**
This indicates the number of times a learner may retake assessment.

1. Consider allowing the learner to take assessment several times, if it is determined that the learner will improve comprehension by repetitive exposure to the same assessment.
2. The Center Training Directorate determines the policy on the number of tries allowed.

**Mandatory Delivery**
This enforces that a test question is always included.

1. Mandatory delivery should be assigned to test questions that provide strong evidence of learner understanding.
2. Consider that learning can be enhanced by careful selection of questions to provide evidence of comprehension.
3. Consider that the careful combination of various test questions can provide strong evidence of comprehension.

**Shuffle**
This is used to rearrange test questions and test options.

1. Shuffle questions when the order in which the questions are presented is not of any significance.
2. Shuffle questions and distracters when you plan to reuse questions for several test types.
3. Consider a mix of question types when mastery of the learning objective is critical. Don’t rely on the reliability of two-state questions.

**Number of Assessment Items**
This assigns the number of test questions that will be displayed to the learner during assessment delivery. This number may be equal to, or greater than, the number of mandatory items.

1. Set the number of test questions to less than what is available in the pool of questions when the number of questions presented to the learner is not of any significance.
2. Set the number of assessment questions to less than what is available when you plan to reuse questions for several test types. This will help to ensure that each delivery of assessment is unique.
3. Consider how many test questions a learner needs to answer correctly to be judged successful on a particular learning objective.
These computer-delivered assessment conditions are listed in Table 12 along with their application when used at the various levels within a test hierarchy.

<table>
<thead>
<tr>
<th>Condition</th>
<th>When Applied at Test Level</th>
<th>When Applied at Test Section Level</th>
<th>When Applied at Test Question Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assigned Passing Score</td>
<td>Indicates the percent to pass test.*</td>
<td>Indicates the percent to pass section.</td>
<td>Indicates the percent to pass test question.</td>
</tr>
<tr>
<td>Duration</td>
<td>Indicates the length of time allotted to complete test.*</td>
<td>Indicates the length of time allotted to complete section.</td>
<td>Indicates the length of time allotted to complete test question.</td>
</tr>
<tr>
<td>Weights(^{15})</td>
<td>Indicates the weight of test in relation to other tests.*</td>
<td>Indicates the weight of test questions in a section.*</td>
<td>Indicates the value of a test question option in relation to other question options.*</td>
</tr>
<tr>
<td>Number of Tries</td>
<td>Indicates the number of times the test may be taken.*</td>
<td>Indicates the number of times the section may be taken.</td>
<td>Indicates the number of times a test question may be taken.*</td>
</tr>
<tr>
<td>Mandatory Delivery</td>
<td>Indicates that the progress test is required to proceed.</td>
<td>Indicates that a section is required to proceed.</td>
<td>Indicates that the test question must be displayed each time the section is delivered.*</td>
</tr>
<tr>
<td>Shuffle</td>
<td>Indicates random ordering of sections.*</td>
<td>Indicates random ordering of sections.*</td>
<td>Indicates random ordering of test question options.*</td>
</tr>
<tr>
<td>Number of Assessment Items</td>
<td>Not applicable.</td>
<td>Indicates the number of test questions that are displayed each time the section is delivered even if a larger number of test questions exist within the section.*</td>
<td>Not applicable.</td>
</tr>
</tbody>
</table>

Table 14: Computer-Delivered Assessment Guidance

\(^*\) Supported in OutStart Evolution\textsuperscript{®} Knowledge Developer.

\(^{15}\) Weights at any level can have an overall impact on performance scoring.
14.7.6. Evaluating Tests and Test Questions
Tests, test questions, and test directions should be formatively evaluated before they are used to assess learner performance. The ISD and SME should ensure that the test directions are clear, that test questions are accurate, and that the conditions in which the learner performs the assessment are appropriately designed so that they address the requirements defined in the learning objective.

Prior to administering the test to the target audience, it may be necessary to preliminarily evaluate the test. A preliminary evaluation can be performed in the following way: set up a scenario in which a learner reads aloud to the ISD the contents of the test, and explains what the learner must do. This kind of evaluation can reveal unclear directions, and confusing examples.

After a test is actually given, the ISD and SME can assess the results for item clarity. Test questions that are frequently missed by most of the learners should be reviewed for inadequacies. The question may be too difficult, not covered in the instructional content, or confusing.

Test questions may be designed for reuse, and random display. When implementing computer-delivered assessment, there is a potential that the selection of questions delivered are not at the same level of difficulty as other selections. Therefore, the questions should be evaluated to ensure all test questions constructed for a learning objective are parallel and at about the same level of difficulty.
14.8. Instruction

Once the questions are developed for each enabling learning objective, instructional content is developed. Content designed using skill objects, incorporates knowledge, skills, and abilities necessary for the Sailor to perform a job. The skill object also includes tools and resources. For example, if resources include technical publications, those publications will be used at each applicable point in the lesson as indicated by the skill object; if the tools include technical training equipment, the equipment will be used as applicable from the skill object.

Table 13 - Table 17 provide a list of instructional tactics that should be used when developing the instructional sections for the lessons. Recall that a section addresses one enabling learning objective. Each enabling learning objective was previously classified by content type, and content use level. Locate the content type and content use level in the tables provided. Based on the classification of each enabling learning objective locate the instructional tactics to use.

<table>
<thead>
<tr>
<th>Concept</th>
<th>Content Use Level</th>
<th>Concept Content Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remember</td>
<td>Introduction, Facts (optional), Definition and Illustration, Elaboration (optional), List (optional), Table/Charts/Figures (optional), Example, Non-example (optional)</td>
<td></td>
</tr>
<tr>
<td>Apply</td>
<td>Introduction, Facts (optional), Definition and Illustration, Elaboration (Optional), List (optional), Table/Charts/Figures (optional), Example, Non-example (optional)</td>
<td></td>
</tr>
</tbody>
</table>

Table 15: Instructional Content Associated with the Concept Content Type
### Facts

<table>
<thead>
<tr>
<th>Content Use Level</th>
<th>Facts Content Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remember</td>
<td>Introduction, Facts, Definition and Illustration (optional), Diagram (optional), Graphic (optional), Table/Charts/Figures (optional), List (optional), Table (optional), Example (optional), Mnemonics (optional)</td>
</tr>
<tr>
<td>Apply</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

**Table 16: Instructional Content Associated with the Fact Content Type**

### Procedure

<table>
<thead>
<tr>
<th>Content Use Level</th>
<th>Procedure Content Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remember</td>
<td>Introduction, Facts (optional), Definition and Illustration (optional), Comparisons and Contrasts (optional), Diagrams (optional), Procedure/ Decision/ Combined table (select one)</td>
</tr>
<tr>
<td>Apply</td>
<td>Introduction, Facts (optional), Definition and Illustration (optional), Comparisons and Contrasts (optional), Diagrams (optional), Procedure/ Decision/ Combined table (select one), Demonstration/ Example (optional)</td>
</tr>
</tbody>
</table>

**Table 17: Instructional Content Associated with the Procedure Content Type**
### Process

<table>
<thead>
<tr>
<th>Content Use Level</th>
<th>Process Content Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remember</td>
<td>Introduction</td>
</tr>
<tr>
<td></td>
<td>Facts (optional)</td>
</tr>
<tr>
<td></td>
<td>Staged table/block diagrams/cycle charts (select one)</td>
</tr>
<tr>
<td>Apply</td>
<td>Introduction</td>
</tr>
<tr>
<td></td>
<td>Facts (optional)</td>
</tr>
<tr>
<td></td>
<td>Staged table/block diagrams/cycle charts (select one)</td>
</tr>
<tr>
<td></td>
<td>Demonstration (optional)</td>
</tr>
<tr>
<td></td>
<td>Comparison and Contrasts (optional)</td>
</tr>
<tr>
<td></td>
<td>Elaboration (optional)</td>
</tr>
<tr>
<td></td>
<td>Definition and Illustration (optional)</td>
</tr>
<tr>
<td></td>
<td>Example/Non-example (optional)</td>
</tr>
<tr>
<td></td>
<td>Procedure/ Decision/ Combined table (select one)</td>
</tr>
</tbody>
</table>

**Table 18: Instructional Content Associated with the Process Content Type**

### Principle

<table>
<thead>
<tr>
<th>Content Use Level</th>
<th>Principle Content Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remember</td>
<td>Introduction</td>
</tr>
<tr>
<td></td>
<td>Facts (optional)</td>
</tr>
<tr>
<td></td>
<td>Principle statement</td>
</tr>
<tr>
<td></td>
<td>Guidelines</td>
</tr>
<tr>
<td></td>
<td>Example</td>
</tr>
<tr>
<td></td>
<td>Non-example (optional)</td>
</tr>
<tr>
<td></td>
<td>Demonstration (optional)</td>
</tr>
<tr>
<td></td>
<td>Elaboration (optional)</td>
</tr>
<tr>
<td></td>
<td>Definition and Illustration (optional)</td>
</tr>
<tr>
<td>Apply</td>
<td>Introduction</td>
</tr>
<tr>
<td></td>
<td>Facts (optional)</td>
</tr>
<tr>
<td></td>
<td>Principle statement</td>
</tr>
<tr>
<td></td>
<td>Guidelines</td>
</tr>
<tr>
<td></td>
<td>Example</td>
</tr>
<tr>
<td></td>
<td>Non-example (optional)</td>
</tr>
<tr>
<td></td>
<td>Demonstration</td>
</tr>
</tbody>
</table>

**Table 19: Instructional Content Associated with the Principle Content Type**

#### 14.8.1. Instruction Development

Consider the following specific guidelines when designing instructional tactics.

**Definitions and Illustrations**
Definitions are used to explain the meanings of words or provide interpretations of phrases. Concepts and facts are defined through text or illustrations.

Illustrations are provided verbally, graphically, or through animation. Steps within a process or procedure are typically shown in an illustration.

1. Write definitions of complex words or phrases at about the ninth-grade reading level.
2. Use common words to define uncommon words and phrases.
3. Use illustrations to provide a scenario description. Describe the scenario in a narrative form.
4. Use graphic illustrations in combination with descriptive text or audio.
5. Use highlights and arrows to identify each area described.

**Demonstrations**
A demonstration is a presentation in which specific steps in a process or procedure are described and performed for the learner. The learner observes the demonstration. Interactivity is recommended every four or five screens to engage the learner.

**Diagrams**
Diagrams are used to show a procedure or process abstractly.

1. Diagrams provide a graphic overview of a procedure or process.
2. Diagrams should be presented in a consistent way throughout a lesson.
3. A diagram is often used within other instructional tactics.
4. Use text to explain the contents of the diagram.

**Elaborations**
An elaboration is a scaffolding organization of instruction. Elaborations should be used to provide detailed information about a complex portion of a concept.

**Example/Non-Example**
An example describes an instance of an object, symbol, event, process, or procedure. Examples are used when conditions can be variable enough that the learner must be able to discriminate among differences. Conditions surrounding the example must be described clearly.

Non-examples are used to practice higher levels of discrimination by offering a scenario or a situation that requires the learner to compare correct and incorrect instances of the condition.

**Mnemonics (clusters, keywords, acronyms)**
Mnemonics are words, phrases, or images that people use to help them recall information. Outlines, clusters, keywords, and acronyms may be used as mnemonic devices. Mnemonic devices rely on the principle that it is easier to remember less than seven items, and that by remembering a smaller cluster, you will be able to recall something larger.

An example of a mnemonic is, “Spring ahead, Fall back” which is used to remember how to adjust clocks for daylight and standard time in many places.

**Tables/Charts/Figures**
Tables, charts, and figures present information in a way that helps the learner understand the narrative text and can help the learner remember and retrieve the text through association.

Textual data should be displayed within a table, while numerical data should be displayed in a chart or a graph. Charts or graphs usually compare quantities. Figures, such as maps and scattergrams, provide a graphic display of data that does not fit the standard definitions of either tables or charts.

**Team/Group/Paired Learning Activities**

Team/group/paired learning activities are used to encourage cooperative learning among members of a group. Learners can excel in group learning activities because these types of activities can encourage learners to:

- Give and receive help, assistance, and feedback on progress.
- Exchange resources and information.
- Challenge others thinking.
- Influence others reasoning and behavior.
- Encourage each other to learn and strive for mutual benefit.
- Build and maintain high levels of trust.
- Cope effectively with anxiety and stress.

To use this tactic, first assign the group a clear and measurable task. Next, structure the activity so members believe that they can attain goals if and only if their group mates also attain their goals. Finally, supplement the activity with a tangible reward for successfully completing a joint task. Other ways to reward the group are to:

1. Celebrate joint success when all members reach criterion.
2. Add bonus points to all members when everyone in the group achieves up to criterion or when overall group scores reach criterion.
3. Provide a single group grade for the combined efforts of group members. This should be employed cautiously until all students are familiar with cooperative learning.
15.0 SECTION II – IMI CURRICULUM DEVELOPMENT

The IMI team members may perform some, or all, of the activities listed in Table 35 depending on the requirements of the proposed IMI project.

<table>
<thead>
<tr>
<th>Team Role</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content Editors</td>
<td>Review lesson designs, flowcharts, and storyboards for content accuracy. Review IMI products for content accuracy.</td>
</tr>
<tr>
<td>Editorial Reviewers</td>
<td>Perform editorial and quality control functions for IMI products.</td>
</tr>
<tr>
<td>Graphic Designers</td>
<td>Develop graphic images to include screen layout, screen design, text attributes and color, illustrations, technical drawings, title, and animation frames. Catalog computer graphic images, and maintain a reference file.</td>
</tr>
<tr>
<td>IMI Developers</td>
<td>Author lessons. Populate content with metadata tag values.</td>
</tr>
<tr>
<td>Instructional System Designers (ISDs)</td>
<td>Identify skill object tasks to be developed as IMI with SME assistance. Develop instructional strategies. Create project’s overall design. Describe appropriate methods. Establish conventions. Review and establish default values for metadata tags. Identify content types and content use levels with SME assistance. Produce terminal and enabling learning objectives with SME assistance. Design questions and instructional content sequence/layout/flow with SME assistance. Review questions. Review instructional content storyboards. Select applicable media. Determine graphic and audio visual requirements. Develop prototype with other team members. Author courseware, as required. Prepare validation plan. Manage validations. Analyze data and write validation report. Review completed lesson designs, flowcharts, and storyboards.</td>
</tr>
<tr>
<td>Platform Administrators (PAs)</td>
<td>Coordinate with appropriate software companies for technical support.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Team Role</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Activities</strong></td>
<td></td>
</tr>
<tr>
<td>Develop computer programming when the authoring software does not meet training strategy need or special feature requirements. Identify hardware and network to support IMI development and delivery. Set up hardware and configure system(s) to meet the needs of the authoring and graphics software.</td>
<td></td>
</tr>
<tr>
<td>Subject Matter Experts (SMEs)</td>
<td>Provide technical information. Identify skill object tasks to be developed as IMI with ISD assistance. Identify content types and content use levels with ISD assistance. Produce terminal and enabling learning objectives with ISD assistance. Design questions and instructional content sequence/layout/flow with ISD assistance. Develop questions with ISD review. Develop instructional content storyboards/ identify graphics with ISD review. Assign metadata tag values. Monitor course for necessary content changes. Make content changes to IMI, as needed, with ISD assistance.</td>
</tr>
<tr>
<td>Project Leader</td>
<td>Individual at the Center or School level who leads the project team and has final approval authority over the delivered product.</td>
</tr>
<tr>
<td>Contracting Officer’s Representative</td>
<td>The Government official appointed in writing by the Procuring Contracting Officer (PCO) and designated in the contract to perform functions as the technical representative of the PCO. The COR serves as liaison between the Government and the contractor for technical aspects of a contract, monitors contract performance and provides technical advice to the contracting officer.</td>
</tr>
<tr>
<td>Contracting Officer</td>
<td>Warranted Government Official who has authority to enter into binding contractual relationships with contractors. Only a contracting officer can legally commit Government resources.</td>
</tr>
<tr>
<td>ILE Support Team Rep</td>
<td>ILE support team representative responsible to assist Center team with content host planning and acceptance testing in the ILE.</td>
</tr>
</tbody>
</table>

Table 20: IMI Team Roles and Activities
15.1. IMI Interface Design and Controls

The IMI courseware is designed for self-paced instruction. The interfaces and controls for each lesson should be consistent. All lessons should be compatible with the Navy Marine Corps Intranet (NMCI) Gold Disk specifications to operate correctly in the ILE. These specifications can be found at:


The learner interfaces with the lesson by responding to visual and audible indications, following the appropriate procedure, and clicking with a mouse on the proper selection.

15.1.1. Visual Design Considerations

The interface can provide quality communication between the computer and learner by providing a logical sequence for learning. Graphics can help enhance instruction and they can help to cue students to specific information in the lesson.

The design of the interfaces should be clear, consistent, and attractive. The learner, dealing with new information, needs to devote attention to the instruction and not the medium in which instruction is displayed. The layout of text and images can help to arrange the parts of IMI into a logical sequence for learning. Divide large units of information into smaller units to improve visual clarity and improve retention of information. Information should be presented in a consistent format. Text should be placed in a similar position; a picture that is available throughout IMI should be placed in the same position; the same type should be used; and images should be similar in style. An imaginary line directly above the center of the computer screen marks the optical center. This is where the learner's vision will focus. Concentrating elements at the optical center will keep the design balanced. Large illustrations should be anchored by other elements. Empty space, through contrast, can act as an anchor to balance a large illustration.

In order to elaborate on concepts during instruction, images can be used. An illustration next to text can help the learner remember and retrieve the text through association. Adding an appropriate image next to text will encourage the learner to employ this strategy. For example, in order to enhance instruction in IMI, images can be used to show how something looks. The image should illustrate a description in text clearly. If the intent of an image is to generalize features of a class, then the image should represent this generalization. For instance, text that describes general characteristics of an object should be illustrated visually with an emphasis on the general characteristics. A digitized photograph of the object will not present the identifying characteristics as well as a simple line drawing because irrelevant detail will interfere. Realism in
instructional graphics may have a negative impact by overloading the learner with irrelevant information.

In order to draw the learner to important information in IMI, visual cueing strategies can be used. Cueing helps to change the emphasis a learner places on different elements shown. Learners perform best when they are cued to information. Cues should visually represent their function. If the learner is unable to recognize a cue's function, then the information being cued will not be evident, and important instructional information may be overlooked or misinterpreted. For example, an arrow symbolically represents the act of pointing. A question mark represents the act of questioning. A box containing information separates it from the rest of the information on the screen.

Consistency in the design of cues can convey a clear visual message to the learner. The purpose of cues should be the same throughout an IMI lesson. For example, if on ten screens a box is placed around supplementary information, a change to displaying this information not in a box will confuse the learner. If it is necessary to change a cue's design, then this change should occur only at the beginning of a new section. The change could help to inform the learner that there is a change in content.

**Graphics, Illustrations, and Audio**
The Icons in Table 36 should be used to design cues.

<table>
<thead>
<tr>
<th>Icon</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Menu</td>
<td>Displays the course menu.</td>
</tr>
<tr>
<td>Index</td>
<td>Shows the course hierarchy and allows navigation to a certain page within the course.</td>
</tr>
<tr>
<td>Glossary</td>
<td>Opens the glossary.</td>
</tr>
<tr>
<td>Print</td>
<td>Prints the current page.</td>
</tr>
<tr>
<td>Page Back</td>
<td>Branches to the previous frame in the current lesson.</td>
</tr>
<tr>
<td>Page Forward</td>
<td>Branches to the next frame in the current lesson.</td>
</tr>
<tr>
<td>Exit</td>
<td>Closes the IMI application.</td>
</tr>
</tbody>
</table>

**Table 21: IMI Standard Icons**

Graphic Notes: Development details should be provided to the graphic artist. Graphic development notes typically contain the following information:

1. **Media Element Type:** All still images for IMI may be saved in JPEG, GIF, PNG, or SVG formats, among others, using maximum quality settings for IMI delivery and download.
2. **Caption:** All captions should be centered below the images. Use title case for caption labels.
3. **Alt text:** Alternate text should be provided for images to identify the images.
4. **Security Classification:** All images should be identified with the security classification.
5. Keywords & Phrases: Keywords and phrases that identify the images should be provided. The keywords may be used for metadata tagging of the images.

6. Suggested Filename (optional): Filenames should provide enough information so that a file can be identified. A possible filename structure is: CourseName_LessonName_ImageDescriptor.

Audio files should be saved as MP3 files and displayed in a template that provides the learner with guidance on use (e.g., requires headphones, length of audio, button to start). See Figure 4.

![Audio File Template](image)

**Figure 12: Example Audio File Template**

### 15.1.2. Interactivity

Interactivity may take various forms, including practice questions, simulation of procedures, and learner selection of instructional scenarios.

Interactivity occurs in every IMI lesson but the amount and nature of interactivity varies depending on content and instructional intent.

Lesson Selection: The IMI lesson menu screen, delivered through the Learning Management System (LMS)\(^{16}\), provides the learner with access to each of the IMI lesson sections.

Section Selection: Within each lesson, the learner is given branching options via the section menu screen and instructions to select a section (path). Upon completion of the selected section, the learner returns to the menu screen and the section is highlighted as complete. The courseware continually monitors and updates the learner's progress. When all options on a menu have been completed, the learner is instructed on how to proceed.

When the learner completes a major teaching point/learning event, a review is conducted and interactive practice questions are presented. Practice questions are not scored and provide as much interactivity as possible to increase lesson interest and supplement learning. See Figures 5 and Figure 6.

---

\(^{16}\) The LMS provides management of curriculum, course(s), and student data. It also provides an interface to the instructional elements. The look and feel of the LMS varies depending on the role of the user.
Lesson Name

Section 1
- Learn
- Explore
- Practice

Section 2

Section 3

Figure 13: IMI Interface Structure

1177
This is an example interface structure for a lesson in OutStart Evolution® Dynamic Knowledge Navigator. If using this authoring system, consider setting the viewer height size to 675 and the viewer width size to 900 for the lesson display. A lesson with these dimensions will provide plenty of space for lesson viewing and will fit within a typical computer display.
15.1.3. **Web Accessibility**

Section 508 requires that Federal agencies' electronic and information technology is accessible to people with disabilities. The following compliance guidelines for web-based delivery of content should be addressed in the design of the interface, navigation, and display of content. An example of how to comply to each guideline is also provided. Further guidance is provided at [www.section508.gov](http://www.section508.gov).

**Guideline:** A text equivalent should be provided for every non-text element.  
**Example:** Use alt text to explain what is displayed in a graphic.

**Guideline:** Equivalent alternatives for any multimedia presentation shall be synchronized with the presentation.  
**Example:** Use text below a slideshow to explain the contents of the presentation.

**Guideline:** Web pages shall be designed so that all information conveyed with color is also available without color.  
**Example:** Use black for text displayed on the lesson screen. Display it on a white screen.

**Guideline:** Documents shall be organized so that they are readable without requiring an associated style sheet.  
**Example:** If you are using an authoring system that relies on style sheets to generate the “look and feel” of the pages, ensure that the pages are legible in the absence of the style sheet.

**Guideline:** Redundant text links shall be provided for each active region of a server-side image map.  
**Example:** If you are using a server-side image map, ensure that there is a text alternative for linking to content.

**Guideline:** Row and column headers shall be identified for data tables.  
**Example:** Make sure that you include row and/or column headings for your data tables as applicable.

**Guideline:** Markup shall be used to associate data cells and header cells for data tables that have two or more logical levels of row or column headers.  
**Example:** Make sure that you include row and/or column headings above embedded rows and columns within a data table.

**Guideline:** Frames shall be titled with text that facilitates frame identification and navigation.  
**Example:** Use headings for sections within the instructional content to help the learner navigate.

**Guideline:** Pages shall be designed to avoid causing the screen to flicker with a frequency greater than 2 Hz and lower than 55 Hz.  
**Example:** Do not use “blinking” within the lesson content.
**Guideline:** A text-only page, with equivalent information and functionality, shall be provided to make a web site comply with the provisions of this part, when compliance cannot be accomplished in any other way. The content of the text-only page shall be updated whenever the primary page changes.

**Example:** Include a text version of the lesson if you are unable to comply with the guidance. It is strongly recommend that your lessons comply so that you do not need to maintain two instances of the lesson, unless it is advantageous to have a text version for instructor-led training or for a study guide.

**Guideline:** When pages utilize scripting languages to display content, or to create interface elements, the information provided by the script shall be identified with functional text that can be read by assistive technology.

**Example:** If a programmer develops the IMI lesson, the programmer should use comments to describe the programming script.

**Guideline:** When a web page requires that an applet, plug-in or other application be present on the client system to interpret page content, the page must provide a link to a plug-in or applet that complies with §1194(a) through (1).

**Example:** If you include a shockwave file, ensure that the delivery computers have the plug-in installed. If you develop the content to play within NMCI’s Blue Disk and Gold Disk specifications, the content should display without problems within the ILE/ISLE.

**Guideline:** When electronic forms are designed to be completed on-line, the form shall allow people with assistive technology to access the information, field elements, and functionality required for completion and submission of the form, including all directions and cues.

**Example:** When creating forms, use text box entries that can be navigated easily with keyboard input.

**Guideline:** A method shall be provided that permits users to skip repetitive navigation links. **Example:** Ensure the next and previous buttons can be operated using a keyboard.

**Guideline:** When a timed response is required, the user shall be alerted and given sufficient time to indicate that more time is required.

**Example:** People with learning disabilities may require an un-timed version of a test. Only use a timed test when the objective of the lesson is to teach a task that requires the learner to perform the task within a certain amount of time.

**15.1.4.**

**15.1.5. Working Documents**

All working documents should be stored on a server during the IMI analysis and design phase.
Storyboarding will provide the foundational material for IMI content. Storyboarding may be performed using storyboard development software, PowerPoint or it may be performed within a Learning Content Management System (LCMS). During the development phase, content will likely be located on an LCMS.

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18 An LCMS is a learning content development environment in which the IMI team can create, store, reuse, manage and deliver training from a central object repository.

19 To support the requirements of ILE-compliant ILT learning content as defined in the body of this document, the AIM governance organization plans to develop and deploy a Web-based ILT content development and management tool to be known as E-LINC.
15.2. IMI Glossary

The glossary provides terms and definitions that are separate from other content on the page. The glossary establishes references identified in the lessons. Refer to Figure 8.

15.2.1. Glossary Format

Term (Initial capital) Definition in the form of a sentence.

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability</td>
<td>Power to perform an act, either innate or the result of learning and practice.</td>
</tr>
<tr>
<td>Ability grouping</td>
<td>Arrangement whereby students are assigned to groups on the basis of aptitude testing.</td>
</tr>
<tr>
<td>Ablation</td>
<td>Optical memory data writing technique where a laser burns holes, or pits, in thin metal film.</td>
</tr>
<tr>
<td>A-B rolls</td>
<td>A technique by which audio and video information are played back from two videotape machines rolled sequentially, often for the purpose of dubbing the sequential information onto a third tape.</td>
</tr>
</tbody>
</table>

Figure 15: Example Interface for Glossary

---

20 Figure 8 is an example interface structure for a lesson in OutStart Evolution® Dynamic Knowledge Navigator. The example content is from MIL-HDBK-29612 Part 4A, Glossary for Training, MIL-HDBK-29612-4A, Department of Defense Handbook, Glossary for Training, 31 August 2001.
15.3. Content Repurposing and Reuse

Reuse is the use of an existing object in a new learning event without any modification to its instructional treatment, context, or content. Repurpose is the use of an existing object in a new learning event with little to no modification to its instructional treatment, context, or content.

Lessons will likely be located on an LCMS during development to support content repurposing and reuse capabilities. Consider the impact of repurposing and reuse when selecting the authoring system for IMI development purposes.

Although, a primary objective of the ILE is to leverage repurposing and reuse, it is important to recall the implications of linking.21

Only link to content if:

- You do not “own” the content and do not see any need to own it.
- A change to the content by the owner does not impact your instruction.
- The content belongs to another organization and is therefore maintained by them.

15.4. Instruction for IMI

The instructional content should be modular and provide enough guidance that the assessment questions associated with the content are addressed in the body of the content. It is important to consider that the instructional content should be designed to stand-alone. An instructor will probably not be available to provide additional guidance during instruction. Therefore, the content must be as descriptive as possible to guide the learner through the material and answer the questions a learner may have. It is also important to remember that the learner will read the material on a computer screen. Therefore, use formatting and organizational methods to help guide the learner.

Writing Style and Conventions22

The following writing conventions should be observed:

- Add headings for readability.

---

21 The R³ model of reuse, repurpose and reference should be considered during instructional content development. If possible, an R³ analysis should be performed prior to IMI development.

• Make sure that sentences are brief but descriptive.
• Preface long sections with summaries.
• Add visuals when appropriate and be sensitive to the level of detail provided. If a line drawing is easier to understand, then it should be used in place of a photograph.
• Add examples to clarify points.
• Add stories to enrich the content and make it memorable.
• Write in a non-gender specific form.
• Use present tense (unless tense is relevant to a series of actions).
• Use active voice.
• Use "You" (2nd person singular) either with subject understood or stated.
• Define an acronym the first time you use it in each section.
• Do not use a slash "/" in place of "and" or "or".
• Use "that" to further define the subject.
• Use "which" when the next phrase (usually separated by commas) is incidental or supplementary.
• When using lists, list vertically down the screen.
• When using lists, skip a line between the stem and the list.
• When using lists, use numbers if list is sequential, bullets if order is not important.
• When using lists, end the stem with a colon before the list.
• When using lists, do not punctuate items in the list unless they are complete sentences.
• When using lists, make all list items consistent in style.
• When using lists, capitalize the first letter of each item in the list.
• Use the digit if number is "10" or more, word if nine or less.
• Use the digit if the number is referring to a reading, position, or name.
• Use the word in place of a number if the number begins a sentence.
• Use the "-" symbol to indicate negative numbers.
• Spell out the word degrees. Do not use the symbol unless that is how it is displayed within the system.
• When showing the operation of a panel, always show the entire panel initially to establish location.

Table 37 shows how style conventions should be applied.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feature</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td>Placement</td>
<td>All text is left justified.</td>
</tr>
<tr>
<td>Case</td>
<td>All Titles, Subtitles, Groups, and Headings are displayed in title case.</td>
</tr>
<tr>
<td>Menus</td>
<td>All notes, tips, warnings, and cautions standout in boxes.</td>
</tr>
</tbody>
</table>

**Table 22: IMI Standard Style Conventions**

15.4.1. **Designing the Overview for IMI**

Each lesson begins with an overview. Each overview consists of the following information:

- Introduction
- Learning Objectives
- Importance
- Bibliography/References

A template may be used to help with the development of an overview for the lessons. Figure 8 is an example of a template.
You are about to begin the [Click here and insert lesson name] lesson. This lesson describes [Click here and insert descriptive text].

This lesson includes [Click here and insert number of CONTENT sections] sections that should take approximately [Click here and insert minutes] minutes each. You may take the lesson in increments or in one continuous session—according to your preference.

Section 1 — [Click here and insert section name]
Section 2 — [Click here and insert section name]
Section 3 — [Click here and insert section name]
Section 4— [Click here and insert section name]
Section 5 — [Click here and insert section name]
Section 6 — [Click here and insert section name]

Non-graded quizzes will be presented throughout the lesson to review and reinforce key teaching points. A graded progress test will be delivered at the end of the lesson.

The following learning objectives will be addressed in this lesson:

[Click here and insert learning objective associated with Section 1]
[Click here and insert learning objective associated with Section 2]
[Click here and insert learning objective associated with Section 3]
[Click here and insert learning objective associated with Section 4]
[Click here and insert learning objective associated with Section 5]
[Click here and insert learning objective associated with Section 6]

The following publications provide additional information:

[Click here and insert number and name of publication]
[Click here and insert number and name of publication]
[Click here and insert number and name of publication]

**Figure 16: Overview Template for IMI**

Figure 9 is an example of a storyboard of an overview for a lesson on bridge-to-bridge communications.
You are about to begin the lesson on Bridge-to-Bridge Radio Communications. A portable VHF transceiver and a hard-wired unit provide submarine bridge-to-bridge communications. This course introduces you to the uses of the channels on the VHF radio, and the operation and speech procedures to pilot and direct the movement of the vessel using the VHF radio.

This lesson includes four sections that should take approximately 15 minutes each. You may take the lesson in increments or in one continuous session—according to your preference.

Section 1—**Parts of the VHF Radio**

Section 2—**Operating the Bridge-to-Bridge Transceiver**

Section 3—**Commonly Used Frequencies**

Section 4—**Guidelines for Using the Bridge-to-Bridge Radio**

Non-graded quizzes will be presented throughout the lesson to review and reinforce key teaching points. A graded progress test will be delivered at the end of the lesson.

The following learning objectives will be addressed in this lesson:

- Given an image of the VHF radio, the learner will identify the parts when the learner takes the Knowledge Examination in which a minimum overall score of 70% must be obtained.

- Given a series of steps, the learner will sequence the steps for operating the bridge-to-bridge transceiver when the learner takes the Knowledge Examination in which a minimum overall score of 70% must be obtained.

- Given a list of frequencies, the learner will select commonly used frequencies when the learner takes the Knowledge Examination in which a minimum overall score of 70% must be obtained.

- Given a scenario, the learner will apply guidelines for using the bridge-to-bridge radio when the learner takes the Knowledge Examination in which a minimum overall score of 70% must be obtained.

The following publications provide additional information:

- NTP 5, Voice Communications

- COMDINST M2300.7, Radiotelephone Handbook
15.4.2. Designing the Sections for IMI
The instructional content associated with sections depends on the content type identified for the sections. Content types and the required/optional elements are defined in this document in Section I—Common Curriculum Elements.

Each section should be subdivided into the following groups and address various levels of interactivity: See Table 38.

Learn
Guidance: Instructional content contained within the Learn group addresses knowledge attainment. Normally the Learn group consists of the knowledge or familiarization component of instruction. It is typically provided in a linear format and introduces an idea or concept.

Explore
Guidance: Instructional content within the Explore group includes examples, learning activities, and cognitive strategies. This instructional content is provided to help the learner understand the content presented in the Learn group. This includes the recall of more information addressed in the section. Emulations or simulations may be presented to the learner. Activities that help the learner study the information may also be provided within the Explore group.

Practice
Guidance: Includes unscored practice test questions required for meeting the ELO.

<table>
<thead>
<tr>
<th>Group</th>
<th>Level of Interactivity(^{23})</th>
<th>Category of Interactivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learn</td>
<td>Level I</td>
<td>The student acts solely as a receiver of information.</td>
</tr>
<tr>
<td></td>
<td>Level 2</td>
<td>The student makes simple responses to instructional cues.</td>
</tr>
<tr>
<td>Explore</td>
<td>Level 2</td>
<td>The student makes simple responses to instructional cues.</td>
</tr>
<tr>
<td></td>
<td>Level 3</td>
<td>The student makes a variety of responses using varied techniques in response to instructional cues.</td>
</tr>
</tbody>
</table>

\(^{23}\) For a complete description of the levels of interactivity refer to MIL-HDBK-29612-3 31 Aug 2001.
Table 23: Levels of Interactivity Implied by the Group

Templates may be developed for each content type for storyboard development. For an example of a template see Figure 10.
[Type Section Name here]
[Type Learning Objective here]

LEARN
[Type Section Name here]
[Click here and type text for intro]
[Click here and type text for facts (optional)]
[Click here and insert definition]
[Click here and insert graphic]

MEDIA ELEMENT TEMPLATE
Caption: [Click here and type text for caption]
Alt text: [Click here and enter text that explains what is shown in the graphic.]
Source PathName: [Click here and add path from media repository]
Security Classification: [Click here and add Classification]
Graphics Instructions: [Add specific instructions for artist]
Key Words & Phrases: [Add 1-5 keywords or phrases]
Suggested File Name (Optional): [Add suggested file name]

[Click here and insert List (optional)]
[Click here and insert table (optional)]

EXPLORE
[Click here and type text for greater detail (optional)]
[Click here and type text for Example]
[Click here and type text for Non-Example (optional)]
[Click here and type text for Analogy (optional)]

PRACTICE
Please answer the following questions to review what you have learned.
Assessment type: [Click here and type Assessment type]
Classification: UNCLASSIFIED
Question: [Click here and type text for Question]
Correct Answer(s):
[Click here and type 1st answer]
[Click here and type 2nd answer]
[Click here and type 3rd answer]
[Click here and type 4th answer]

Incorrect Answers:
[Click here and type 1st answer]
[Click here and type 2nd answer]
[Click here and type 3rd answer]
[Click here and type 4th answer]

Correct remediation: Correct. [Click here; type additional info]
Incorrect remediation: The answer was incorrect. [Add text here]
Figure 11 is an example of a storyboard for a section within a lesson on bridge-to-bridge communications.
LEARN

How to Send a Distress Call

You will probably only have seconds to send a distress call. If you do need to send one, though, you will need to put into action the following procedure:
Tune your VHF radio to channel 16. Start the transmission with "MAYDAY-MAYDAY-MAYDAY, this is…"

MEDIA ELEMENT TEMPLATE
Caption: Sending a Distress Call
Alt text: This is an image of a VHF radio.
Source PathName: Media_Repository/Channel16.jpg
Security Classification: Unclassified
Graphics Instructions: Provide a realistic image of a radio with the appropriate channel displayed on screen.
Key Words & Phrases: bridge-to-bridge radio communications, distress call
Suggested File Name (Optional): Channel16.jpg

EXPLORE

Here is an example of a Mayday call:

MAYDAY-MAYDAY-MAYDAY
THIS IS SUREFIRE-SUREFIRE-SUREFIRE, WAB1234
JUST EAST OF TURTLE ISLAND
STRUCK SUBMERGED OBJECT
NEED MEDICAL ASSISTANCE
12 PEOPLE ONBOARD
ONE PERSON HEAD INJURY
OVER

PRACTICE

Please answer the following questions to review what you have learned.
Assessment type: Multiple choice (single answer)

Classification: UNCLASSIFIED

Question: You are the Contact Coordinator inbound for Pearl Harbor when you hear another submarine send a distress call on the bridge-to-bridge radio. How does this transmission start?

Correct Answer(s):
- Mayday, Mayday, Mayday, this is…

Incorrect Answers:
- Silence on the line, this is…
- Pan Pan, Pan Pan, Pan Pan, this is…
- Securite, Securite, Securite, this is…

Correct remediation: Correct. The transmission would start, “Mayday, Mayday, Mayday, this is…”

Incorrect remediation: The answer was incorrect. The transmission would start, “Mayday, Mayday, Mayday, this is…”

Figure 19: Example of Section for IMI
Figure 12 is an example of the Learn group instructional content for the lesson on bridge-to-bridge radio communications.

How to Send a Distress Call

You will probably only have seconds to send a distress call. If you do need to send one, though, you will need to put into action the following procedure:

Tune your VHF radio to channel 16. Start the transmission with “MAYDAY-MAYDAY-MAYDAY, this is...”
15.4.3. Designing the Summary for IMI

A summary and progress test follows the completion of the lesson. The summary includes a list of the enabling learning objectives addressed in the lesson. The summary may also provide a review, expand on key material, and develop relationships that lead to generalizations.

A template may be used to help with the development of the summary for the lessons. Figure 13 is an example of a summary template.

You have now completed [Click here and type lesson name]. The following learning objectives were addressed in this lesson:

[Click here and insert learning objective associated with Section 1]
[Click here and insert learning objective associated with Section 2]
[Click here and insert learning objective associated with Section 3]
[Click here and insert learning objective associated with Section 4]
[Click here and insert learning objective associated with Section 5]
[Click here and insert learning objective associated with Section 6]

Once you are satisfied that you understand the material, press the "Next" button to proceed to the progress test. Your performance on these questions should give you a general idea of your mastery of the material in preparation for the module test.

Figure 21: Summary Template for IMI

Figure 14 is an example of a storyboard for a summary within a lesson on bridge-to-bridge communications.
You have now completed the Bridge-to-Bridge Radio Communications lesson. The following learning objectives were addressed in this lesson:

- Given an image of the VHF radio, the learner will identify the parts when the learner takes the Knowledge Examination in which a minimum overall score of 70% must be obtained.

- Given a series of steps, the learner will sequence the steps for operating the bridge-to-bridge transceiver when the learner takes the Knowledge Examination in which a minimum overall score of 70% must be obtained.

- Given a list of frequencies, the learner will select commonly used frequencies when the learner takes the Knowledge Examination in which a minimum overall score of 70% must be obtained.

- Given a scenario, the learner will apply guidelines for using the bridge-to-bridge radio when the learner takes the Knowledge Examination in which a minimum overall score of 70% must be obtained.

Once you are satisfied that you understand the material, press the "Next" button to proceed to the progress test. Your performance on these questions should give you a general idea of your mastery of the material in preparation for the module test.

**Figure 22: Example of Summary for IMI**

**15.5. Evaluation of IMI**

IMI should undergo several evaluations. In the early stages, subject matter experts and instructors review the content for accuracy. When the IMI is piloted, data should be collected regarding the learners’ reaction to instruction. In addition, an evaluation should assess the extent students have advanced in skills, knowledge, or attitude. Finally, a longitudinal evaluation should be done to determine if the acquired skills and knowledge are accurately applied in the submarine environment. This is a typical approach for evaluating a training program. Based on these evaluations, the IMI is modified and updated.²⁴

²⁴ The Kirkpatrick Model of Training Evaluation provides a representation of the evaluation process for training programs. This model includes four levels of evaluation that measure reaction, learning, behavior, and results.
16.0 SECTION III – ILT CURRICULUM DEVELOPMENT

16.1. Lesson Plans for ILT

Course lesson plans should contain certain elements in the front and back matter.

Front matter should contain:

- List of Effective Elements that informs the user that sections have undergone a change. All front matter elements and content are tracked by change level. In new development, such tracking is not necessary since all elements are new.
- Change Record Page that records the entry of changes in the lesson plan.
- Table of Contents listing all elements of the lesson plan.
- Security Awareness as it pertains to the course materials.
- Safety/Hazard Awareness as it pertains to the course materials.
- Information on how the lesson plan should be used.
- Allocation of Instructional Time that provides section, lesson, and module lengths.

Back matter should contain:

- Resource Requirements List
- Answer Sheets for any assignments given
- Fault Applicability List

The instructional content should be modular to the extent possible to allow flexibility for instructional schedules. Content should provide all necessary references to technical publications so the instructor can personalize and prepare for instruction.

Courses are named using the critical work function (CWF) title:

- CWF: Maintain and Operate Auxiliary Systems.
- Course title: Maintaining and Operating Auxiliary Systems.

Modules are named using the skill object title.

- Skill object: Auxiliary Equipment Troubleshooting.
- Module title: Auxiliary Equipment Troubleshooting.

The lesson titles and terminal objectives are developed using the skill object’s level 1 data.
Level 1 Data: Maintain auxiliary equipment.
Lesson Title: Maintaining Auxiliary Equipment.

The sections and ELOs are developed from the skill object’s level 2 data. Examples of level 2 tasks follow:

1. Clean auxiliary equipment.
2. Inspect auxiliary equipment.
3. Lubricate auxiliary equipment.

It is possible that skill objects will sometimes have “broad” tasks assigned, requiring that more specific objectives be developed that are directly related to the tasks from the skill object. It is acceptable to develop objectives and materials that meet the intent of the skill object tasks. Job steps from skill objects are located in the sub discussion points and/or trainee guide.

16.1.1. Designing the Overview for ILT
Each lesson begins with an overview. Each overview consists of the following information:

- Introduction
- Terminal Learning Objectives
- Importance
- Bibliography/References

Content that is designed using skill objects includes the knowledge, skills, and abilities necessary for the Sailor to perform a job. The skill object will include tools, resources, and unique knowledge required for each learning event. Knowledge, skills, and abilities will be incorporated through the use of level 2 JTA data. Tools and resources will be incorporated into each enabling learning objective through the corresponding discussion points, and related instructor activities. For example, if resources include technical publications, those publications will be used at each applicable point in the discussion points and as indicated by the skill object. If the tools include technical training equipment, the equipment will be used. Figure 15 is an example of an Overview for ILT.
Lesson: Maintaining Auxiliary Equipment  
CIN: X-XXX-XXXX  
Change 0

OVERVIEW

Introduction: You are about to begin the lesson on Maintaining Auxiliary Equipment. You will learn to clean, inspect and lubricate this equipment. Non-graded quizzes will be given during each section, and graded practical or progress exams will be delivered at the end of each section.

This lesson includes the following sections:

1. Cleaning Auxiliary Equipment
2. Inspecting Auxiliary Equipment
3. Lubricating Auxiliary Equipment

Terminal Learning Objectives:

1. Given the technical publication of the auxiliary equipment, the learner will be able to describe the general, physical, functional operation, interfaces, and documentation of the auxiliary equipment with 90% accuracy on a knowledge-based progress test.

2. Given the technical publication of the auxiliary equipment, the learner will be able to clean, inspect, and lubricate the auxiliary equipment with 90% accuracy on a performance-based test.

Importance: This course introduces you to maintenance procedures required to ensure proper auxiliary equipment operation.

References:
1. Technical Publication XXXX-XX, Auxiliary Equipment

Figure 23: Example of Overview for ILT

16.1.2. Designing the Sections for ILT

The sections and ELOs are developed from the skill object’s level 2 data. The instructional content associated with each section depends on the content type identified. The ISD and SME must determine the content type for each enabling learning objective. The section and associated trainee guide is formatted to include the content type elements specific to the content type selected. For instance, if a procedure content type is selected, the section and/or trainee guide contains the following:

- An introduction
- Facts
• Procedure/decision/ combined table (select one)
• A demonstration/example
• Practice

Content type elements can be part of the section content or displayed on a trainee guide sheet. Each objective results in a main discussion point.

Examples of level 2 tasks follow:

1. Clean auxiliary equipment.
2. Inspect auxiliary equipment.
3. Lubricate auxiliary equipment.

Example Section Title for Procedure Content Type: Cleaning Auxiliary Equipment

Example enabling learning objective: *Given the technical publication cleaning steps of the auxiliary equipment cleaning procedure, the learner will clean the auxiliary equipment with 90% accuracy during a performance-based test.*

The first page of the section is the section introduction page, and contains the introduction, enabling learning objectives, importance of the subject matter, and references. The section title page must also include trainee preparation materials, instructor preparation material, and any training materials required to conduct the section. See Figure 16 for an example of Section Introduction Page for ILT.
Lesson: Maintaining Auxiliary Equipment

CIN: X-XXX-XXXX

Change 0

Section: Cleaning Auxiliary Equipment

Introduction: You are about to begin the section on Cleaning Auxiliary Equipment. You will learn to clean this equipment. A graded knowledge/practical progress test will be delivered at the end of this section.

Enabling Learning Objectives:

1. Given the technical publication cleaning steps of the auxiliary equipment cleaning procedure, the learner will clean the auxiliary equipment with 90% accuracy during a performance-based test.

XXX-XXXX

Importance: This section provides the learner with the skills necessary to clean auxiliary equipment, promoting efficient operation.

Trainee Preparation:
None

Instructor Preparation:

A. Review Assigned Trainee Material
B. Reference Publications
   1. XXXX-XX, Auxiliary Equipment

C. Training Materials Required:

1. Trainee Guide
2. References
   a. XXXX-XX, Auxiliary Equipment
3. Miscellaneous Materials
   a. PowerPoint Presentation X-XXX-XXXX
4. Training Devices
   a. Auxiliary Equipment
   b. Electronic Classroom

Figure 24: Example of Section Introduction Page for ILT

See Figure 17 for an example of the Section Discussion Points Page, the first main discussion point is “Facts on Cleaning the Auxiliary Equipment.” Sub-level discussion points follow the discussion point. These provide a detailed description of the procedure. This description should directly support the procedure. Steps for the procedure are derived from the skill object, if steps are part of the skill object. It should also contain a sub discussion point on Safety. In many cases, a procedure content type will be preceded by a fact content type (or other “remember” use level content type) that provides the general, physical, functional, interface or documentation descriptions that indirectly support the procedure.

A main discussion point called “Demonstration” or “Example” follows, allowing the instructor to demonstrate or provide an example of the procedure.

A main discussion point called “Practice” follows the demonstration that allows the trainee to practice the newly developed skill. In the following example of the Section Discussion Points Page, the discussion point related instructor activity
A discussion point called “Procedure” will follow the practice. The learner will perform the procedure independently.

A discussion point called “Summary” follows the procedure, allowing the instructor to review the ELOs and summarize the learning event that occurred. The summary may also provide a review, expand on key material, and develop relationships that lead to generalizations. See Figure 18.

For the procedure content type (“apply” content use level), a performance-based progress test may occur after the section summary. If it makes more sense to conduct a test after a group of sections, typically at the lesson level, the test may be conducted after the completion of the lesson or after a logical group of sections. A knowledge-based progress test should also be used within the section or lesson after the learner has received knowledge-based information or content types (“remember” content use level). One use may be to administer a
knowledge-based progress test, the successful completion of which leads to a practical exam.

17.0

<table>
<thead>
<tr>
<th>Lesson: Maintaining Auxiliary Equipment</th>
<th>CIN: X-XXX-XXXX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section: Cleaning Auxiliary Equipment</td>
<td>Change 0</td>
</tr>
</tbody>
</table>

**DISCUSSION POINT**

4. Procedure

4. Refer Trainees to Job Sheet number XX-XX in the Trainee Guide. Direct Trainees to perform the steps on the Procedure Table.

5. Summary

   a. Objectives
   b. Review

6. Progress Test (knowledge and practical)

**Figure 26: Example of Section Discussion Points Page for ILT (Cont’d)**

**Discussion Points and Trainee Guide Sheets**

Discussion points guide the instructor to provide oral instruction, or to refer or direct trainees to technical documents or the trainee guide for amplifying information best taught using graphic illustrations, tables/charts or textual information for the learner. Each trainee guide sheet is “anchored” to a discussion point, using the related instructor activity column to refer or direct the trainees to the associated trainee guide sheet. The following table provides some suggestions for the contents of the trainee guide and discussion points based on content types and the elements of each. Some content type elements are optional; all others are required. In some cases the use of a discussion point will suffice; in others the trainee guide should be used to provide tables, charts, graphics, and textual information to support the instruction. See Table 39.
### Table 24: Discussion Point (DP)/Trainee Guide Table

Trainee guide sheet types are: information, diagram, problem, job, assignment, or outline. Table 40 provides suggestions for using trainee guide sheets based on content types. Outlines are not shown on the table because they consist of an outline of the section that mirrors the discussion points.
<table>
<thead>
<tr>
<th>Fact</th>
<th>Concept</th>
<th>Principle</th>
<th>Process</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table: Diagram Sheet or Information Sheet</td>
<td>Table Diagram Sheet or Information Sheet</td>
<td>Example: Information Sheet or Diagram Sheet</td>
<td>Practice: Job Sheet</td>
<td>Practice: Job Sheet</td>
</tr>
<tr>
<td>Example: Information Sheet or Diagram Sheet</td>
<td>Example: Information Sheet or Diagram Sheet</td>
<td>Non-example (optional): Information Sheet or Diagram Sheet</td>
<td>Practice: Problem Sheet or Assignment Sheet</td>
<td></td>
</tr>
<tr>
<td>Practice: Problem Sheet or Assignment Sheet</td>
<td>Non-example (optional): Information Sheet or Diagram Sheet</td>
<td>Practice: Problem Sheet or Assignment Sheet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analogy (optional): Information Sheet</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Practice: Problem Sheet or Assignment Sheet</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 25: Use of Trainee Guide Sheets**

The trainee guide front matter should contain:

- **Title Page**: Identifies the title of the course, the course identification number, the revision or change number, the approving agency, and the promulgation date.
• Trainee Name Page: The trainee can enter their name and class number on this page to identify ownership.

• List of Effective Elements: Informs the reader of instruction sheets that have undergone a change. All front matter elements and instruction sheets are tracked by change level. In new development, such tracking is not necessary since all elements are new.

• Change Record Page: Records the entry of changes into the trainee guide.

• Safety/Hazard Awareness Notice: It is identical to the Safety/Hazard Awareness Notice in the lesson plan.

• Security Awareness Notice: Is identical to the Security Awareness Notice in the lesson plan. If you need to add any information, you should go to the lesson plan and edit the Security Awareness Notice there.

• Table of Contents: Lists the titles and the page numbers of all instruction sheets arranged by module, lesson, and section.

• How to Use Your Trainee Guide: Information for the trainee on the composition, function and use of instruction sheets and what the trainee can expect regarding examinations and quizzes in the course.

• TLOs identical to those found in the lesson plan.

**Related Instructor Activities**

The Related Instructor Activity (RIAs) column is used to give the instructor details and direction about what activities will occur with corresponding discussion points. The RIAs provide an opportunity to employ blended solutions in the classroom and lab environment, allowing the use of many instructional delivery methods, including self-paced courseware, simulations, software scenarios, and use of psychomotor skills with technical training equipment. RIAs should be numbered with the corresponding discussion point. There are many RIA action options available to developers and SMEs. These provide the basis for activities in the classroom. To keep uniformity, the following RIA actions and their definitions are provided:

Reference: Used when the instructor needs to reference technical publications or other source material to prepare for instructing.

Refer to: Used when an instructor should refer to materials for use in the classroom without necessarily having the trainee go there.

Refer Trainee to: Used when the instructor wants the trainee to go to the material in the classroom.

Display: Used when the instructor needs to display instructional media materials to the class.
Direct Trainee to: Used when the instructor needs to have the trainee perform a particular task, including hands-on activity in a laboratory, discussions, and seminar activities.

Demonstrate, Show, Point to: Used to tell the instructor what actions are required and identify any unique approach that may be necessary to teach the lesson.

Prepare: Used to tell the instructor to prepare for an event.

**Instructor Personalization**
The structure of the lesson plan requires the instructor to personalize each section as a subject matter expert by reviewing each reference and adding content based on their knowledge of the subject. The final lesson plan, trainee guide and instructional media materials result in the approved materials for the course; however, instructors should add their own personalization to the lesson plan to provide amplifying information necessary to make the instruction uniquely theirs without deviating from the approved course of instruction.

Personalization includes adding subject matter detail needed to cover the topic discussion points to the required depth.

Subject Matter Detail: Use this type of information to provide technical details. Course reference materials provide this information and must be thoroughly reviewed by instructors while preparing to instruct the material.

Instructional Techniques: Use carefully written questions to check for knowledge, well-planned visual aids, and additional student/instructor activities to enhance the lesson.

Personal Experiences: The addition of on-the-job experiences increases student interest and understanding. Relating personal experiences has the positive effect of reinforcing the practical application of the material.

Examples and Analogies: Support main points of the lesson plan by examples and analogies to simplify the concepts or ideas being taught. For example, if the lesson is on the way sound waves travel through air, but the class has difficulty understanding that concept, then perhaps an analogy such as “it is similar to the way ripples travel after a stone is dropped in water” will help them understand.

Discussions and Seminars: Engage the class in discussions to share and collaborate on key points. Seminar activities can also be used, such as brainstorming and role-playing.
17.1. Instructional Media Materials

Instructors may want to use graphic presentations to accentuate their materials. An example of this is the use of software presentation applications. Presentations should be well organized and color schemes should provide adequate contrast between backgrounds and text or graphics so they can be easily seen and read by the student.

Presentations should use one concept per slide to clearly illustrate a point. Slide titles should be in title case letters using 36 to 48-point font size. Bullets should be upper and lower case letters and between 24 and 32-point, with sub-bullets going down to no smaller than 16-point. Labels and captions should not be smaller than 14-point. Arial or Times New Roman fonts are the most appropriate formal font types for instructional presentations.

Animation should be used when it enhances a point or more clearly illustrates a concept. Sounds should be used in the same manner. It is always recommended that presentations be viewed in the classroom where they will be displayed to students before use. This allows a final look to ensure the display is clear and legible from the back of the room.

Presentations and slides should be numbered using locally approved conventions. It is important to identify presentations and slides so they can be called out appropriately in the related instructor activity column of the lesson plan.

The uses of dynamic instructional media materials that require the use of different senses (audio/visual) will reach the varying learning styles of students. Hearing and seeing audio/visual materials will also facilitate retention.
17.2. Evaluation of ILT

Phases 1 through 3 concern the analysis, design, and development of lesson plans and trainee guides. These phases have been previously described, using skill objects to derive learning objectives, discussion points, and job steps, and content types to create content. Section 1 provides further information on content types that will aid the ISD, SME and content developer with determining appropriate content types and the elements that are required or optional for each.

Phase 4 concerns the implementation of materials, beginning with a pilot to validate instructional flow, sequence, time, and quality. Center Training Directorates should be consulted with regard to specific pilot policies on when to proceed with a formal pilot of the material, conduct a pilot for time only, or when to waive a pilot. Piloting of materials requires monitors who are subject matter experts, as well as familiar with content standards and guidelines. A pilot coordinator should be assigned and should meet with stakeholders to determine if the material is ready to pilot. The coordinator should also assign monitors, a timekeeper, and provide overall monitoring guidance. Every effort should be made to allow all sites teaching the materials to sit in on the pilot. Monitoring reports should be submitted to the chairperson on a regular basis. A final monitoring report should be submitted to provide details concerning additional work or materials required to promulgate the materials.

Pilot monitoring reports should include:

- Course Identification Number
- Location
- Course Title
- Period of the Report
- Course Convening Dates
- Monitors/Timekeeper
- Administration
  - Facilities
  - Safety
  - Security
  - Time Allocation
  - Summary of Student Critiques
- Curriculum Validation
  - Lesson Plan
  - Trainee Guide
  - Equipment/Tools

---

25 All existing AIM-based lesson plans, trainee guides, and supporting graphics and media shall be published from AIM I or AIM II software applications as browser friendly Extensible Markup Language (XML) data outputs, packaged in accordance with the requirements of either the Advanced Distributed Learning (ADL) SCORM 1.2 or 2004.
Phase 5 is the constant monitoring of the materials to ensure they meet the training requirements. If a change occurs to a skill object, a change will most likely need to be made to curriculum materials. Additionally, instructors, course reviews, feedback from the fleet, assessments, and student critiques may lead to the need for content modifications.
18.0 ADDENDUM A

18.1.1. OutStart Evolution® Knowledge Developer: Development Guidelines
The developer of the IMI works closely with the instructional systems designer, storyboard author, and the graphic designer to create the lessons in OutStart Evolution® Knowledge Developer.

18.1.2. Importing Storyboards
There are two options for importing the storyboards:

- Using the Microsoft® Word Import option.
- Using the templates.

18.1.3. Word Import
You can import the Word documents into the OutStart Evolution® Knowledge Developer hierarchy. Make sure that the appropriate heading styles are selected for the various sections of the Word document so that the mapping to the OutStart Evolution® hierarchy is correct.

18.1.4. Using Templates
Templates may be developed within OutStart Evolution® Knowledge Developer environment that comprise the basic structure for sections. See Figure 19.

![Figure 27: Example Templates](image-url)
18.1.5. Aggregating Learning Objectives
Recall that the Aggregate element in OutStart Evolution® Knowledge Developer gathers existing information from designated fields of the Data tab. The aggregated information displays with a title and text in list format. Aggregated elements are commonly used to list objectives within the lesson.

Recall that on the Source tab of the Aggregate element, the level drop-down list provides you with a choice of the content levels available for aggregation.

The Group/Tag drop-down list provides you with a selection of the metadata tags made available for aggregation by the platform administrator.

Developers should aggregate learning objectives.

18.1.6. Hyperlinking Content
Hyperlinks may be used. However, they should only reference documents within the course. If you plan to link to content outside the course, consider how that content’s lifecycle management may impact the course.

18.1.7. Working with Media
The Media Manager in OutStart Evolution® Knowledge Repository is the centralized location for handling graphic content.

Locate the “rough” graphics in the storyboards. The graphic designers work from these “rough” versions to develop the final versions. The filenames should be provided below the graphics and can be located in the Media Manager using search criteria.

18.1.8. File Management
You should export a copy of your lesson periodically, especially when you expect to make several changes that may impair the lesson. Recall that there is not a “save as…” capability in OutStart Evolution® Knowledge Developer.

18.1.9. Locking
Make sure that your lesson is locked. You do not want to lose your content in this collaborative working environment.

18.1.10. Metadata Tags
Default values are set where appropriate in OutStart Evolution® Knowledge Developer. The entries that must be entered by the developer are provided on the General Tab for each knowledge element in OutStart Evolution® Knowledge Developer. The platform administrator creates metadata groups and tags using the Metadata Manager in OutStart Evolution® Knowledge Developer.
19.0 ADDENDUM B

All existing lesson plan, trainee guide, and supporting graphics and media shall be published from AIM I or AIM II software applications as browser friendly Extensible Markup Language (XML) data outputs, packaged in accordance with the requirements of either the Advanced Distributed Learning (ADL) SCORM 1.2 or 2004. This output supports reuse of this learning content in several ways:

- As baseline learning content for delivery in the electronic classroom via the GD-AIS Elite classroom management software being implemented by the Submarine Learning Center and Center for Surface Combat Systems.
- Once imported into the Integrated Submarine Learning Environment (ISLE) OutStart Evolution® LCMS as external objects, it can be used for reuse in onboard instructor-facilitated training.
- Once imported into shore-based instances of the OutStart Evolution® LCMS, it can be used for reuse of media assets via the OutStart Evolution® Media Manager digital asset management system.


The SCORM Generated Data Output can be created for either SCORM 1.2 or SCORM 2004.

To create AIM SCORM output, follow the steps provided in Table 41.
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<th>Steps</th>
<th>Description</th>
</tr>
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<tr>
<td><strong>1</strong></td>
<td>Log in to AIM.</td>
</tr>
<tr>
<td><strong>NOTE</strong></td>
<td>A SCORM output can be generated for SCORM 1.2 or SCORM 2004 and for Approved or Locked courses, provided the correct parameters are set in the AIM.INI file. SCORM 1.2 and Approved only generation is the default when AIM I or AIM II is initially installed. See “What’s new in 3.2.1” under the Help menu to select the appropriate parameters in the AIM.INI file for generating SCORM 2004 and/or Locked course output.</td>
</tr>
<tr>
<td><strong>2</strong></td>
<td>Select the Course menu item and the Select sub-menu item.</td>
</tr>
<tr>
<td><strong>3</strong></td>
<td>From the Course Select menu, highlight the course for which you want to create the SCORM/XML output files and click on the Select menu item.</td>
</tr>
<tr>
<td><strong>4</strong></td>
<td>Click on the Document menu item and the SCORM Data sub-menu item or click on the SCORM icon.</td>
</tr>
<tr>
<td><strong>5</strong></td>
<td>The SCORM output can be created for the entire course by opening the course folder in the browser and selecting the File menu item and the Generate SCORM Output sub-menu item. AIM will output each Topic as a SCO to a directory titled by Course Identification Number (CIN), Revision and Change, which will contain a zip file. This zip file can be sent to Elite for use in the electronic classroom or to Evolution LCMS to import the aggregation, SCOs, and assets as external objects.</td>
</tr>
<tr>
<td><strong>6</strong></td>
<td>To view the Topic files (SCOs) created in the SCORM Output, extract the files contained in the zip file to a temporary directory and double click on the desired Topic XML files (e.g., A-121-0541 Change 4_E3507-1-1.xml). The files will open in Windows Internet Explorer (Version 5.5 or later).</td>
</tr>
</tbody>
</table>

Table 26: Steps to create AIM SCORM Output
19.1.2. SCORM Data Tabs Content
The SCORM Data Tabs represent the information required for development of metadata (data about data) files. Metadata files provide a common nomenclature enabling learning resources to be described in a common way. Metadata can be collected in a catalog, as well as directly packaged with the learning resource it describes. Learning resources that are described with metadata can be systematically searched for and retrieved for use and reuse. Aggregation (e.g., course) and shareable content object (SCO) (e.g., topic) have certain metadata fields that are required. Asset (e.g., trainee guide graphic and IMI library files) has only a small subset of those same fields required. The tabs, shown in Figure 20, contain all SCORM 1.2/2004 mandatory elements (marked in boldface type) as well as optional metadata information.

![Figure 28: Example AIM Screen](image)

AIM automatically generates default information for the mandatory fields in the tabs to develop metadata files for General, Lifecycle, Rights, Classification, and Purpose categories. During course development, the tabs for the course, topics, and graphics can be edited by the developer from the SCORM Data window, which is accessible by selecting the desired course in the Course Select menu and selecting the Document main menu item and the SCORM Data sub-menu item or by clicking on the SCORM icon. The browser in the left pane allows you to open the desired folder to edit the tabs. The course tabs can also be edited from the lesson plan window (i.e., Cover Page) by selecting the Contents menu item and the SCORM Meta-Data sub-item. The Tabs for individual Topics (i.e., SCOs) can be edited from the Lesson Plan window (i.e., Course Outline of Instruction) by highlighting the desired Topic, selecting the Contents menu item and clicking on the SCORM Meta-Data sub-menu item.
• General – Groups the general information that describes the resource as a whole.
  ➢ *Catalog – NILARS (listing identification system – should be based on SSIC)
  ➢ *Catalog Entry – Describes the resource according to known cataloging system so that it may be externally searched for and located.
  ➢ *Description – Textual description of the content of this resource.
  ➢ *Keywords – Keywords or phrases describing the resource.

• Lifecycle – Groups the features related to the history and current state of this resource and those who have affected this resource during its evolution.
  ➢ *Date – Date of Contribution (Promulgation)
  ➢ *Role – Kind of Contribution
    ▪ Author
    ▪ Initiator
    ▪ Instructional Designer
    ▪ Publisher
    ▪ Script Writer
    ▪ Terminator
    ▪ Unknown
    ▪ Validator
  ➢ *Role Name
  ➢ Role Address
  ➢ Role Email

• Rights – Groups the intellectual property rights and condition of use for the resource.
  ➢ *Cost
    ▪ Yes
    ▪ No
  ➢ *Copyright
    ▪ Yes
    ▪ No
  ➢ Description

• Classification – Describes where this resource falls within a particular classification system.
  ➢ *Classification Description
  ➢ *Purpose – The purpose of classifying this resource.
    ▪ Accessibility Restriction
    ▪ Discipline
    ▪ Educational Objective
    ▪ Idea
    ▪ Prerequisite
    ▪ Security Level
    ▪ Skill Level
  ➢ *Keywords – Keywords and phrases descriptive of the resource relative
to the slated classification.

* Indicates that AIM provides Default Data. This is currently being scrutinized -- it may be affected by the work of the Navy metadata standards working group, which in turn will be integrated into the ILE content repository architecture. AIM will be updated to reflect the Navy metadata working group decisions as soon as approved.

19.1.3. Detailed Contents of the AIM SCORM/XML Output Package
The files contained in the output package are generated to conform to SCORM Version 1.2 and SCORM 2004 and include:

- An imsmanifest file that contains the "structure" or organization of the course. The content of this file includes references and locations of all SCOs, raw media files, metadata files, and supporting files. It also lists dependencies between the files.
- The SCOs that are associated with each Topic of the course and are generated as XML content. The corresponding Extensible Stylesheet Language (XSL) is referenced in each SCO in order to have the XML rendered to HTML by the Internet Explorer 5.0 browser (with MSXML 3.0 installed in "replace" mode). (e.g., "A-121-0541 Change 4_E3507-1-1.xml") If Internet Explorer 6.0 is used, MSXML 3.0 is the default XML parser and does not have to be installed separately.
- The graphics files from the AIM Graphics Library for integration into the trainee guide. They are stored in the graphics directory of the package in .jpg format.
- The media files from the AIM IMI Library and linked to lesson plan or trainee guide content. They are stored in the Media directory of the package in their native format as loaded into the AIM IMI Library.
- The metadata files for the course, SCOs, graphics, and media files. (Ex. 1-1_meta.xml; 20000001_meta.xml).
- The API files that are necessary for communication with the LMS. These files are referenced in the rendered HTML files.
- Document Type Definition (DTD) and entity files that specifically relate to the SCOs. Because the SCO content is in XML format, there are corresponding DTD and entity files associated with the SCOs (e.g., Topic.dtd, TaskandMaterial.ent, TestInfo.ent, TextContent.ent).
- The XSL stylesheet (Topic.xsl) and Cascading Style Sheet (SCORMTopic.css), because the SCOs are generated as XML content, there is an XSL stylesheet referenced with the SCO in order to allow the XML content to be rendered as HTML and displayed in the Internet Explorer browser (as described previously). A Cascading Style Sheet (CSS) is associated with the rendered HTML document.
The AIM SCORM/XML output does validate against both the final SCORM 1.2 and SCORM 2004 Conformance Suite software posted at ADLnet.org, depending on which type output was selected in the AIM Preferences module as outlined earlier in this addendum.
20.0 ADDENDUM C

20.1.1. Re-authoring Legacy Lesson Plan/Trainee Guide Data from AIM for use with Self-paced IMI Authoring Tools

Over 300,000 hours of legacy AIM-based instructor-led training lesson plan/trainee guide-based learning content is available for re-authoring into IMI to support the Revolution in Training and the Integrated Learning Environment. The AIM team, led by the Program Manager at NAVAIR Orlando Training Systems Division (TSD), has been actively prototyping a tool to support the re-authoring of this current, configuration controlled content into IMI compliant with ILE architecture and guidelines.

This Terminal Learning Object (TLO)-Enabling Learning Object (ELO) Module is designed to produce digital learning content assets (text and media files) packaged in accordance with NETC/NPDC guidelines for input to both commercial off-the-shelf (COTS) and government off-the-shelf (GOTS) IMI authoring tools for production of final self-paced IMI content. One of the COTS IMI tool vendors with which the AIM team has been working is OutStart Evolution®, with their Evolution LCMS. When complete, the interface between the TLO/ELO Module and OutStart Evolution® should permit the re-authored AIM content to import into OutStart Evolution® as native content for complete production, testing, and deployment. This process will support the IMI guidelines in the body of this document as well as produce Evolution-compatible content in accordance with the OutStart Evolution®-specific guidelines in Addendum A.

The TLO/ELO Module has gone through many research and development builds and is now being used in several major prototype projects sponsored by the ILE Program Management Team and supporting Centers to re-author legacy lesson plan/trainee guide content into self-paced IMI. Once these prototype projects are complete, lessons learned documented, and software changes incorporated into the prototype TLO/ELO Module, the AIM governance organization consisting of the Configuration Control Board (CCB), Executive Steering Committee (ESC), and Functional Requirements Board (FRB) will deploy an operational version of the TLO/ELO Module to support NETC/NPDC goals of migrating major portions of legacy “C” School learning content to the ILE during FY06-11.

Details of this re-authoring process will be supplied in this Addendum as soon as they are finalized and the operational TLO/ELO Module available. In the meantime, an overview of the proposed re-authoring process and interface with the various COTS and GOTS IMI tools under consideration is available on Navy Knowledge Online (NKO) – NKO Library/Personal and Teams/AIM and ILE/AIM CCB Mtg - Feb 05. This is an open cabinet with automatic subscription.

21.0
22.0 ADDENDUM D

22.1.1. Developing and Maintaining ILE-compliant ILT Learning Content with the Electronic Linking and Integration of Navy Content (E-LINC) Tool

To support the requirements of ILE-compliant ILT learning content as defined in the body of this document, the AIM governance organization plans to develop and deploy a Web-based ILT content development and management tool to be known as E-LINC.

This tool will be based on the current prototype AIM TLO/ELO Module now being used in a number of ILE PMT-sponsored and Center-coordinated prototype projects. From an ILE ILT perspective, these projects will help to:

- Refine the requirements for and identify shortfalls in the prototype TLO/ELO Module functionality.
- Define required functionality and process improvements needed in the TLO/ELO process prior to deploying an operational E-LINC tool.

The AIM Program Manager at NAVAIR Orlando TSD will produce detailed System Subsystem Specification and Functional Requirements documents to support the design, development, and rollout of E-LINC. Once these documents are drafted, the AIM team will circulate them for review as directed by the ILE Implementation Team Lead. Once this revised ILT learning content development and maintenance process is proven and software tools are in place to support it, this addendum will be expanded to provide operational guidelines for:

- Migration of existing lesson plan/trainee guide AIM-based content to the new ILE standards.
- Development and maintenance of new ILE-compliant ILT learning content in E-LINC.
23.0 REFERENCES

The following documents were used in the development of this guide.

23.1.1. Documents

A Systematic Approach to Media Selection by William W. Lee and Diana Owens, an ASTD white paper.


Implementing Instructions, 23 Mar 2001, IMI Implementing Instructions Version 1.0.

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<tr>
<th>Reference</th>
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<tr>
<td>MIL-HDBK-29612-3 31 Aug 2001</td>
<td>Development of Interactive Multimedia Instruction (IMI) (Part 3 of 5).</td>
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<tr>
<td>MIL-HDBK-29612-4 31 August 2001</td>
<td>Glossary for Training.</td>
<td></td>
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<tr>
<td>SECNAVINST 5510.36</td>
<td>Department of the Navy (DON) Information Security Program (ISP) Regulation</td>
<td></td>
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<tr>
<td>TRADOC PAM 350-70-2 1</td>
<td>Training Multimedia Courseware Development Guide.</td>
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<tr>
<td>TRADOC Regulation 350-70 9 Mar 1999</td>
<td>Systems Approach to Training (SAT) Management Processes, and Products, Chapter VI-1 0, IMI.</td>
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23.1.2.

23.1.3. Books


23.1.4. Wld Wide Web Links


Defense Training Standards Working Group (DTSWG) http://www.dtswg.org/

Section 508. http://www.section508.gov/

Web Accessibility Guidelines. http://www.w3.org/
ILE Content Metadata Guide

For Development and Delivery

Version 3.0

11 August 2005
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<td>Initial release for comments</td>
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<tr>
<td>2.0</td>
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<td>16 May 2005</td>
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<tr>
<td>3.0</td>
<td>Added Security Classification Group</td>
<td>11 August 2005</td>
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24.0 INTRODUCTION

This guide is a reference for content developers, instructional designers, system developers and other practitioners associated with the US Navy’s Integrated Learning Environment (ILE). It provides metadata specifications that should be used to annotate content at multiple levels of aggregation including Terminal Learning Object (TLO), Enabling Learning Object (ELO), and assets. This specification is part of the Navy’s Content Design, Development, and Deployment (CD3) Guide which presents the framework for ILE content.

The ILE is the Navy’s new generation of training systems and methods designed to implement the vision and objectives of the Revolution in Training (RiT). These include tailoring training and learning events to the individual needs of each of the 370,000 Sailors, focusing training and learning on skill and knowledge gaps for jobs and positions, and using reusable and repurposable object-based content structured according to the Sharable Content Object Reference Model (SCORM) standard. The ILE provides a complete environment of technology tools, information architecture, and data formatting and exchange standards.

A key aspect of ILE is its dynamic determination of learning event content for a Sailor based on their demonstrated proficiencies using a repository of information objects (i.e. chunks of content). These are selected and delivered in real-time. Performing these tasks in a computer system requires a new physical and logical architecture for ILE compared to how legacy learning systems work. A foundational component of this new architecture is the use of metadata to enable: discovery of assets by people; calculation of skill gaps using business rules and SkillObjects; enforcing organizational rules for types of learning events and assessments and personalizing the learning to each Sailor. All of this must be done in an integrated (the “I” in ILE) system that is scalable and has a high level of automation. Metadata is the “connecting tissue” of the ILE. Consequently, content must be annotated to support both human discovery of content during development, as well as real-time machine analysis of business rule based personalization and compilation of learning events.

The core requirements for annotating content with metadata are described by the Advanced Distributed Learning (ADL) SCORM standard. This reference model is a baseline information model for building and integrating object-based content into interoperable systems. It includes three primary parts: Content Aggregation Model (CAM); Sequencing and Navigation (SN); and Run-Time Environment (RTE). The CAM specification describes a metadata model to annotate content at all levels of aggregation to support reuse and repurposing of content among developers and organizations. SN is a datamodel that supports defining links and rules for ordering learning objects for a learning event with specific emphasis on using a standard datamodel for Learning Management Systems (LMS) to maximize interoperability. RTE is a datamodel, communication, and Application
Programming Interface (API) specification for the events needed to launch content and communicate results in a LMS. An upcoming DoD instruction (expected to be 1322.20) may require use of SCORM 2004 and a new ADL registry architecture across DoD training and education commands.

This guide builds on the CAM specification adding greater detail to tailor its use for the ILE. It refines the baseline CAM list of mandatory and optional elements to support ILE’s greater use of dynamic assessment and selection of content, and especially the use of SkillObjects to determine individual Sailor learning needs.
25.0 PURPOSE

This guide serves as a reference for content developers, instructional designers, system developers and other practitioners associated with the ILE. It is designed to provide concise, useful guidance for those who create ILE learning content. It contains descriptions of the required metadata that should be assigned to content from assets to TLOs. As the ILE is still evolving, the guidance presented here is also evolving and will be updated as needed.

Many documents have been created in the last couple of years on the topic of metadata for learning content. This document is intended to pull together the best of these efforts and establish a definitive guide to assist in defining metadata for content development and delivery within the ILE environment. Accurate, meaningful, and adequate metadata is essential to the effective and efficient operation of the ILE.

This edition of the ILE Content Metadata Guide expands on previous editions provided by several training groups. It incorporates descriptions of ILE metadata from the perspectives of developing learning content as well as delivering content. This edition also emphasizes the “about” and “how” roles of metadata – the use of metadata to both describe other data and information as well as providing the system and context-level information required to properly make use of data and information in an automated system.
26.0 BACKGROUND

26.1. SCORM Content Aggregation Model (CAM)

The SCORM CAM is based on several key concepts. It describes responsibilities and requirements for building content and content organizations (e.g., course, lessons, modules, etc.). It provides guideline information on creating content packages, applying metadata to the components in the content package and applying sequencing and navigation details in the context of a content package. SCORM Content Packaging provides a consistent form for describing content structures, learning content, the metadata that describes the various components of the content structures and sequencing and navigation rules. This consistency facilitates search and discovery of content packages and their resources (helping facilitate reuse of SCORM-conformant content) building of content organizations that will behave in a similar manner from system to system and standard understanding of the contents of the content package. The SCORM CAM 2004 specifies a metadata element structure (schema) that defines the requirements for metadata application profiles.

26.2. The ILE Content Design, Development, and Deployment Guide

The ILE Content Design, Development, and Deployment Guide describes the overall processes and mechanisms for designing and deploying content within the ILE. In keeping with the SCORM conceptual model, there are several levels of aggregation of content starting with individual assets going through combinations of Terminal Learning Objects as shown in the figure below. This figure shows the translation of the SCORM 2004 hierarchy to the Navy Content Object Model (NCOM) hierarchy. NCOM is the ILE’s basic content model built on the foundation of SCORM.
The components of NCOM are defined as:

- **Learning Object Aggregation** - top level grouping of related content
- **Terminal Learning Object** - an aggregation of 1 or more ELOs, it satisfies one terminal objective (TO) and correlates to a SCORM aggregation
- **Enabling Learning Object** - an aggregation of 1 or more Assets, it satisfies one enabling objective (EO) and correlates to SCORM SCO
- **Asset** - the base building block of TLOs, it is either a representation of text or a media element (e.g., web file, assessment object, video, and other data elements)

The ILE Content Developer's guide is a specification intended to define and enforce standards for developing, formatting, and using object based content for the ILE throughout the lifecycle of content from requirements definition to procurement and eventual archiving. These guidelines and rules are not intended to hinder use of advanced technologies and instructional methods but rather to require the minimum set of formatting, structure, and methods necessary to ensure interoperability, extensibility, and reasonable Total Cost of Ownership to the Navy.

In an effort to maintain alignment with accepted standards, the content schema specification uses SCORM 2004 as its foundation. While SCORM 2004 is a highly optimized reference model for object-based content, it lacks certain specific definitions that are critical to the ILE. Thus, the Navy has used the extensibility of the SCORM 2004 model to extend its core schema with Navy required metadata elements and allowed values. This customized version is named SCORM-Navy which will be used throughout the specification series and in this document.

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<table>
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<td>- Root Aggregation</td>
<td>- Learning Object Aggregation</td>
</tr>
<tr>
<td>• Aggregation</td>
<td>• Terminal Learning Object (TLO)</td>
</tr>
<tr>
<td>• Sharable Content Object (SCO)</td>
<td>• Enabling Learning Object (ELO)</td>
</tr>
<tr>
<td>• Asset (with metadata)</td>
<td>• Asset</td>
</tr>
</tbody>
</table>

Figure 29  Comparison of SCORM and NCOM content hierarchies.
26.3. ILE

In 2001, the Chief of Naval Operations sponsored and directed the Task Force for Excellence through Commitment to Education and Learning (EXCEL) to act as the catalyst for RiT by overseeing pilot programs which would precisely align job opportunities with individual competencies using five defined areas: personal development; professional development; professional military education and leadership; certifications and qualifications; and performance. When tied to proficiency and seniority levels, these five areas define vectors, which are the focal point of the RiT, and serve as the basis for learning object assembly and distribution.

To realize this vision, the Navy has developed methods and tools to provide the core personalized data and analysis for each Sailor’s current career status, potential job opportunities, and the associated training and education credentials they must acquire to progress to higher levels of skill, knowledge, and proficiency. In addition, every Navy job is being broken into its component requisite tasks and skills, and when combined with the Sailor data analysis, forms a well defined matrix of jobs, tasks, skills, required learning, and qualifications.

The ILE vision is to develop an information environment that provides capabilities for Navy Training and Education (T&E) operations, and easily integrates with the larger Sea Warrior and DoD systems. It should fully encompass the Operational, Technical, and Systems architectures required to transform training and personnel operations both in ashore and afloat environments. The ILE will realign the existing Navy T&E environment of diverse databases and applications into an inclusive multi-level architecture, delivering new web-based capabilities based on an integrated infrastructure and shared services.

The ILE information environment will enable individual Sailors to access their customized T&E services through a single web-based location. These customized services will offer content and information targeted to each Sailor’s specific rate, grade, and situation based upon the most up-to-date personnel data, ensuring that the right information is delivered at the right time. Combined with policy, procedures, and standards, the ILE achieves standardization, consolidated management, and seamless interoperability.

The ILE is not just a system. It is an information environment which encompasses all aspects of interactions within the environment, ILE technologies, and applicable processes. The ILE presents an enormous systems engineering challenge due to its primary strategic requirements:

1. Managing the discrete definition of the skills and courses needed for every Navy job position and seniority level according to Fleet requirements.
2. Managing specific Sailors’ educational and training status, options, plans, and requirements for rate and grade advancement with configuration management and continuous upgrades.

3. The creation and management of independent reusable learning objects that can then be combined “on the fly”, creating the right training, for the right sailor, at the right time.

Figure 30   Operational view (OV-1) for to-be ILE.
26.4. My Learning Event

Much of the insight into the application of metadata to the ILE came from the My Learning Event proof of concept evaluation. This project provided a test bed for the ILE information and physical architecture concepts, especially focusing on the metadata architecture, and validated the guidance provided in this document.

There are several key principles evaluated in MLE that are listed below. Each of these highlights a hurdle elucidated by pilot efforts that attempted to extend current system components to the combination of new requirements. Indeed, some of these requirements can be addressed with existing systems but the challenge for ILE is addressing all of them in one system.

- **Metadata Architecture:** Use metadata architecture with XML namespaces to allow layered filtering to select content for personalized training needs.
- **Human Capital Objects (HCO):** Use SkillObjects as foundation of defining job requirements for knowledge, skills, and abilities for full spectrum of proficiency from apprentice to master. HCO also includes specific use case requirements of a position (a job in a billet) and the work environment.
- **Sharable Content Objects (SCO):** Use SCORM compliant content created and used as reusable learning objects developed to meet individual learning objectives mapped to SkillObject performance objectives.
- **Personalized learning events:** Learning options are presented to each Sailor that relate specifically to their current and target job and position. Training gaps are defined in real-time by ILE using required skill proficiencies from HCO and demonstrated Sailor proficiencies. This leads to automated selection of content performed by software at runtime without predefined curricula. Sailors are allowed to “test out” of learning they can demonstrate adequate proficiency in the skill or knowledge topic.
- **Distributed architecture:** Use federated distribution of hardware and content with core software services.

A workshop was held with major stakeholders in October 2004 sponsored by Sea Warrior and Naval Personnel Development Command (NPDC) to identify the metadata requirements for delivering content in ILE. This is shown in the figure below. As is evident from the figure, metadata is used extensively at many points of ILE functions. Much of this metadata will be defined ahead of time and stored in a repository including SCORM metadata specified in this guide. The metadata required for each content object will be assigned by content developers, system administrators, and automated classifier tools.
Metadata schemas were determined to belong to the following major functional areas:

1. Learning Objects
2. Delivery & Mgmt
3. Human Capital Object & Mgmt
4. Naval Cap Dev Process
5. Manpower & Personnel
6. Systems Engineering (SYSCOMS)
7. Training & Education
8. Sailor Personalization
26.5. ILE Information Architecture

A new information architecture has been developed for ILE to incorporate the system requirements enumerated in the previous sections. The key precepts of this architecture are listed below.

- Manpower Analysis creates a requirement for humans to perform work
- Work requirements lead to jobs and positions
- Job/position requirements are expressed as Human Capital Objects
- HCO contain SkillObjects defining core work requirements, and also contain worker and work environment requirements as use case specific attributes
- SkillObjects define knowledge, skills, and abilities people need to perform work proficiently
- SkillObjects are information objects and are therefore reusable and modular
- 1 SkillObject has several performance groups
  - One group of core KSA
  - Several groups defining context-based KSAs
- Each group has 1 overall performance statement with performance objective(s), standard(s), assessment method(s), and required proficiencies
- Assessment methods include knowledge test, supervised skill demonstration, qualification, certification
- Each performance objective maps to 1 Terminal Objective as bridge from occupational to learning conceptual areas
  - 1 Terminal Objective maps to 1 Terminal Learning Object
  - 1 TLO is composed of several Enabling Learning Objects
- New ILE content will be developed at the ELO level to maximize reusability and repurposing
- Legacy content can be converted into TLO
- Testing out occurs at TO/TLO level
- Measure results of learning and feedback into requirements and evolving specifications and methods

The conceptual model of the ILE information architecture is shown below. The important concepts to understand are the highly intertwined nature of issues across Manpower, Personnel, Training and Education, and the relationships among the definitions of work, competency, SkillObjects, and learning objectives that drive the requirements for learning content.
The logical model shown below indicates how a SkillObject is composed of performance groups each with performance objectives mapping to learning objectives at the TO level. This in turn maps to content at the TLO level which is used for a personalized learning event. Metadata underlies all of these mappings since it is the explicit expression of the rules and values governing this mapping.
26.6. Taxonomies

Taxonomies are the classification scheme used to categorize a set of information items. They represent an agreed vocabulary of topics arranged around a particular theme. Although they can have either a hierarchical or non-hierarchical structure, we typically encounter hierarchical taxonomies such as in libraries, biology, or military organizations. This type has a tree-like structure with nodes branching into sub-nodes where each node represents a topic with a few descriptive words. For example, the following table shows a portion of the familiar Dewey Decimal System that was introduced in 1876 as a general catalog of knowledge and is the most common system used in libraries.
Classifying information becomes more important as the number of information items increases and people have more trouble remembering what they have and where to find it. This is now crucial as people increasingly are overwhelmed by the immense volume of information available through computer networks.

There are many taxonomies used in the Navy and the learning community. These include vocabularies for learning events, knowledge (e.g. Bloom’s), and subjects. Listed below are examples of a few important taxonomies.

- **Official Navy Baseline Tagset Library** - The “official Navy baseline tagset library” is oriented toward manuals (paper or electronic) markup and description rather than descriptions of learning objects.
- **SPAWAR Common Systems Administration and Maintenance** - This focuses on lesson plans and training publications.
- **Cognizance Symbol 2 (Cog 2) “O” Equipment Designator Table** - This is a taxonomy for describing training devices and generating designators (such as 2F122A) for the training devices. It includes major categories such as aviation, Anti-submarine warfare, land operations, surface operations, and undersea operations as well as areas such basic science, combined operations and physiological training.
- **NAVAIR Media Development Kit (MDK)** - The MDK contains many elements similar to those in SCORM and a few not contained in SCORM.
- **Standard Subject Identification Codes (SSIC)** - The purpose of the SSIC is to provide a single standard system of numbers and letters for categorizing Navy and Marine Corps information such as letters, messages, directives, forms, and reports. It is not intended to describe aspects of media assets needed for SCORM compliant repositories such as graphics file formats and sizes. However, it does represent a taxonomy of Navy content that has been useful and commonly used to describe information. Some of the more relevant of the 14 major subject groups are operations and readiness, logistics, ordinance, aeronautical and astronautically, and facilities and activities ashore.
- **Defense Technical Information Center (DTIC)** - The DTIC thesaurus and associated taxonomy provides a multidisciplinary vocabulary that includes
nearly 12,000 topics, such as communications, guided missile technology, navigation, detection and countermeasures. In addition, it provides extensive information on general topics such as chemistry, physics and atmospheric sciences.
27.0 USINGMETADATA IN ILE

27.1. What is Metadata?

Metadata is defined simply as data about data. It provides additional information on the context and characteristics of data and information items. We can describe the source of data, both human and machine, as well as time-sensitive issues like expiration of approval or legal standing. In addition, we can describe how the data is intended to be used, such as for students taking tests, and even the key business processes associated with the data and metadata, like how many times a student can take a test before failing.

Metadata adds several important capabilities to data and information that are not available without it and which are increasingly critical to meeting operational capabilities. These include:

- High quality search and information retrieval
- Semantic Web
- Knowledge discovery
- Intelligent applications based on business rules and models of the organization’s specific processes
- Automated machine-machine reasoning
- Interoperability
- Linking and mapping disparate data format, content, usage, and constraints.

Metadata serves two primary purposes, namely:

- Browsing, searching, and navigation of assets
- Automated machine-machine transactions.

The first purpose is served by metadata catalogs, such as the Department of Defense Discovery Metadata Specification (DDMS). This is similar to a library card catalog. It stores the schema elements, not the values assigned to schema. This allows people to find schema that they can then decide whether to use for information retrieval, asset management, or reuse in another system design project. In contrast, the second purpose describes one of the greatest potentials of the Semantic Web; that is, to enable much more intelligent processing by computers based on analysis of the meaning of text and images, not just its structure as is currently the case. This is exemplified in the figure below that shows a goal for intelligent machine-machine communications that will depend on the definition and interoperable use of metadata.
27.2. What does Metadata do for ILE?

Metadata is critical for two primary use cases of ILE content:

- Content development
- Content delivery

This is expressed in the SCORM CAM v1.3 manual as:

“Describing the components with meta-data facilitates the search and discovery of the components across systems. A LMS could use the meta-data to give the learner information about the content organization (i.e., course, lesson, module, etc). Meta-data can also
Content development is the process of developing new content or adapting existing content to meet learning objectives that in turn meet the need to raise Sailor proficiencies in the SkillObjects required for Navy jobs and positions. One of the main tenets of SCORM is the reuse and repurposing of content. To enable this important capability, content must be stored and advertised in a manner that makes it easy for other developers to find out that it exists, what it is about, where to get it, how to use it, and whether it addresses the learning methods and objectives they are working on. This is a requirement for metadata aiding discovery of products, and information on using them in constructing content.

In contrast, delivering content requires metadata enabling computer systems to discern (i.e. actively determine through machine reasoning) which content items should be used for a particular Sailor at a particular time and place. This is much more important to ILE than most LMS-based systems because ILE will not have pre-defined curriculum and lesson plans for Sailors. Rather, a core objective of ILE is determining a Sailor’s lesson plan as a learning event at runtime based on a calculation of a gap in their skills using SkillObjects and personnel and training records. This skills-centric learning is a defining characteristic of how ILE is putting into practice the goals of the RiT. This use focuses on feeding applications the necessary information on how to use the content so it can be organized into an effective learning event.

These two distinct use cases are shown in the following figure. Although personalization is shown as being applied at the last step, all aspects of ILE are personalized with characteristics built into information and data assets continuously.

Figure 35 Use cases for content development and delivery.
27.3. Applying Metadata Tags

Metadata tags are applied during the content development process and required by the content delivery and discovery processes as shown in the figure below. Different kinds of tags are applied by different individuals or systems for both the accuracy of the tags and the efficiency of the development process.

Figure 36 Metadata tags are assigned by different people and automated tools through the lifecycle of content in ILE.

Applying metadata tags is a normal component of the content workflow process and should not add significant time nor cost to learning content if done properly. The decision criteria for each metadata element covers the same criteria used by content developers in determining the best content, degree of difficulty, length of learning presentation, and other key characteristics. Thus, most, if not all, of the decisions needed to assign metadata values from the prescribed schema and associated vocabularies should already be part of the development process. The tagging process is therefore essentially documenting analyses and decisions already made. A separate situation exists that existing content is being modified in its structure and not its learning content. This will occur when the large SCORM 1.2 objects are broken into smaller SCORM-Navy objects. In this case, there may be greater deliberation required for assigning some metadata element values.

A metadata tagging management tool will be provided by the Navy or available as part of authoring tools. Developers and Subject Matter Experts (SME) will be able to choose from pre-defined lists of allowed values (i.e. the taxonomies or
vocabularies) for many of the metadata elements which will then be automatically stored in the proper format in an ILE metadata repository for general use.

27.4. Development Scenario

The organizations developing content are responsible for assigning metadata tags to content relating to discovering the existence, purpose, learning characteristics, and suitability for reuse and repurposing. The success of the content delivery process hinges on the right tags being utilized and accurate values being assigned. The first step of the content development process involves discovery of currently available learning objects which fulfill a given learning objective. This discovery could involve multiple pieces of search criteria, but will usually involve discovery by subject matter classification and learning modes.

An example of how metadata can be used to discover reusable learning content objects is described at a high level in the diagram below.
Figure 37  Sample process showing the use of metadata to discover learning objects during content development.

27.5. Delivery Scenario

The ILE automatically selects, aggregates, sequences, and delivers a learning event to a Sailor based on their individual skills gap using the information architecture described earlier in this document. The connection to learning content is made through the performance objectives defined in SkillObjects that are mapped to Terminal Objectives and therefore to TLOs. Making these mappings accurate in real-time in an automated system relies heavily on metadata to distinguish possible combinations of learning content objects into the right set for the right Sailor. This filtering process is based upon application rules that utilize metadata to describe the learning objects in relation to the individual.
The content delivery system uses metadata to:

- Determine the training requirements of the Sailor who is engaging in the Learning Event
- Discover learning objects that satisfy performance objectives
- Determine constraints and options for learning events based on a Sailor’s situation
- Determining the best physical delivery mechanism (e.g. storage, network throughput)

These are not the only aspects needed to deliver content. SCORM uses the Sequencing and Navigation datamodel to define the basic rules governing the ordering of content items, branching between items based on assessments or other situation characteristics, and other key Instructional Design issues. Similarly, the exchange of data between the content (as a SCO) and the LMS is governed by the Run Time Environment specification of SCORM.
28.0 GUIDANCE FOR ASSIGNING METADATA

An upcoming DoD instruction (expected to be 1322.20) is expected to require the use of SCORM 2004 as well as a new ADL metadata registry architecture. The guidelines in this document are consistent with the architecture proposed in the DoD instruction.

28.1. Overview

The SCORM CAM schema has nine categories. This has been extended with the addition of a tenth category on Security Classification. The purpose of each category is listed below as defined in the CAM document, and by this guide for group ten.

1. General: describes general information about the SCORM Content Model Component as a whole.
2. LifeCycle: describes features related to the history and current state of the SCORM Content Model Component and those who have affected the component during its evolution.
3. Meta-metadata: describes information about the meta-data record itself (rather than the SCORM Content Model Component that the record describes).
4. Technical: describes technical requirements and characteristics of the SCORM Content Model Components.
5. Educational: describes the educational and pedagogic characteristics of the SCORM Content Model Component.
6. Rights: describes the intellectual property rights and conditions of use for the SCORM Content Model Component.
7. Relation: describes features that define the relationship between this SCORM Content Model Component and other targeted components.
8. Annotation: provides comments on the educational use of the SCORM Content Model Component and information on when and by whom the comments were created.
9. Classification: describes where the SCORM Content Model Component falls within a particular classification system.
28.2. Mandatory and Optional Element Use

SCORM 2004 is based on the IEEE Learning Object Metadata (LOM) specification. LOM declares all metadata elements to be optional since it is a framework intended to support myriad usage scenarios and be as widely applicable as possible. In contrast, functioning IT systems have many real world Operation and Maintenance (O&M), system performance, and interoperability requirements. As such, they require greater consistency and a minimum set of metadata used by all content items. SCORM 2004 specifies mandatory metadata elements for this reason. Similarly, ILE has more stringent operational requirements and this guide specifies a larger set of mandatory elements than SCORM 2004.

This approach follows the ADL SCORM 2004 approach described in the CAM as:

“The following sections outline the LOM XML meta-data elements. According to the IEEE, every LOM meta-data element is optional. This implies that when building a XML meta-data instance, the developer can optionally pick and choose which elements to use. In order to meet several of the key high-level requirements of ADL, SCORM places additional requirements on which elements are mandatory in SCORM-conformant Meta-data XML instances. These additional requirements enable the ability to describe those objects with meta-data (in a consistent manner using a consistent set of required elements) and the ability to find those learning objects in a repository so they can be used in other contexts. This list of required elements is different depending on the SCORM Content Model Component (Asset, SCO, Activity, Content Organization) being described by the meta-data. Refer to Section 4.5.2: SCORM Meta-data Application Profile Requirements for a complete listing of the elements and their usage requirements.”

There are three types of metadata usage requirements: mandatory, optional, and conditional. They have the following definitions:

- **Mandatory:** the metadata element must be assigned a value or values depending on its multiplicity requirement and using the stated approved vocabulary if listed
- **Optional:** the metadata element may be used or not used depending on the decision of the content developer or content manager. If used, the element values and number of instances must follow the stated specification for the element and its children elements
Conditional: the use metadata element depends on a condition such as the optional use of its parent element. In this case, the element is not used if the parent is not used but it required if the parent is used. This situation, as for Contribute (3.2) and Role (3.2.1), indicates that the child element (e.g. Role) is mandatory if the parent element (e.g. Contribute) is used and should not be used otherwise.

28.3. Summary Table of Metadata Elements

Table 28 ILE metadata content requirements. Legend: M=mandatory; O=optional; C=Conditional

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<td>Document Title</td>
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<td>10.9.3.2</td>
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</tr>
<tr>
<td>10.9.4.4</td>
<td>Reason</td>
<td>M</td>
<td>M</td>
</tr>
</tbody>
</table>
28.4. Differences from SCORM 2004

Several changes were made to the baseline SCORM 2004 list of mandatory and optional elements to satisfy ILE requirements. These changes do not violate SCORM. Indeed, SCORM is intended to be tailored to the application and the published ADL standard is a baseline version, as is stated in the SCORM CAM v1.3 document.

“The SCORM Meta-data Profiles represents a mapping and recommended usage of the IEEE Learning Technology Standards Committee (LTSC) Learning Object Metadata (LOM) elements for each of the SCORM Content Model components. In general, guidance is provided for meta-data to be applied to Assets, SCOs, Activities and Content Organizations to describe them in a consistent fashion such that they can be identified, categorized, searched for and discovered within and across systems to further facilitate sharing and reuse. Policies governing the application of meta-data to the components of the Content Aggregation Model should be defined within organizations that wish to enable reuse based on the requirements of those organizations. SCORM does not seek to impose requirements related to the scope of meta-data tagging of Content Model components, but rather seeks to provide practical, standards-based guidance for those organizations wishing to enable sharing and reuse.”

The differences between the ILE Content Metadata guide and SCORM 2004 are listed in the table below.
Table 29  Differences between ILE metadata guide and SCORM.

<table>
<thead>
<tr>
<th>ID</th>
<th>Name</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Catalog</td>
<td>Required for TLO/ELO and assets because the Entry value has no meaning without the catalog system being listed.</td>
</tr>
<tr>
<td>1.3</td>
<td>Language</td>
<td>Required for TLO/ELO and assets because knowing the language the object is targeted for helps personalize ILE delivery and content development.</td>
</tr>
<tr>
<td>1.5</td>
<td>Keyword</td>
<td>Required for assets to improve ability to discover them across functional communities to maximize reuse</td>
</tr>
<tr>
<td>1.7</td>
<td>Structure</td>
<td>Required for TLO/ELO to support determining internal structure of an object for runtime operations</td>
</tr>
<tr>
<td>2.0</td>
<td>Lifecycle</td>
<td>Required for assets to support ILE workflow processes</td>
</tr>
<tr>
<td>2.1</td>
<td>Version</td>
<td>Required for assets to support ILE workflow processes</td>
</tr>
<tr>
<td>2.2</td>
<td>Status</td>
<td>Required for assets to support ILE workflow processes</td>
</tr>
<tr>
<td>2.3</td>
<td>Contribute</td>
<td>Required to support ILE workflow processes. Only 1 instance allowed to restrict annotation to primary POC</td>
</tr>
<tr>
<td>2.3.3</td>
<td>Date</td>
<td>Required to support ILE workflow processes</td>
</tr>
<tr>
<td>3.1</td>
<td>Catalog</td>
<td>Required for TLO/ELO and assets because the Entry value has no meaning without the catalog system being listed.</td>
</tr>
<tr>
<td>3.2.1</td>
<td>Role</td>
<td>Only a “creator” role is allowed to focus workflow on developers and reuse of objects</td>
</tr>
<tr>
<td>3.2.3</td>
<td>Date</td>
<td>Required to support ILE workflow processes</td>
</tr>
<tr>
<td>4.4.1.1</td>
<td>Type</td>
<td>Required to establish value for OrComposite if it used (i.e. mandatory only if parent element is used)</td>
</tr>
<tr>
<td>4.4.1.2</td>
<td>Name</td>
<td>Required to establish value for OrComposite if it used (i.e. mandatory only if parent element is used)</td>
</tr>
<tr>
<td>4.7</td>
<td>Duration</td>
<td>Run time of TLO/ELO is needed for ILE to construct a learning event</td>
</tr>
<tr>
<td>5.0</td>
<td>Educational</td>
<td>Required to provide important information to ILE and developers on the educational intent and value of objects</td>
</tr>
<tr>
<td>5.2</td>
<td>Learning Resource Type</td>
<td>Required to provide important information to ILE and developers on the type of educational object</td>
</tr>
<tr>
<td>5.7</td>
<td>Typical age range</td>
<td>ILE will use this to include AJM values</td>
</tr>
<tr>
<td>5.8</td>
<td>Difficulty</td>
<td>Required for all objects to allow ILE to know how to target objects</td>
</tr>
<tr>
<td>5.9</td>
<td>Typical learning time</td>
<td>Required for all objects to allow ILE to know how to construct a learning event that has an appropriate time</td>
</tr>
<tr>
<td>5.10</td>
<td>Description</td>
<td>Required for all objects to provide contextual comments to other developers</td>
</tr>
<tr>
<td>6.3</td>
<td>Description</td>
<td>Required for all objects to know language of educational event</td>
</tr>
<tr>
<td>7.1</td>
<td>Kind</td>
<td>If parent element is used, this is required for all objects to specify the nature of the relationship between objects</td>
</tr>
<tr>
<td>7.2</td>
<td>Resource</td>
<td>If parent element is used, this is required for all objects to specify the name of the second object</td>
</tr>
<tr>
<td>7.2.11</td>
<td>Catalog</td>
<td>Required since name of object is not useful without knowing catalog system</td>
</tr>
<tr>
<td>8.0</td>
<td>Annotation (all elements in group)</td>
<td>Required of all objects to assist developers across the Navy with understanding the intent and issues associated with an object for reuse and repurposing as expressed by original developer. This is a knowledge sharing mechanism.</td>
</tr>
<tr>
<td>9.0</td>
<td>Classification (all elements in group except Keyword)</td>
<td>Required of all objects to assign classification values for subject matter and other taxonomies from functional communities, like aviation or technical data manual, within the SCORM framework. Two external classification systems are required for the purpose of subject matter classification using the DTIC and SSIC taxonomies. Others can be used but are optional.</td>
</tr>
</tbody>
</table>
10.0 Security

This entire group has been added to the baseline SCORM CAM schema. It allows assigning USDoD security classification levels using the controlled taxonomy from DoD 5200.1. Others markings are allowed but are optional.

28.4.1. Addition of Group 10 for Security Classification

The addition of the new element group 10 for Security extends the SCORM 2004 CAM datamodel. This was done to provide a sufficient set of metadata elements to meet US DoD and international requirements for classification markings and control of content, both written and electronic. The definition of authoritative rules for security classification markings are taken from the DoD Discovery Metadata Standard (DDMS) and DoD 5200.1 Information Security Program. In addition, marking requirements were taken from DoD 5230.24 Distribution Statements on Technical Documents, and SECNAVINST 5510.36 Department of the Navy Information Security Program Regulation.

The SCORM specification allows this extension as noted below from the CAM document. Each of the restrictions on extending the datamodel has been followed.

“There may be situations where organizations have policies and practices for describing SCORM Content Model Components in ways the LOM does not support with its element set. For example, organizations may have a robust digital rights management scheme that is used to describe their learning content. The LOM permits its base scheme to be extended. As mentioned above this has potential to decrease the semantic interoperability of the meta-data and learning content.

If an organization wishes to provide its own extensions to the current LOM the following rules shall be adhered to: Extensions to the LOM base schema shall retain the value space and data type of data elements from the LOM base schema; Extensions shall not define data types or value spaces for aggregate data elements in the LOM base schema; Extended data elements should not replace data elements in the LOM base schema.”
29.0 METADATA ELEMENT SPECIFICATIONS

The following descriptions provide the specific requirements for assigning metadata to content. Elements are defined for two levels of aggregation:

1. TLO and ELO
2. assets

Mandatory elements must be used while other elements are optional and can be used if the developer or SME thinks they add value. As in SCORM, each element has a multiplicity value that defines how many times it can be used, as listed below.

Table 30  Metadata element multiplicity legend.

<table>
<thead>
<tr>
<th>Multiplicity</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0 values are allowed. That is, the element is disallowed and should not be used.</td>
</tr>
<tr>
<td>1</td>
<td>1 value is required. A single instance must be used but no more than 1.</td>
</tr>
<tr>
<td>0-1</td>
<td>For an optional element, there can be one instance or no instances but nothing else.</td>
</tr>
<tr>
<td>0-n</td>
<td>For an optional element, there does not have to be an instance but can be as many instances as needed by repeating the element with new values for each new instance.</td>
</tr>
<tr>
<td>1-n</td>
<td>For a required element, there must be at least one instance but can be as many instances as needed by repeating the element with new values for each new instance.</td>
</tr>
</tbody>
</table>

Some of the CAM elements are parent elements that do not have a value themselves but are used to demarcate sections of the metadata definition file, whether in a manifest or XML document. The children elements will have values assigned.

Each element is described below. The tables define the numeric code for the element, its purpose, usage and multiplicity in ILE at both TLO/ELO and asset levels.
29.1.  General

<table>
<thead>
<tr>
<th>Code</th>
<th>Purpose</th>
<th>Usage</th>
<th>Multiplicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>Provides administrative details on the learning object</td>
<td>Parent element for this group.</td>
<td>1</td>
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</table>

29.1.1.  Identifier

<table>
<thead>
<tr>
<th>Code</th>
<th>Purpose</th>
<th>Usage</th>
<th>Multiplicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Unique ID</td>
<td>Parent element for this subgroup.</td>
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</table>

29.1.1.1.  Catalog

<table>
<thead>
<tr>
<th>Code</th>
<th>Purpose</th>
<th>Usage</th>
<th>Multiplicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1.1</td>
<td>Specify the classification system used to assign a unique ID</td>
<td>Include name of classification system chosen from authorized vocabulary</td>
<td>1</td>
</tr>
</tbody>
</table>

The catalog system will be specified at a future date for ILE. At this time, one of the following schemes should be used although the DOI is preferred since it is aligned with the Handle system that is part of CORDRA, the registry architecture for learning objects that is being developed and may be used in the DoD in conjunction with SCORM. The chosen scheme is entered as the value of this element.

- Universal Resource Identifier (URI)
- Universal Resource Name (URN)
- Digital Object Identifier (DOI)

29.1.1.2.  Entry

<table>
<thead>
<tr>
<th>Code</th>
<th>Purpose</th>
<th>Usage</th>
<th>Multiplicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1.2</td>
<td>Specify the value of the ID in the classification system</td>
<td>State ID value</td>
<td>1</td>
</tr>
</tbody>
</table>
## 29.1.2. Title

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>1.2</td>
</tr>
<tr>
<td>Purpose</td>
<td>Give name to object</td>
</tr>
<tr>
<td>Usage</td>
<td>Provide a descriptive name that conveys its intent, topic, and learning objective. Provide a descriptive name that conveys the topic of main point of the asset. Do not include indication of file format in the name nor learning event specific information in order to avoid limiting reusability or repurposing.</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>

## 29.1.3. Language

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>1.3</td>
</tr>
<tr>
<td>Purpose</td>
<td>Specify primary language of object</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>

## 29.1.4. Description

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>1.4</td>
</tr>
<tr>
<td>Purpose</td>
<td>Provide a description of the key characteristics and issues associated with the object from the perspective of the developer for another developer to read</td>
</tr>
<tr>
<td>Usage</td>
<td>Write a brief description of 1-2 sentences</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>

## 29.1.5. Keyword

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>1.5</td>
</tr>
<tr>
<td>Purpose</td>
<td>Provide keywords to aid in searching and browsing of content objects in a repository</td>
</tr>
<tr>
<td>Usage</td>
<td>Provide a word or short phrase to describe the object. Multiple keywords can be used but each one should use a separate instance of the KEYWORD element.</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1-n</td>
</tr>
</tbody>
</table>
29.1.6. Coverage

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>1.6</td>
</tr>
<tr>
<td>Purpose</td>
<td>Specify a time, culture, geography or region that applies to the object</td>
</tr>
<tr>
<td>Usage</td>
<td>Optional</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>0-1</td>
</tr>
</tbody>
</table>

29.1.7. Structure

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>1.7</td>
</tr>
<tr>
<td>Purpose</td>
<td>Specify the relationship between object components</td>
</tr>
<tr>
<td>Usage</td>
<td>Specify how the components of the object are related. Use approved vocabulary. If a value is entered for an asset it must be atomic</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>

For the structure element, one of the values must be chosen from the following list:

- **atomic**: an object that is indivisible
- **collection**: a set of objects with no specified relationship between them
- **networked**: a set of objects with relationships that are unspecified
- **hierarchical**: a set of objects whose relationships can be represented by a tree structure
- **linear**: a set of objects that are fully ordered. Example: A set of objects that are connected by “previous” and “next” relationships.

29.1.8. Aggregation Level

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>1.8</td>
</tr>
<tr>
<td>Purpose</td>
<td>Specify scale or scope of the object</td>
</tr>
<tr>
<td>Usage</td>
<td>Define the scale using approved vocabulary. Use a value of 2 for an ELO and a value of 3 for a TLO if this element is used.</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>0-1</td>
</tr>
</tbody>
</table>

If a value is entered for the aggregation level element, it must be chosen from the list below:

1: the smallest level of aggregation, e.g., raw media data or fragments.
2: a collection of level 1 learning objects, e.g., a lesson.
3: a collection of level 2 learning objects, e.g., a course
4: the largest level of granularity, e.g., a set of courses that lead to a certificate
# Lifecycle

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>2.0</td>
</tr>
<tr>
<td>Purpose</td>
<td>Provides a history of changes to an object through stages of development especially status of workflow processes</td>
</tr>
<tr>
<td>Usage</td>
<td>Parent element for this group.</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1 1</td>
</tr>
</tbody>
</table>

## Version

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>2.1</td>
</tr>
<tr>
<td>Purpose</td>
<td>Specify the current version of an object. Should be updated as the object is modified over its lifecycle</td>
</tr>
<tr>
<td>Usage</td>
<td>Provide a version number for the object in alphanumeric text</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1 1</td>
</tr>
</tbody>
</table>

## Status

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>2.2</td>
</tr>
<tr>
<td>Purpose</td>
<td>Specify the completion status of an object along its lifecycle. Update this value as the object’s status changes during workflow processes</td>
</tr>
<tr>
<td>Usage</td>
<td>Provide the completion status for an object using the approved vocabulary</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1 1</td>
</tr>
</tbody>
</table>

For the status element, one of the values must be chosen from the following list:

- **draft**: the component is in a draft state (as determined by the developer)
- **final**: the component is in a final state (as determined by the developer)
- **revised**: the component has been revised since the last version
- **unavailable**: the status information is unavailable
### 29.2.3. Contribute

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Code</strong></td>
<td>2.3</td>
</tr>
<tr>
<td><strong>Purpose</strong></td>
<td>Specify the person or organization that contributed to the object</td>
</tr>
<tr>
<td><strong>Usage</strong></td>
<td>Parent element of this group</td>
</tr>
<tr>
<td><strong>Multiplicity</strong></td>
<td>1</td>
</tr>
</tbody>
</table>

#### 29.2.3.1. Role

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Code</strong></td>
<td>2.3.1</td>
</tr>
<tr>
<td><strong>Purpose</strong></td>
<td>Describe the role that the contributor played in the object’s development</td>
</tr>
<tr>
<td><strong>Usage</strong></td>
<td>Use approved vocabulary to describe the role</td>
</tr>
<tr>
<td><strong>Multiplicity</strong></td>
<td>1</td>
</tr>
</tbody>
</table>

For the role element, one of the values must be chosen from the following list:

- author
- publisher
- unknown
- initiator
- terminator
- validator
- editor
- graphical designer
- technical implementer
- content provider
- technical validator
- educational validator
- script writer
- instructional designer
- subject matter expert

#### 29.2.3.2. Entity

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Code</strong></td>
<td>2.3.2</td>
</tr>
<tr>
<td><strong>Purpose</strong></td>
<td>Specify the name of the person or group working on the object</td>
</tr>
<tr>
<td><strong>Usage</strong></td>
<td>Several names can be added. For each name, use a new instance of the element. System will use vCard format.</td>
</tr>
<tr>
<td><strong>Multiplicity</strong></td>
<td>1-n</td>
</tr>
</tbody>
</table>
### Date

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>2.3.3</td>
</tr>
<tr>
<td>Purpose</td>
<td>Specify a date for a contribution</td>
</tr>
<tr>
<td>Usage</td>
<td>Parent element of this subgroup</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>

### Date Time

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>2.3.3.1</td>
</tr>
<tr>
<td>Purpose</td>
<td>Specify a date for a contribution</td>
</tr>
<tr>
<td>Usage</td>
<td>Enter as date and time in format yyyy-mm-dd, hh:mm:ss</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>

### Description

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>2.3.3.2</td>
</tr>
<tr>
<td>Purpose</td>
<td>Provide text description of the date including issues associated with the date</td>
</tr>
<tr>
<td>Usage</td>
<td>Use succinct text statement</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>
29.3. **Meta-metadata**

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>3.0</td>
</tr>
<tr>
<td>Purpose</td>
<td>Describe the source and nature of the information in the metadata record itself. This information describes the metadata not the learning object. Thus, it is a record of who filled out the metadata for the learning object.</td>
</tr>
<tr>
<td>Usage</td>
<td>Parent element of this group</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>

29.3.1. **Identifier**

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>3.1</td>
</tr>
<tr>
<td>Purpose</td>
<td>Identify metadata record with a unique ID. This is not the same as identifying the learning object</td>
</tr>
<tr>
<td>Usage</td>
<td>Parent element of this subgroup</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>

29.3.1.1. **Catalog**

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>3.1.1</td>
</tr>
<tr>
<td>Purpose</td>
<td>Specify the classification system used to assign a unique ID</td>
</tr>
<tr>
<td>Usage</td>
<td>Include name of classification system chosen from authorized vocabulary</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>

The catalog system will be specified at a future date for ILE. At this time, one of the following schemes should be used although the DOI is preferred since it is aligned with the Handle system that is part of CORDRA, the registry architecture for learning objects that is being developed and may be used in the DoD in conjunction with SCORM. The chosen scheme is entered as the value of this element.

- Universal Resource Identifier (URI)
- Universal Resource Name (URN)
- Digital Object Identifier (DOI)
29.3.1.2. Entry

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>3.1.2</td>
</tr>
<tr>
<td>Purpose</td>
<td>Specify the value of the ID in the classification system</td>
</tr>
<tr>
<td>Usage</td>
<td>State ID value</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>

29.3.2. Contribute

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>3.2</td>
</tr>
<tr>
<td>Purpose</td>
<td>States who developed the metadata for the object. This is not necessarily the same person or group who developed the learning object.</td>
</tr>
<tr>
<td>Usage</td>
<td>Parent element of this subgroup</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>0-1</td>
</tr>
</tbody>
</table>

29.3.2.1. Role

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>3.2.1</td>
</tr>
<tr>
<td>Purpose</td>
<td>States the workflow process role of the person creating the metadata record (not the learning object)</td>
</tr>
<tr>
<td>Usage</td>
<td>Required if parent element is used. Choose value from approved vocabulary.</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>

Approved vocabulary is:
- Creator

29.3.2.2. Entity

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>3.2.2</td>
</tr>
<tr>
<td>Purpose</td>
<td>Name of the person or group creating the metadata record</td>
</tr>
<tr>
<td>Usage</td>
<td>Required if parent element is used. System will use vCard format.</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1-n</td>
</tr>
</tbody>
</table>

Multiple values are allowed by repeating the entity element for each value. It is preferred that only one value be used.
### 29.3.2.3. Date

<table>
<thead>
<tr>
<th>Code</th>
<th>3.2.3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose</td>
<td>State the date the metadata record is created or changed</td>
</tr>
<tr>
<td>Usage</td>
<td>Required if parent element is used. Parent element of this subgroup.</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>

### Datetime

<table>
<thead>
<tr>
<th>Code</th>
<th>3.2.3.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose</td>
<td>Enter value of the date</td>
</tr>
<tr>
<td>Usage</td>
<td>Required if parent element is used. Enter as date and time in format yyyy-mm-dd, hh:mm:ss</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>

### Description

<table>
<thead>
<tr>
<th>Code</th>
<th>3.2.3.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose</td>
<td>Enter text description of issues or activities relating to the date this metadata record is made</td>
</tr>
<tr>
<td>Usage</td>
<td>Required if parent element is used.</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>

### 29.3.3. Metadata Schema

<table>
<thead>
<tr>
<th>Code</th>
<th>3.3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose</td>
<td>Enter names of metadata schema used to create metadata for learning object.</td>
</tr>
<tr>
<td>Usage</td>
<td>Must enter 2 primary schema from LOM and SCORM using approved vocabulary. Other schema can be used and listed if needed</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>2-n</td>
</tr>
</tbody>
</table>

Approved vocabulary for two required schema:

- LOMv1.0
- SCORM_CAM_v1.3
### 29.3.4. Language

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Code</strong></td>
<td>3.4</td>
</tr>
<tr>
<td><strong>Purpose</strong></td>
<td>Specify primary language of metadata record</td>
</tr>
<tr>
<td><strong>Multiplicity</strong></td>
<td>0-1</td>
</tr>
</tbody>
</table>
### 29.4. Technical

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Code</strong></td>
<td>4.0</td>
</tr>
<tr>
<td><strong>Purpose</strong></td>
<td>Specify the technical details and technical requirements for an object</td>
</tr>
<tr>
<td><strong>Usage</strong></td>
<td>Parent element</td>
</tr>
<tr>
<td><strong>Multiplicity</strong></td>
<td>1 1</td>
</tr>
</tbody>
</table>

### 29.4.1. Format

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Code</strong></td>
<td>4.1</td>
</tr>
<tr>
<td><strong>Purpose</strong></td>
<td>Specify the file formats used in the object</td>
</tr>
<tr>
<td><strong>Usage</strong></td>
<td>State the file format for the object using industry standard suffix labels like jpg, mpeg, pdf. Multiple values can be used by repeating this element.</td>
</tr>
<tr>
<td><strong>Multiplicity</strong></td>
<td>1-n 1-n</td>
</tr>
</tbody>
</table>

### 29.4.2. Size

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Code</strong></td>
<td>4.2</td>
</tr>
<tr>
<td><strong>Purpose</strong></td>
<td>Specify the size of an object to aid in location and physical storage and transmission</td>
</tr>
<tr>
<td><strong>Usage</strong></td>
<td>State the size of the object in bytes. This element is unnecessary and is therefore optional since the server automatically determines the size of the object</td>
</tr>
<tr>
<td><strong>Multiplicity</strong></td>
<td>0-1 0-1</td>
</tr>
</tbody>
</table>

### 29.4.3. Location

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Code</strong></td>
<td>4.3</td>
</tr>
<tr>
<td><strong>Purpose</strong></td>
<td>State the physical location of the object</td>
</tr>
<tr>
<td><strong>Usage</strong></td>
<td>Optional but is recommended not to use since the object’s location will be adjusted within the distributed ILE architecture as needed and therefore not known ahead of time.</td>
</tr>
<tr>
<td><strong>Multiplicity</strong></td>
<td>0-1 0-1</td>
</tr>
</tbody>
</table>
29.4.4. Requirement

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>4.4</td>
</tr>
<tr>
<td>Purpose</td>
<td>States the technical requirements for using the object</td>
</tr>
<tr>
<td>Usage</td>
<td>Parent element of this group. Multiple requirements can be stated by repeating this element. These requirements are treated as a set of requirements all of which must be supplied for the object to be used.</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>0-n 0-n</td>
</tr>
</tbody>
</table>

29.4.4.1. Or Composite

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>4.4.1</td>
</tr>
<tr>
<td>Purpose</td>
<td>Specify one technical requirement for an object</td>
</tr>
<tr>
<td>Usage</td>
<td>Parent element of this subgroup. Multiple instances can be stated with the set treated as requiring at least one but not all of the values of this element.</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1-n 1-n</td>
</tr>
</tbody>
</table>

Type

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>4.4.1.1</td>
</tr>
<tr>
<td>Purpose</td>
<td>Specify the type tool need to use the object</td>
</tr>
<tr>
<td>Usage</td>
<td>Use the approved vocabulary.</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1 1</td>
</tr>
</tbody>
</table>

The approved vocabulary is:
- operating system
- browser

Name

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>4.4.1.2</td>
</tr>
<tr>
<td>Purpose</td>
<td>States the name of the required tool needed to use the object</td>
</tr>
<tr>
<td>Usage</td>
<td>Use the approved vocabulary.</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1 1</td>
</tr>
</tbody>
</table>

The approved vocabulary is:
For operating system:
- pc-dos
- ms-windows
- macos
- unix
- multi-os
- none

For browser:
- any
- netscape communicator
- ms-internet explorer
- opera
- amaya

**Minimum Version**

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>4.4.1.3</td>
</tr>
<tr>
<td>Purpose</td>
<td>Specify the minimum version of the tool needed to use the object</td>
</tr>
<tr>
<td>Usage</td>
<td>Enter an alphanumeric text value</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>0-1</td>
</tr>
</tbody>
</table>

**Maximum Version**

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>4.4.1.4</td>
</tr>
<tr>
<td>Purpose</td>
<td>Specify the maximum version of the tool needed to use the object</td>
</tr>
<tr>
<td>Usage</td>
<td>Enter an alphanumeric text value</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>0-1</td>
</tr>
</tbody>
</table>

**29.4.5. Installation Remarks**

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>4.5</td>
</tr>
<tr>
<td>Purpose</td>
<td>Specify any additional instructions for use or installation instructions for the object</td>
</tr>
<tr>
<td>Usage</td>
<td>Enter succinct text description</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>0-1</td>
</tr>
</tbody>
</table>
### 29.4.6. Other Platform Requirements

<table>
<thead>
<tr>
<th>Code</th>
<th>Purpose</th>
<th>Usage</th>
<th>Multiplicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.6</td>
<td>Specify any additional software or hardware requirements for an object</td>
<td>Enter succinct text description</td>
<td>0-1</td>
</tr>
</tbody>
</table>

### 29.4.7. Duration

<table>
<thead>
<tr>
<th>Code</th>
<th>Purpose</th>
<th>Usage</th>
<th>Multiplicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.7</td>
<td>Specify the average time it takes to complete an object</td>
<td>State the time in hh:mm:ss</td>
<td>1</td>
</tr>
</tbody>
</table>
29.5. **Educational**

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>5.0</td>
</tr>
<tr>
<td>Purpose</td>
<td>Provides information on the educational nature of the object</td>
</tr>
<tr>
<td>Usage</td>
<td>Parent element for this group.</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>

29.5.1. **Interactivity type**

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>5.1</td>
</tr>
<tr>
<td>Purpose</td>
<td>Specify the learning mode intended when using the object</td>
</tr>
<tr>
<td>Usage</td>
<td>Choose from approved vocabulary. This vocabulary is not fully representative of all ILE learning modes at this time so this element is allowed but not required.</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>0-1 0-1</td>
</tr>
</tbody>
</table>

The approved vocabulary is:

- active: Active learning (e.g., learning by doing) is supported by content that directly induces productive action by the learner.
- expositive: Expositive learning (e.g., passive learning) occurs when the learner’s job mainly consists of absorbing the content exposed to them.
- mixed: A blend of active and expositive interactivity types.

29.5.2. **Learning Resource Type**

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>5.2</td>
</tr>
<tr>
<td>Purpose</td>
<td>Specify the type of learning object from a learning event perspective</td>
</tr>
<tr>
<td>Usage</td>
<td>Choose from approved vocabulary. Multiple values can be assigned by using a new instance of the element for each value.</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1-n 1-n</td>
</tr>
</tbody>
</table>

The approved vocabulary is:

- exercise
- simulation
- questionnaire
- diagram
29.5.3. **Interactivity level**

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>5.3</td>
</tr>
<tr>
<td>Purpose</td>
<td>Describe the degree of user interactivity while using the object in a learning event</td>
</tr>
<tr>
<td>Usage</td>
<td>Choose from approved vocabulary. This vocabulary is not fully representative of ILE learning modes at this time so this element is allowed but not required.</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>0-1</td>
</tr>
</tbody>
</table>

The approved vocabulary is:

- very low
- low
- medium
- high
- very high

29.5.4. **Semantic density**

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>5.4</td>
</tr>
<tr>
<td>Purpose</td>
<td>Describe the conciseness of the object’s information</td>
</tr>
<tr>
<td>Usage</td>
<td>Choose from approved vocabulary. This vocabulary is not fully representative of ILE learning modes at this time so this element is allowed but not required.</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>0-1</td>
</tr>
</tbody>
</table>

The approved vocabulary is:

- very low
29.5.5. Intended end user role

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>5.5</td>
</tr>
<tr>
<td>Purpose</td>
<td>Describe the type of user intended for object</td>
</tr>
<tr>
<td>Usage</td>
<td>Choose from approved vocabulary. This vocabulary is useful but not of high value to ILE learning modes at this time so this element is allowed but not required.</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>0-1</td>
</tr>
</tbody>
</table>

The approved vocabulary is:

- teacher
- author
- learner
- manager

29.5.6. Context

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>5.6</td>
</tr>
<tr>
<td>Purpose</td>
<td>Describe the type of environment intended for using the object</td>
</tr>
<tr>
<td>Usage</td>
<td>Choose from approved vocabulary. This vocabulary is useful but not of high value to ILE learning modes at this time so this element is allowed but not required.</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>0-n</td>
</tr>
</tbody>
</table>

The approved vocabulary is:

- school
- higher education
- training
- other
29.5.7. **Typical age range**

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>5.7</td>
</tr>
<tr>
<td>Purpose</td>
<td>Targets the object to a particular level of mastery</td>
</tr>
<tr>
<td>Usage</td>
<td>Choose from approved vocabulary. This vocabulary is extended from SCORM to use Navy RAJM levels. Since this nomenclature is being reassessed, this element is preferred but not required. The element can be repeated if the object is suitable to multiple levels of mastery.</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>0-n</td>
</tr>
</tbody>
</table>

The approved vocabulary is:

- recruit
- apprentice
- journeyman
- master

29.5.8. **Difficulty**

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>5.8</td>
</tr>
<tr>
<td>Purpose</td>
<td>Specifies how hard the learning material is in the object</td>
</tr>
<tr>
<td>Usage</td>
<td>Choose from approved vocabulary. Required for TLO/ELO and optional for assets.</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>

The approved vocabulary is:

- Very easy
- easy
- medium
- difficult
- very difficult

29.5.9. **Typical learning time**

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>5.9</td>
</tr>
<tr>
<td>Purpose</td>
<td>Specifies an estimated amount of time for the learner to go through the material in the object</td>
</tr>
<tr>
<td>Usage</td>
<td>Parent element of this subgroup</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>
### 29.5.9.1. Duration

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>5.9.1</td>
</tr>
<tr>
<td>Purpose</td>
<td>Specifies time value</td>
</tr>
<tr>
<td>Usage</td>
<td>Required if parent element is used. State as hh:mm:ss</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>

### 29.5.9.2. Description

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>5.9.2</td>
</tr>
<tr>
<td>Purpose</td>
<td>Describe characteristics or issues associated with the time value assigned</td>
</tr>
<tr>
<td>Usage</td>
<td>Required if parent element is used. Enter succinct text description.</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>

### 29.5.10. Description

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>5.10</td>
</tr>
<tr>
<td>Purpose</td>
<td>Describe how the learning object should be used in a learning event.</td>
</tr>
<tr>
<td>Usage</td>
<td>Enter succinct text description.</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>

### 29.5.11. Language

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>5.11</td>
</tr>
<tr>
<td>Purpose</td>
<td>Specify primary language of intended user of object</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>
29.6. Rights

<table>
<thead>
<tr>
<th>Code</th>
<th>Purpose</th>
<th>Usage</th>
<th>Multiplicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.0</td>
<td>Specify the cost of use or copyright information for the object</td>
<td>Parent element</td>
<td>1</td>
</tr>
</tbody>
</table>

29.6.1. Cost

<table>
<thead>
<tr>
<th>Code</th>
<th>Purpose</th>
<th>Usage</th>
<th>Multiplicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.1</td>
<td>Specify whether or not the object requires payment</td>
<td>State whether or not the object requires payment. Use approved vocabulary</td>
<td>1</td>
</tr>
</tbody>
</table>

The approved vocabulary is:

- Yes
- no

29.6.2. Copyright and Other Restrictions

<table>
<thead>
<tr>
<th>Code</th>
<th>Purpose</th>
<th>Usage</th>
<th>Multiplicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.2</td>
<td>Specify whether or not the object has any restrictions on use</td>
<td>State whether or not the object has any restrictions on use. Use approved vocabulary</td>
<td>1</td>
</tr>
</tbody>
</table>

The approved vocabulary is:

- Yes
- no

29.6.3. Description

<table>
<thead>
<tr>
<th>Code</th>
<th>Purpose</th>
<th>Usage</th>
<th>Multiplicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.3</td>
<td>Describe issues or provide context details on copyright information for the object</td>
<td>Enter succinct statement</td>
<td>1</td>
</tr>
</tbody>
</table>
### 29.7. Relation

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>7.0</td>
</tr>
<tr>
<td>Purpose</td>
<td>Specify relationships among this learning object and other learning objects. These are strong relationships not the ordering of objects for a learning event which is handled by the Sequencing and Navigation datamodel.</td>
</tr>
<tr>
<td>Usage</td>
<td>Parent element of this group. Repeat for each instance of a second object relating to this object.</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>0-n</td>
</tr>
</tbody>
</table>

### 29.7.1. Kind

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>7.1</td>
</tr>
<tr>
<td>Purpose</td>
<td>Specify nature of the relationship between this learning object and another object.</td>
</tr>
<tr>
<td>Usage</td>
<td>Choose from approved vocabulary. Required if parent element used.</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>

Approved vocabulary:

- ispartof
- haspart
- isversionof
- hasversion
- isformatof
- hasformat
- references
- isreferencedby
- isbasedon
- isbasisof
- requires
- isrequiredby
### 29.7.2. Resource

<table>
<thead>
<tr>
<th>Code</th>
<th>7.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose</td>
<td>Defines the second object.</td>
</tr>
<tr>
<td>Usage</td>
<td>Parent element of this subgroup. Required if parent element used</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>

#### 29.7.2.1. Identifier

<table>
<thead>
<tr>
<th>Code</th>
<th>7.2.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose</td>
<td>Defines unique ID for the second object.</td>
</tr>
<tr>
<td>Usage</td>
<td>Parent element of this subgroup. Required if parent element used</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>

### Catalog

<table>
<thead>
<tr>
<th>Code</th>
<th>7.2.1.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose</td>
<td>Defines the classification system for the ID of the second object.</td>
</tr>
<tr>
<td>Usage</td>
<td>Choose from approved vocabulary.</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>

The catalog system will be specified at a future date for ILE. At this time, one of the following schemes should be used although the DOI is preferred since it is aligned with the Handle system that is part of CORDRA, the registry architecture for learning objects that is being developed and may be used in the DoD in conjunction with SCORM. The chosen scheme is entered as the value of this element.

- Universal Resource Identifier (URI)
- Universal Resource Name (URN)
- Digital Object Identifier (DOI)
### Entry

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>7.2.1.2</td>
</tr>
<tr>
<td>Purpose</td>
<td>Defines the value of the ID of the second object.</td>
</tr>
<tr>
<td>Usage</td>
<td>Enter value associated with catalog system</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>

### 29.7.2.2. Description

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>7.2.2</td>
</tr>
<tr>
<td>Purpose</td>
<td>Describes the second object related to this learning object.</td>
</tr>
<tr>
<td>Usage</td>
<td>Enter succinct description</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>
29.8. Annotation

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>8.0</td>
</tr>
<tr>
<td>Purpose</td>
<td>Provides comments on the educational use of the object to enable better understanding among developers of how to best use the object.</td>
</tr>
<tr>
<td>Usage</td>
<td>Parent element of this group.</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1-n</td>
</tr>
</tbody>
</table>

This element is required in order to capture the knowledge and intentions of developers to share with other potential users of the object. Additional comments can be captured as the object is used by others than the original creator.

29.8.1. Entity

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>8.1</td>
</tr>
<tr>
<td>Purpose</td>
<td>States the name of the person(s) creating the annotation</td>
</tr>
<tr>
<td>Usage</td>
<td>Multiple entries are allowed per annotation. System format will use vCard</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1-n</td>
</tr>
</tbody>
</table>

29.8.2. Date

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>8.2</td>
</tr>
<tr>
<td>Purpose</td>
<td>States the date the annotation was created</td>
</tr>
<tr>
<td>Usage</td>
<td>Parent element of this subgroup</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>

29.8.2.1. Datetime

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>8.2.1</td>
</tr>
<tr>
<td>Purpose</td>
<td>Enter value of the date</td>
</tr>
<tr>
<td>Usage</td>
<td>Enter as date and time in format yyyy-mm-dd, hh:mm:ss</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>
### 29.8.2.2. Description

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>8.2.2</td>
</tr>
<tr>
<td>Purpose</td>
<td>Enter text description of the date</td>
</tr>
<tr>
<td>Usage</td>
<td>Required if parent element is used. Describe issues associated with date</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>

### 29.8.3. Description

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>8.3</td>
</tr>
<tr>
<td>Purpose</td>
<td>Enter text description of the annotation</td>
</tr>
<tr>
<td>Usage</td>
<td>Required if parent element is used. Enter a succinct but meaningful statement of what the educational value and intent of this learning object is and any guidelines to its use for other developers.</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>
29.9. Classification

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>9.0</td>
</tr>
<tr>
<td>Purpose</td>
<td>Describe object using external classification systems</td>
</tr>
<tr>
<td>Usage</td>
<td>Parent element of this group. One instance of this element group is required for subject matter classification</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1-n</td>
</tr>
</tbody>
</table>

This element allows the object to be classified according to multiple taxonomies. One is required for all objects to describe the subject matter of the learning object. Additional instances of this group can be used to add classifications for other reasons such as using functional community taxonomies, DoN policies and standards, or SkillObject taxonomy.

The required instance of Classification group is:

- Purpose = discipline: for subject matter assignments
- Taxonomy = SSIC
- Taxonomy = DTIC

29.9.1. Purpose

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>9.1</td>
</tr>
<tr>
<td>Purpose</td>
<td>Describe the reason for classifying the object with an external classification system</td>
</tr>
<tr>
<td>Usage</td>
<td>Select from the approved vocabulary list. For the required group on subject matter choose “discipline”.</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>

The approved vocabulary is:

- discipline
- idea
- prerequisite
- educational objective
- accessibility restrictions
- educational level
- skill level
- competency
29.9.2. Taxonpath

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>9.2</td>
</tr>
<tr>
<td>Purpose</td>
<td>Defines the taxonomy nodes used from the external classification systems</td>
</tr>
<tr>
<td>Usage</td>
<td>Parent element of this subgroup.</td>
</tr>
</tbody>
</table>
| Multiplicity | 2 for required instance of parent group.  
1-n for other optional instances of Classification group |

This element should be repeated for each distinct classification system used within this single Classification element group. For example, one Classification element group is used to specify categories according to DTIC and SSIC for subject matter. In this case, two TaxonPath elements are needed: one for DTIC and one for SSIC.

Two instances of this are required for the two taxonomies DTIC and SSIC for the first instance of the parent Classification group, which has a purpose of “discipline”.

29.9.2.1. Source

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>9.2.1</td>
</tr>
<tr>
<td>Purpose</td>
<td>Defines the name of the taxonomy used</td>
</tr>
<tr>
<td>Usage</td>
<td>Enter authoritative name of the taxonomy fully spelled out or use an approved acronym.</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>

Names should be fully spelled out unless the source is one of the following approved acronyms:

- SSIC: Standard Subject Identification Codes
- DTIC: Defense Technical Information Center
- LOCC: Library of Congress Classification
- FAM: Functional Area Manager (Navy list)
29.9.2.2. **Taxon**

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>9.2.2</td>
</tr>
<tr>
<td>Purpose</td>
<td>Defines the value of the taxonomy node(s) used. Multiple nodes can be assigned from one taxonomy.</td>
</tr>
<tr>
<td>Usage</td>
<td>Parent element of this subgroup.</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1-n</td>
</tr>
</tbody>
</table>

**ID**

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>9.2.2.1</td>
</tr>
<tr>
<td>Purpose</td>
<td>ID value used in the external taxonomy</td>
</tr>
<tr>
<td>Usage</td>
<td>Enter authoritative values from the external taxonomy.</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>

**Entry**

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>9.2.2.2</td>
</tr>
<tr>
<td>Purpose</td>
<td>Text value of the ID value used in the external taxonomy</td>
</tr>
<tr>
<td>Usage</td>
<td>Enter authoritative values from the external taxonomy.</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>

- For SSIC, see [SECNAVINST 5210.11](http://www.dtic.mil/dtic/subcatguide/)

29.9.3. **Description**

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>9.3</td>
</tr>
<tr>
<td>Purpose</td>
<td>Comments on why external classification systems used or associated issues</td>
</tr>
<tr>
<td>Usage</td>
<td>Enter succinct statements.</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>

58
### Keyword

<table>
<thead>
<tr>
<th>Code</th>
<th>TLO/ELO</th>
<th>Purpose</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.4</td>
<td></td>
<td>Keywords to describe the external classification system or why it is used</td>
<td></td>
</tr>
<tr>
<td>Usage</td>
<td>0-n</td>
<td>Enter keywords preferably from a commonly used taxonomy for the command or Navy</td>
<td>0-n</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>0-n</td>
<td></td>
<td>0-n</td>
</tr>
</tbody>
</table>
29.10. Security Classification

The SCORM CAM has been extended to include a Security Classification category based on the concerns of the security community that the inclusion of a Security element under the Classification category is insufficient to control classified SCORM Content Model components.

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>10.0</td>
</tr>
<tr>
<td>Purpose</td>
<td>Provide security classification for learning objects</td>
</tr>
<tr>
<td>Usage</td>
<td>Parent element for this group</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>

One instance of this group is required even if content is unclassified.

29.10.1. US Classification

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>10.1</td>
</tr>
<tr>
<td>Purpose</td>
<td>To identify the security classification level according to DoD and DoN guidance</td>
</tr>
<tr>
<td>Usage</td>
<td>Parent element for this subgroup</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>

One instance of this sub-group is required to annotate the US security classification as defined in authoritative guidance documents DoD 5200-1

29.10.1.1. Marking

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>10.1.1</td>
</tr>
<tr>
<td>Purpose</td>
<td>To specify the level of classification</td>
</tr>
<tr>
<td>Usage</td>
<td>States the classification level per DoD 5200-1 specifications</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>

Allowed values are:

- Top Secret (TS)
- Secret (S)
- Confidential (C)
- Unclassified (U)
29.10.1.2. Derived From

<table>
<thead>
<tr>
<th>Code</th>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose</td>
<td>Provides the linkage to the source document(s) or classification guide(s) that the marking is derived form</td>
<td></td>
</tr>
<tr>
<td>Usage</td>
<td>Parent of this subgroup</td>
<td></td>
</tr>
<tr>
<td>Multiplicity</td>
<td>Conditional</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0: do not use if parent element</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DESIGNATION has a value of Unclassified</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1-n: use at least one instance for all other values of parent element</td>
<td></td>
</tr>
</tbody>
</table>

Document Title

<table>
<thead>
<tr>
<th>Code</th>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose</td>
<td>Provide the title of the source document(s) or classification guide(s) that the marking is derived form</td>
<td></td>
</tr>
<tr>
<td>Usage</td>
<td>State the title of the document</td>
<td></td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

"Multiple Sources" is allowed as long as a separate file listing the sources is kept with the original record copy

Document ID

<table>
<thead>
<tr>
<th>Code</th>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose</td>
<td>Provide the document control number of the source document(s) or classification guide(s) that the marking is derived form</td>
<td></td>
</tr>
<tr>
<td>Usage</td>
<td>State the document control number</td>
<td></td>
</tr>
<tr>
<td>Multiplicity</td>
<td>0-1</td>
<td></td>
</tr>
</tbody>
</table>
## Date

<table>
<thead>
<tr>
<th>Code</th>
<th>Purpose</th>
<th>Usage</th>
<th>Multiplicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.1.2.3</td>
<td>Provide the publication date of the source document(s) or classification guide(s) that the marking is derived form</td>
<td>Enter as date in format yyyy-mm-dd</td>
<td>1 1</td>
</tr>
</tbody>
</table>

## Agency

<table>
<thead>
<tr>
<th>Code</th>
<th>Purpose</th>
<th>Usage</th>
<th>Multiplicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.1.2.4</td>
<td>Provide the name of the responsible agency publishing the source document(s) or classification guide(s) that the marking is derived form</td>
<td>State the responsible agency name</td>
<td>1 1</td>
</tr>
</tbody>
</table>

### 29.10.1.3. Declassify On

<table>
<thead>
<tr>
<th>Code</th>
<th>Purpose</th>
<th>Usage</th>
<th>Multiplicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.1.3</td>
<td>Provides a date when the material will be declassified</td>
<td>State the declassification date (yyyymmdd) as assigned by the responsible Original Classifying Authority (OCA)</td>
<td>0-1 0-1</td>
</tr>
</tbody>
</table>

### 29.10.1.4. Downgrade To

<table>
<thead>
<tr>
<th>Code</th>
<th>Purpose</th>
<th>Usage</th>
<th>Multiplicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.1.4</td>
<td>Specify a lower classification level for classified material when directed to include by contract or regulation</td>
<td>Parent element of this subgroup</td>
<td>0-1 0-1</td>
</tr>
</tbody>
</table>
**New Marking**

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>10.1.4.1</td>
</tr>
<tr>
<td>Purpose</td>
<td>To identify the new lower classification of classified material</td>
</tr>
<tr>
<td>Usage</td>
<td>Lower classification indicator using restricted vocabulary</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>

Allowed values are:

- Secret (S)
- Confidential (C)
- Unclassified (U)

**Effective Date**

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>10.1.4.2</td>
</tr>
<tr>
<td>Purpose</td>
<td>To indicate when classified material will be downgraded</td>
</tr>
<tr>
<td>Usage</td>
<td>Downgrade date as yyyy-mm-dd</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>

**29.10.1.5. Classified By**

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>10.1.5</td>
</tr>
<tr>
<td>Purpose</td>
<td>Identifies the responsible OCA by position/office</td>
</tr>
<tr>
<td>Usage</td>
<td>Parent element of this subgroup. Use if required by contract or regulation.</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>0-1</td>
</tr>
</tbody>
</table>

**Name**

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>10.1.5.1</td>
</tr>
<tr>
<td>Purpose</td>
<td>Name of responsible OCA</td>
</tr>
<tr>
<td>Usage</td>
<td>State the name of the person</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>
### Agency

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>10.1.5.2</td>
</tr>
<tr>
<td>Purpose</td>
<td>Identifies the title/office of the responsible OCA</td>
</tr>
<tr>
<td>Usage</td>
<td>State the title/office of the responsible OCA</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>

### Date

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>10.1.5.3</td>
</tr>
<tr>
<td>Purpose</td>
<td>Identifies the date of original classification</td>
</tr>
<tr>
<td>Usage</td>
<td>State the date as yyyy-mm-dd</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>

### Reason

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>10.1.5.4</td>
</tr>
<tr>
<td>Purpose</td>
<td>Identifies the reason for classification in accordance with E.O. 12958</td>
</tr>
<tr>
<td>Usage</td>
<td>State the reason for classification</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>

See the restricted vocabulary in E.O. 12958

#### 29.10.2. **Non-US Classification**

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>10.2</td>
</tr>
<tr>
<td>Purpose</td>
<td>Provides security classification information about material from Non-US sources</td>
</tr>
<tr>
<td>Usage</td>
<td>Parent element for this group</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>0-1</td>
</tr>
</tbody>
</table>

| Multiplicity | 0-1 |
### 29.10.2.1. Marking

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>10.2.1</td>
</tr>
<tr>
<td>Purpose</td>
<td>Identifies the security classification level of the non-US material</td>
</tr>
<tr>
<td>Usage</td>
<td>States the classification level per specific country guidance</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>

### 29.10.2.2. Source

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>10.2.2</td>
</tr>
<tr>
<td>Purpose</td>
<td>Identifies the source of the non-US classified material</td>
</tr>
<tr>
<td>Usage</td>
<td>Parent element for this subgroup</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>

**Document Title**

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>10.2.2.1</td>
</tr>
<tr>
<td>Purpose</td>
<td>Provides the title of the source document</td>
</tr>
<tr>
<td>Usage</td>
<td>State the title of the document</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>

"Multiple Sources" is allowed as long as a separate file listing the sources is kept with the original record copy

**Document ID**

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<tr>
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</thead>
<tbody>
<tr>
<td>Code</td>
<td>10.2.2.2</td>
</tr>
<tr>
<td>Purpose</td>
<td>Provides the document ID for the source document or classification guide</td>
</tr>
<tr>
<td>Usage</td>
<td>State the document control number</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>0-1</td>
</tr>
</tbody>
</table>
**Date**

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>10.2.2.3</td>
</tr>
<tr>
<td>Purpose</td>
<td>Provides the publication date of the source document or classification guide</td>
</tr>
<tr>
<td>Usage</td>
<td>Enter the date in yyyymmdd format</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1 1</td>
</tr>
</tbody>
</table>

**Agency**

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>10.2.2.4</td>
</tr>
<tr>
<td>Purpose</td>
<td>Provides the name of the responsible agency that published the source document or classification guide</td>
</tr>
<tr>
<td>Usage</td>
<td>States the responsible agency name</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1 1</td>
</tr>
</tbody>
</table>

**29.10.2.3. Country Trigraph**

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>10.2.3</td>
</tr>
<tr>
<td>Purpose</td>
<td>Provides the trigraph identifying the country which provide the source document</td>
</tr>
<tr>
<td>Usage</td>
<td>State the trigraph from the approved ANSI/ISO 3166 country listing</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1 1</td>
</tr>
</tbody>
</table>

See the restricted vocabulary in ANSI/ISO 3166

**29.10.3. Joint Classification**

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>10.3</td>
</tr>
<tr>
<td>Purpose</td>
<td>Provides security classification information about material from joint (US and non-US) sources</td>
</tr>
<tr>
<td>Usage</td>
<td>Parent element for this subgroup</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>0-1 0-1</td>
</tr>
</tbody>
</table>
### 29.10.3.1. Marking

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>10.3.1</td>
</tr>
<tr>
<td>Purpose</td>
<td>Identifies the security classification level of the joint material</td>
</tr>
<tr>
<td>Usage</td>
<td>States the classification level per specific country guidance</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>

### 29.10.3.2. Source

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>10.3.2</td>
</tr>
<tr>
<td>Purpose</td>
<td>Identifies the source of the joint classified material</td>
</tr>
<tr>
<td>Usage</td>
<td>The parent element of this subgroup</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>

**Document Title**

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>10.3.2.1</td>
</tr>
<tr>
<td>Purpose</td>
<td>Provides the title of the source document</td>
</tr>
<tr>
<td>Usage</td>
<td>State the title of the document</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>

Allowed values:
- Country
- Organization

**Document ID**

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>10.3.2.2</td>
</tr>
<tr>
<td>Purpose</td>
<td>Provides the document ID for the source document or classification guide</td>
</tr>
<tr>
<td>Usage</td>
<td>State the document control number</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>0-1</td>
</tr>
</tbody>
</table>
### Date

<table>
<thead>
<tr>
<th>Code</th>
<th>10.3.2.3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose</td>
<td>Provides the publication date of the source document or classification guide</td>
</tr>
<tr>
<td>Usage</td>
<td>Enter the date in yyyymmdd format</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1 1</td>
</tr>
</tbody>
</table>

### Agency

<table>
<thead>
<tr>
<th>Code</th>
<th>10.3.2.4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose</td>
<td>Provides the name of the responsible agency that published the source document or classification guide</td>
</tr>
<tr>
<td>Usage</td>
<td>States the responsible agency name</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1 1</td>
</tr>
</tbody>
</table>

### 29.10.3.3. Country Trigraph

<table>
<thead>
<tr>
<th>Code</th>
<th>10.3.3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose</td>
<td>Provides the trigraph(s) identifying the country or countries which provide the source document</td>
</tr>
<tr>
<td>Usage</td>
<td>State the trigraph(s) from the approved ANSI/ISO 3166 country listing</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1 1</td>
</tr>
</tbody>
</table>

See the restricted vocabulary in ANSI/ISO 3166

### 29.10.4. SCI Control Systems

<table>
<thead>
<tr>
<th>Code</th>
<th>10.4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose</td>
<td>Provides SCI control system(s) information which governs the handling of specific SCI material</td>
</tr>
<tr>
<td>Usage</td>
<td>Parent element for this subgroup</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>0-1 0-1</td>
</tr>
</tbody>
</table>

### 29.10.4.1. Marking

<table>
<thead>
<tr>
<th>Code</th>
<th>10.4.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose</td>
<td>Provides the specific SCI level</td>
</tr>
<tr>
<td>Usage</td>
<td>States the governing SCI control information</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1-n 1-n</td>
</tr>
</tbody>
</table>
29.10.5. **Foreign Government Markings**

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>10.5</td>
</tr>
<tr>
<td>Purpose</td>
<td>Provides security classification information about material from foreign government sources when the country of origin should not be specified</td>
</tr>
<tr>
<td>Usage</td>
<td>The parent element of this group</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>0-1 0-1</td>
</tr>
</tbody>
</table>

29.10.5.1. **Marking**

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>10.5.1</td>
</tr>
<tr>
<td>Purpose</td>
<td>Provides the equivalent US classification level for the foreign government information source</td>
</tr>
<tr>
<td>Usage</td>
<td>States the classification level per DoD 5200.1</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1 1</td>
</tr>
</tbody>
</table>

29.10.6. **Dissemination Controls**

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>10.6</td>
</tr>
<tr>
<td>Purpose</td>
<td>Provides the control markings that identify the expansion or limitations on the distribution of a resource</td>
</tr>
<tr>
<td>Usage</td>
<td>Parent element for this subgroup</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>0-1 0-1</td>
</tr>
</tbody>
</table>

29.10.6.1. **Marking**

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>10.6.1</td>
</tr>
<tr>
<td>Purpose</td>
<td>Provide the marking(s) that define distribution parameters</td>
</tr>
<tr>
<td>Usage</td>
<td>State the distribution parameters</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1-n 1-n</td>
</tr>
</tbody>
</table>
## Non-Intelligence Community Marking

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>10.7</td>
</tr>
<tr>
<td>Purpose</td>
<td>Provides the marking(s) that define the handling and distribution of non-intelligence community information</td>
</tr>
<tr>
<td>Usage</td>
<td>Parent element for this group</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>0-1 0-1</td>
</tr>
</tbody>
</table>

### 29.10.6.2. Marking

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>10.7.1</td>
</tr>
<tr>
<td>Purpose</td>
<td>Provides the specific non-intelligence community marking</td>
</tr>
<tr>
<td>Usage</td>
<td>State the non-intelligence community marking</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1-n 1-n</td>
</tr>
</tbody>
</table>

### 29.10.6.3. Position Listing

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>10.7.2</td>
</tr>
<tr>
<td>Purpose</td>
<td>Provides the exclusive, complete listing of specific recipients for this information</td>
</tr>
<tr>
<td>Usage</td>
<td>States the title/office of each recipient</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>0-n 0-n</td>
</tr>
</tbody>
</table>

### 29.10.7. Document Declassification

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>10.8</td>
</tr>
<tr>
<td>Purpose</td>
<td>Provides the declassification identifier/date for this information</td>
</tr>
<tr>
<td>Usage</td>
<td>Parent element for this subgroup</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1 1</td>
</tr>
</tbody>
</table>

### 29.10.7.1. Marking

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>10.8.1</td>
</tr>
<tr>
<td>Purpose</td>
<td>Provides the specific date of declassification and/or a declassification exemption identifier</td>
</tr>
<tr>
<td>Usage</td>
<td>Parent element for this subgroup</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1-n 1-n</td>
</tr>
</tbody>
</table>
Exemption Code

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>10.8.1.1</td>
</tr>
<tr>
<td>Purpose</td>
<td>Provides the specific exemption code for declassifying this information</td>
</tr>
<tr>
<td>Usage</td>
<td>State the applicable declassification code as supplied by the responsible OCA</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>0-n</td>
</tr>
</tbody>
</table>

Date

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>10.8.1.2</td>
</tr>
<tr>
<td>Purpose</td>
<td>Provides a date when the material will be declassified</td>
</tr>
<tr>
<td>Usage</td>
<td>State the date in yyyymmdd format</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>0-1</td>
</tr>
</tbody>
</table>

29.10.8. Extended Classification

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>10.9</td>
</tr>
<tr>
<td>Purpose</td>
<td>Provides the ability to address additional classification requirements</td>
</tr>
<tr>
<td>Usage</td>
<td>Parent element for this group</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>0-n</td>
</tr>
</tbody>
</table>

This subgroup allows other external classification systems to be used, such as the S1000 specification for international technical data.

29.10.8.1. Designation

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>10.9.1</td>
</tr>
<tr>
<td>Purpose</td>
<td>To specify the level of classification</td>
</tr>
<tr>
<td>Usage</td>
<td>States the classification level per the external system</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>
29.10.8.2. Classification System

<table>
<thead>
<tr>
<th>TLO/ELO Code</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.9.2</td>
<td></td>
</tr>
</tbody>
</table>

**Purpose**: Provides the linkage to the source classification system

**Usage**: State the name/code for the external classification system

<table>
<thead>
<tr>
<th>Multiplicity</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1-n</td>
<td>1-n</td>
</tr>
</tbody>
</table>

29.10.8.3. Source

<table>
<thead>
<tr>
<th>TLO/ELO Code</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.9.3</td>
<td></td>
</tr>
</tbody>
</table>

**Purpose**: Provides the linkage to the source document(s) or classification guide(s) that the marking is derived form

**Usage**: Parent of this subgroup

<table>
<thead>
<tr>
<th>Multiplicity</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1-n</td>
<td>1-n</td>
</tr>
</tbody>
</table>

**Document Title**

<table>
<thead>
<tr>
<th>TLO/ELO Code</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.9.3.1</td>
<td></td>
</tr>
</tbody>
</table>

**Purpose**: Provide the title of the source document(s) or classification guide(s) that the marking is derived form

**Usage**: State the title of the document

<table>
<thead>
<tr>
<th>Multiplicity</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
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</tbody>
</table>

**Document ID**

<table>
<thead>
<tr>
<th>TLO/ELO Code</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.9.3.2</td>
<td></td>
</tr>
</tbody>
</table>

**Purpose**: Provide the control number of the source document(s) or classification guide(s) that the marking is derived form

**Usage**: State the document control number

<table>
<thead>
<tr>
<th>Multiplicity</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1</td>
<td>0-1</td>
</tr>
</tbody>
</table>
### Date

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>10.9.3.3</td>
</tr>
<tr>
<td>Purpose</td>
<td>Provide the publication date of the source document(s) or classification guide(s) that the marking is derived form</td>
</tr>
<tr>
<td>Usage</td>
<td>Enter as date in format yyyy-mm-dd</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>

### Agency

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>10.9.3.4</td>
</tr>
<tr>
<td>Purpose</td>
<td>Provide the name of the responsible agency publishing the source document(s) or classification guide(s) that the marking is derived form</td>
</tr>
<tr>
<td>Usage</td>
<td>State the responsible agency name</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>

### 29.10.8.4. Classified By

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>10.9.4</td>
</tr>
<tr>
<td>Purpose</td>
<td>Identifies the responsible OCA by position/office</td>
</tr>
<tr>
<td>Usage</td>
<td>Parent element of this subgroup</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>0-1</td>
</tr>
</tbody>
</table>

### Name

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>10.9.4.1</td>
</tr>
<tr>
<td>Purpose</td>
<td>Name of responsible OCA</td>
</tr>
<tr>
<td>Usage</td>
<td>State the name of the responsible OCA</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>

### Agency

<table>
<thead>
<tr>
<th>TLO/ELO</th>
<th>Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>10.9.4.2</td>
</tr>
<tr>
<td>Purpose</td>
<td>The agency to which the classifier belongs</td>
</tr>
<tr>
<td>Usage</td>
<td>State the name of the organization</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>
### Date

<table>
<thead>
<tr>
<th>Code</th>
<th>10.9.4.3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose</td>
<td>Identifies the date the material was classified</td>
</tr>
<tr>
<td>Usage</td>
<td>State the date as yyyy-mm-dd</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1 1</td>
</tr>
</tbody>
</table>

### Reason

<table>
<thead>
<tr>
<th>Code</th>
<th>10.9.4.4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose</td>
<td>Identifies the reason for classification in accordance with E.O. 12958</td>
</tr>
<tr>
<td>Usage</td>
<td>State the reason for classification</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>1</td>
</tr>
</tbody>
</table>


30.0 EXAMPLE TLO METADATA TAGGING

This chapter presents an example of tagging a learning object with metadata according to the guidelines of this document. The object is a TLO from the Center for Surface Combat Systems (CSCS) concerned with networking IT systems on an Aegis ship. There is audio commentary and interactive graphics which are reviewed as part of the tagging process. Sample screens are shown below.

Figure 38 Title page of the ALIS learning object.
Figure 39  TLO screen showing learning objectives.

Figure 40  Screen from example TLO showing NIS cabinets.
Figure 41  Screen from example TLO showing patch panel assembly.

Each metadata element category and element value are assigned using this document’s guidance.
30.1. **General**

The *General* category describes administrative details about the learning object. Since this is a TLO, the following elements in this category are required:

- **Identifier**
  - Catalog
  - Entry
- **Title**
- **Language**
- **Description**
- **Keyword**
- **Structure**

The optional elements are:

- **Aggregation level**

**Table 31** Metadata values for General category for example TLO.

<table>
<thead>
<tr>
<th>ID</th>
<th>Element Name</th>
<th>Value</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>General</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1</td>
<td>Identifier</td>
<td></td>
<td>This identifier is the globally unique ID for the learning object. Other identifiers are used in the SCORM schema to specify IDs for other purposes and should not be confused with each other.</td>
</tr>
<tr>
<td>1.1.1</td>
<td>Catalog</td>
<td>URN</td>
<td>An authoritative registry system has not yet been chosen for ILE. There is discussion that it will be CORDRA that uses the Handle system (similar to DOI). In this example, we use a fictitious registry name Navy_ILE and use the URN system to denote its use.</td>
</tr>
<tr>
<td>ID</td>
<td>Element Name</td>
<td>Value</td>
<td>Explanation</td>
</tr>
<tr>
<td>------</td>
<td>--------------</td>
<td>----------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>1.1.2</td>
<td>Entry</td>
<td>Urn:Navy_ILCE:CSCS_TLO_0011-23456-101</td>
<td>The URN namespace for Navy_ILE is used along with an alphanumeric value that would be assigned to this TLO once it is approved in a workflow process and registered in the overall ILE repository. Here, a fictitious value is used that includes the learning center from which the content originates (CSCE), the type of object (TLO), and a numbering scheme. This value should <strong>not</strong> be used as an official naming convention and is only included as an example.</td>
</tr>
<tr>
<td>1.2</td>
<td>Title</td>
<td>General, Physical, Functional, and Interface description of ALIS: NIS and routers</td>
<td>The title for a TLO is determined by the developer. In this case, the title is also displayed on the first screen.</td>
</tr>
<tr>
<td>1.3</td>
<td>Language</td>
<td>en-US</td>
<td>The TLO is in US English and is annotated as such using the ISO nomenclature.</td>
</tr>
<tr>
<td>1.4</td>
<td>Description</td>
<td>This lesson describes the major components of the AEGIS LAN system and their functions focusing on the Network Interconnection System cabinets, router assemblies and patch panels, and interconnecting cables. It is an introduction to these systems that must be fully memorized by the learner.</td>
<td>This is a tag best applied by a Subject Matter Expert that describes what the object is about and provides additional information on the intention of the developer to provide critical information that the learner must know and remember as they do their job. Hence, it is expected that the learner will memorize the key facts and knowledge in this object.</td>
</tr>
<tr>
<td>1.5</td>
<td>Keyword</td>
<td>ALIS</td>
<td>Keywords describing the topic and source of the TLO so that it may be easily found by others searching for a TLO to reuse it or for TLOs related to the topic or learning center.</td>
</tr>
<tr>
<td>1.5</td>
<td>Keyword</td>
<td>NIS</td>
<td></td>
</tr>
<tr>
<td>1.5</td>
<td>Keyword</td>
<td>router</td>
<td></td>
</tr>
<tr>
<td>1.5</td>
<td>Keyword</td>
<td>cabinets</td>
<td></td>
</tr>
<tr>
<td>1.5</td>
<td>Keyword</td>
<td>patch panel</td>
<td></td>
</tr>
<tr>
<td>1.7</td>
<td>Structure</td>
<td>Linear</td>
<td>This TLO is composed of several Macromedia flash files, html files, and JavaScript files. They are organized into a specific order and connected with specific integration points and programming branching actions. Therefore, this TLO has a structure closest to the “linear” value. Note that a perfect match is neither always possible nor necessary to make this assignment.</td>
</tr>
<tr>
<td>ID</td>
<td>Element Name</td>
<td>Value</td>
<td>Explanation</td>
</tr>
<tr>
<td>-----</td>
<td>-------------------</td>
<td>-------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>1.8</td>
<td>Aggregation Level</td>
<td>3</td>
<td>Although optional, we will supply this value for the example. This is a level three (TLO) collection of level 2 (ELO) objects, which are in turn collections of level 1 (asset) fragments.</td>
</tr>
</tbody>
</table>
30.2. Lifecycle

This category describes features related to its history and current state in terms of workflow processes. All of the child elements are mandatory for a TLO.

<table>
<thead>
<tr>
<th>ID</th>
<th>Name</th>
<th>Value</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0</td>
<td>Life Cycle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1</td>
<td>Version</td>
<td>1.0</td>
<td>This is the first approved production version of the TLO so it is assigned version number 1.0.</td>
</tr>
<tr>
<td>2.2</td>
<td>Status</td>
<td>Final</td>
<td>This object has been approved and published</td>
</tr>
<tr>
<td>2.3</td>
<td>Contribute</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.3.1</td>
<td>Role</td>
<td>author</td>
<td>This states the role of the person or group that submits the object to the repository. ILE only allows one Contribute element to be used so we are concerned with the authorship of the object. Other workflow processes will be captured in a future content management system.</td>
</tr>
<tr>
<td>2.3.2</td>
<td>Entity</td>
<td>Lockheed Martin</td>
<td>This TLO was developed by a contractor for CSCS. The ILE system will use vcard format but the metadata management user interface does not need to be concerned with physical data formats.</td>
</tr>
<tr>
<td>2.3.3</td>
<td>Date</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.3.3.1</td>
<td>dateTime</td>
<td>2004-08-21, 11:00:00</td>
<td>This is the date that Lockheed Martin submitted the object to the repository (21Aug2004)</td>
</tr>
<tr>
<td>2.3.3.2</td>
<td>description</td>
<td>This is the date that the object was provided to the government for approval and accepted into the ILE repository</td>
<td>This description is related to the date. It says what actually happened on that date.</td>
</tr>
</tbody>
</table>
30.3. Meta-metadata

The *Meta-metadata* describes the metadata record itself as opposed to the learning object. The following elements are mandatory for a TLO:

- Identifier
  - Catalog
  - Entry
- Metadata Schema

The following elements are optional:

- Contribute
- Language

If Contribute is used, then its child elements are mandatory:

- Role
- Entity
- Date
  - dateTime
  - description

Note the use of repeated instances of some of the elements in this category showing how multiplicity is used.

**Table 33  Metadata values for Meta-metadata category for example TLO.**

<table>
<thead>
<tr>
<th>ID</th>
<th>Name</th>
<th>Value</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.0</td>
<td>Meta-Metadata</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.1</td>
<td>Identifier</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.1.1</td>
<td>Catalog</td>
<td>URN</td>
<td>An authoritative registry system has not yet been chosen for ILE. There is</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>discussion that it will be CORDRA that uses the Handle system (similar to</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>DOI). In this example, we use a fictitious registry name Navy_ILE and use the</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>URN system to denote its use.</td>
</tr>
<tr>
<td>ID</td>
<td>Name</td>
<td>Value</td>
<td>Explanation</td>
</tr>
<tr>
<td>-----</td>
<td>--------</td>
<td>----------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>3.1.2</td>
<td>Entry</td>
<td>Urn:Navy_ILE:CSCS_MD R_0011-23456-101</td>
<td>The fictitious URN namespace for Navy_ILE is used along with an alphanumeric value that would be assigned to this metadata record (not the TLO which was identified in the General category). Here, a fictitious value is used that includes the learning center from which the content originates (CSCS), the fact that it is a metadata record (MDR), and a numbering scheme that is the same as for the ID of the TLO itself in the General category. This value should <strong>not</strong> be used as an official naming convention and is only included as an example.</td>
</tr>
<tr>
<td>3.2</td>
<td>Contribute</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.2.1</td>
<td>Role</td>
<td>Creator</td>
<td>This states the role of the person or group that submits the metadata record to the repository. ILE only allows one Contribute element and only the value of Creator for metadata records.</td>
</tr>
<tr>
<td>3.2.2</td>
<td>Entity</td>
<td>Geoffrey Malafsky</td>
<td>This is the name(s) of the people and groups who created the metadata record (not the TLO). In this example, two people and one organization are listed so there are three instances of this element used.</td>
</tr>
<tr>
<td>3.2.2</td>
<td>Entity</td>
<td>Christian Marquise</td>
<td>This is the name(s) of the people and groups who created the metadata record (not the TLO). In this example, two people and one organization are listed so there are three instances of this element used.</td>
</tr>
<tr>
<td>3.2.2</td>
<td>Entity</td>
<td>TECHi2</td>
<td>This is the name(s) of the people and groups who created the metadata record (not the TLO). In this example, two people and one organization are listed so there are three instances of this element used.</td>
</tr>
<tr>
<td>3.2.3</td>
<td>Date</td>
<td></td>
<td>The date the metadata record was submitted</td>
</tr>
<tr>
<td>3.2.3.1</td>
<td>dateTime</td>
<td>2005-05-16, 08:15:00</td>
<td>Date format</td>
</tr>
<tr>
<td>3.2.3.2</td>
<td>description</td>
<td>Mid-may 2005 to coordinate with new specification of ILE information architecture</td>
<td>Text description of date</td>
</tr>
<tr>
<td>3.3</td>
<td>Metadata Schema</td>
<td>LOMv1.0</td>
<td>These two values are the mandatory values in SCORM</td>
</tr>
<tr>
<td>3.3</td>
<td>Metadata Schema</td>
<td>SRORM_CAM_v1.3</td>
<td>These two values are the mandatory values in SCORM</td>
</tr>
<tr>
<td>3.4</td>
<td>Language</td>
<td></td>
<td>Optional and not used in this example</td>
</tr>
</tbody>
</table>
30.4.  **Technical**

The *Technical* category describes technical requirements and characteristics of the learning object.

The following elements are mandatory for a TLO:

- Format
- Duration

The following elements are optional:

- Size
- Requirement
- OrComposite
- InstallationRemarks
- Other Platform Requirements

If OrComposite is used, then two of its child elements are mandatory:

- Type
- Name

And two of its child elements are optional:

- MinimumVersion
- MaximumVersion

The Location element is excluded and should not be used.
Table 34  Metadata values for Technical category for example TLO.

<table>
<thead>
<tr>
<th>ID</th>
<th>Name</th>
<th>Value</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.0</td>
<td>Technical</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.1</td>
<td>Format</td>
<td>Flash</td>
<td>The TLO is composed of multiple file types which are specified with multiple</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>instances of the element.</td>
</tr>
<tr>
<td>4.1</td>
<td>Format</td>
<td>Html</td>
<td>The TLO is composed of multiple file types which are specified with multiple</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>instances of the element.</td>
</tr>
<tr>
<td>4.1</td>
<td>Format</td>
<td>Javascript</td>
<td>The TLO is composed of multiple file</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>types which are specified with multiple instances of the element.</td>
</tr>
<tr>
<td>4.1</td>
<td>Format</td>
<td>VBScript</td>
<td>The TLO is composed of multiple file types which are specified with multiple</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>instances of the element.</td>
</tr>
<tr>
<td>4.2</td>
<td>Size</td>
<td></td>
<td>The size is optional and since it is automatically recorded by the storage</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>server it is not used</td>
</tr>
<tr>
<td>4.4</td>
<td>Requirement</td>
<td></td>
<td>This element subgroup is intended to define tool requirements for using the</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>object. Since ILE is planned to be a fully integrated services based</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>architecture, the required tools will be defined at runtime using the SOA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>methods. Thus, this definition is not necessary and the element is not used.</td>
</tr>
<tr>
<td>4.4.1</td>
<td>OrComposite</td>
<td></td>
<td>Not used</td>
</tr>
<tr>
<td>4.4.1.1</td>
<td>Type</td>
<td></td>
<td>Not used</td>
</tr>
<tr>
<td>4.4.1.2</td>
<td>Name</td>
<td></td>
<td>Not used</td>
</tr>
<tr>
<td>4.4.1.3</td>
<td>Minimum Version</td>
<td></td>
<td>Not used</td>
</tr>
<tr>
<td>4.4.1.4</td>
<td>Maximum Version</td>
<td></td>
<td>Not used</td>
</tr>
<tr>
<td>4.5</td>
<td>Installation Remarks</td>
<td></td>
<td>This is concerned with special needs to install the object. ILE is integrated services architecture and does not need this definition. This element is not used.</td>
</tr>
<tr>
<td>4.6</td>
<td>Other Platform Requirements</td>
<td></td>
<td>This is concerned with special software and hardware needs to use the object. ILE is integrated services architecture and does not need this definition. This element is not used.</td>
</tr>
<tr>
<td>4.7</td>
<td>Duration</td>
<td>00:15:00</td>
<td>This is required and should state the estimated time for object to run as hh:mm:ss</td>
</tr>
</tbody>
</table>


30.5. Educational

The *Educational* category describes the educational and pedagogic characteristics of the object.

The following elements are mandatory:

- Learning Resource Type
- Typical Age Range
- Difficulty
- Typical Learning Time
  - duration
  - description
- Description
- Language

The following elements are optional:

- Interactivity Level
- Semantic Density
- Intended End-User Role
- Context
**Table 35  Metadata values for Educational category for example TLO.**

<table>
<thead>
<tr>
<th>ID</th>
<th>Name</th>
<th>Value</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.0</td>
<td>Educational</td>
<td></td>
<td>This element is optional but in the case of this TLO it describes the nature of how the learner interacts</td>
</tr>
<tr>
<td>5.1</td>
<td>Interactivity Type</td>
<td>expositive</td>
<td>The TLO is mostly one type of resource. The flash modules convey all the learning material while the JavaScript adds choices for navigation and controls interaction with user choices. Thus, this TLO is predominately narrative text</td>
</tr>
<tr>
<td>5.2</td>
<td>Learning Resource Type</td>
<td>Narrative text</td>
<td>This TLO has very little user interactions so is labeled as very low</td>
</tr>
<tr>
<td>5.3</td>
<td>Interactivity Level</td>
<td>Very low</td>
<td>This TLO has very little user interactions so is labeled as very low</td>
</tr>
<tr>
<td>5.4</td>
<td>Semantic Density</td>
<td></td>
<td>Optional and not used in this example</td>
</tr>
<tr>
<td>5.5</td>
<td>Intended End User Role</td>
<td></td>
<td>Although clear that the intended user is a learner, there is little value of this element’s information to the ILE so it is not used in this example</td>
</tr>
<tr>
<td>5.6</td>
<td>Context</td>
<td></td>
<td>This element does not have much direct value to ILE at this time so is not used</td>
</tr>
<tr>
<td>5.7</td>
<td>Typical Age Range</td>
<td>Journeyman</td>
<td>This element uses the ILE specific vocabulary for the RAJM levels. This TLO is targeted to the journeyman level since it requires some existing basic knowledge of IT systems and electronic cabinets</td>
</tr>
<tr>
<td>5.8</td>
<td>Difficulty</td>
<td>medium</td>
<td>Since this is a TLO, this element is required. The TLO presents detailed information at a mid-level.</td>
</tr>
<tr>
<td>5.9</td>
<td>Typical Learning Time</td>
<td></td>
<td>This is the estimated time required for a learner to go through the object’s lesson. Entered as hh:mm:ss</td>
</tr>
<tr>
<td>5.9.1</td>
<td>Duration</td>
<td>00:45:00</td>
<td>Comments on the time required for a learner.</td>
</tr>
<tr>
<td>5.9.2</td>
<td>description</td>
<td></td>
<td>A learner should be able to complete this TLO in 30 minutes with a concentrated study and existing knowledge of the Aegis LAN. Additional time is estimated for an average learner based on feedback from students.</td>
</tr>
<tr>
<td>5.10</td>
<td>Description</td>
<td></td>
<td>This is a description of how the object should be used educationally. It is not the same as the previous element which was a description solely of the estimated time.</td>
</tr>
<tr>
<td>5.11</td>
<td>Language</td>
<td>en-US</td>
<td>The primary learner should speak US English</td>
</tr>
</tbody>
</table>
30.6. Rights

The Rights category describes the intellectual property rights and conditions of use for the object. All elements are required.

Table 36  Metadata values for Rights category for example TLO.

<table>
<thead>
<tr>
<th>ID</th>
<th>Name</th>
<th>Value</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.0</td>
<td>Rights</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.1</td>
<td>Cost</td>
<td>no</td>
<td>States whether a cost is necessary for using this TLO or repurposing it.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Since this is custom content the Navy owns, there is no cost required</td>
</tr>
<tr>
<td>6.2</td>
<td>Copyright and Other</td>
<td>no</td>
<td>States whether a cost is necessary for using this TLO or repurposing it.</td>
</tr>
<tr>
<td></td>
<td>Restrictions</td>
<td></td>
<td>Since this is custom content the Navy owns, there are no restrictions</td>
</tr>
<tr>
<td>6.3</td>
<td>Description</td>
<td></td>
<td>This is custom content developed for and owned by the Navy entirely.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>This has comments on copyright issues</td>
</tr>
</tbody>
</table>
30.7. Relation

The *Relation* category describes how this object is related to other objects in a strong manner. Strong relationships mean that the learning value of one object is so tightly linked to another that it is worthwhile stating the relationship in the metadata records of both objects. For example, this object may present one-half of the information on ALIS network cabinets so it is important for the learner to get both halves at one time. This can be represented in this element. This is not the same thing as a prerequisite which should be handled in the LMS records, or by the Classification element. It is an optional element group but if used all of its children elements are mandatory.

Table 37 Metadata values for Relation category for example TLO.

<table>
<thead>
<tr>
<th>ID</th>
<th>Name</th>
<th>Value</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.0</td>
<td>Relation</td>
<td>Optional but used in this example</td>
<td></td>
</tr>
<tr>
<td>7.1</td>
<td>Kind</td>
<td>ispartof</td>
<td>Determine how the objects are related. In this example, the current TLO is part of a set of TLO dealing with ALIS. This is documented in this element</td>
</tr>
<tr>
<td>7.2</td>
<td>Resource</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.2.1</td>
<td>Identifier</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.2.1.1</td>
<td>Catalog</td>
<td>URN</td>
<td>An authoritative registry system has not yet been chosen for ILE. There is discussion that it will be CORDRA that uses the Handle system (similar to DOI). In this example, we use a fictitious registry name Navy_ILE and use the URN system to denote its use.</td>
</tr>
<tr>
<td>7.2.1.2</td>
<td>Entry</td>
<td>Urn:Navy_ILE:CSCS_TLO GROUP_0011-23456-100</td>
<td>The fictitious URN namespace for Navy_ILE is used along with an alphanumeric value that would be assigned to group of TLOs. Here, a fictitious value is used that includes the learning center from which the content originates (CSCS), the fact that it is a TLO group, and a numbering scheme that is the same as for the ID of the TLO itself in the General category except that the suffix is coded to denote a set (-100) of TLOs. This value should <em>not</em> be used as an official naming convention and is only included as an example.</td>
</tr>
<tr>
<td>7.2.2</td>
<td>Description</td>
<td>The set of TLOs comprise 10 TLOS on ALIS which must be taken together although testing out can occur.</td>
<td>Comments on the other object not this TLO</td>
</tr>
</tbody>
</table>
30.8. Annotation

The Annotation category allows educators to share comments on the educational value and best use of the learning object. This should be used as a knowledge sharing mechanism to aid developers working across Navy functional communities. All elements are required. Note the use of multiple instances of the some of the elements.

Table 38 Metadata values for Annotation category for example TLO.

<table>
<thead>
<tr>
<th>ID</th>
<th>Name</th>
<th>Value</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.0</td>
<td>Annotation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.1</td>
<td>Entity</td>
<td>Jeffrey Escudero</td>
<td>This tag is the person or organization who is adding the annotation.</td>
</tr>
<tr>
<td>8.1</td>
<td>Entity</td>
<td>Christian Marquise</td>
<td>This tag is the person or organization who is adding the annotation.</td>
</tr>
<tr>
<td>8.1</td>
<td>Entity</td>
<td>TECHi2</td>
<td>This tag is the person or organization who is adding the annotation.</td>
</tr>
<tr>
<td>8.2</td>
<td>Date</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.2.1</td>
<td>dateTime</td>
<td>2005-05-16, 12:53:30</td>
<td>This tag indicates the date the annotation was added</td>
</tr>
<tr>
<td>8.2.2</td>
<td>description</td>
<td>Date of final listing of comments after review and approval</td>
<td>Add text description and comments about the date</td>
</tr>
<tr>
<td>8.3</td>
<td>Description</td>
<td>ALIS is introductory material necessary for an understanding of AEGIS systems and the relationship to other ship radar components. It is not just about IT systems and learners should be told that the IT is tightly connected to the Radar system objects.</td>
<td>In this example an SME is adding additional information on how the content might better be utilized in relation to other learning objects</td>
</tr>
</tbody>
</table>
30.9. Classification

The Classification category describes the object according to other taxonomies and classification systems. This is a required category for assigning subject matter categories. It can be repeated for optional use with other classification systems such as: aviation functional community taxonomy; technical data manual taxonomy; DoN functional area manager taxonomy; geographic regions of intended use; Intelligence Community taxonomy; Joint Forces taxonomies; professional technical society taxonomies like IEEE, ACM; and many others.

It is mandatory to use this element group as shown in the example below. Note that within this group, several taxonomies can be used. The group should be repeated once per Purpose value with multiple taxonomies specified in repeated instances of the child element Taxonpath.

The required instance of Classification group:

- Purpose = discipline : for subject matter assignments
- Taxonomy = SSIC
- Taxonomy= DTIC

<table>
<thead>
<tr>
<th>ID</th>
<th>Name</th>
<th>Value</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.0</td>
<td>Classification</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.1</td>
<td>Purpose</td>
<td>discipline</td>
<td>State the purpose of doing the classification. Assigning subject matter classifications is mandatory. SCORM does not use this term in the controlled vocabulary so we use “discipline” instead.</td>
</tr>
<tr>
<td>9.2</td>
<td>Taxon Path</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.2.1</td>
<td>Source</td>
<td>SSIC</td>
<td>This is the source of the classification. In this case, the classification is one of the mandatory SSIC tags</td>
</tr>
<tr>
<td>9.2.2</td>
<td>Taxon</td>
<td></td>
<td>Compare the primary topics covered in this learning object to the taxonomy and determine which of the nodes strongly represent the subject matter. Each node should then be included with a new instance of the Taxon element. In this example, ALIS is assigned to several categories in SSIC. Automated classifier tools can be used in this process to help determine appropriate nodes.</td>
</tr>
<tr>
<td>ID</td>
<td>Name</td>
<td>Value</td>
<td>Explanation</td>
</tr>
<tr>
<td>------</td>
<td>---------------</td>
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</tr>
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<td>ID</td>
<td>2010</td>
<td>Enter alphanumerical identification number that the SSIC uses to identify unique elements within the classification schema.</td>
</tr>
<tr>
<td>9.2.2.2</td>
<td>Entry</td>
<td>Telecommunications: Telecommunication Systems: Special system/networks</td>
<td>Enter name of the taxonomy node. In this example, we use the long name of the node that includes all parent levels of the node separated by colons</td>
</tr>
<tr>
<td>9.2.2</td>
<td>Taxon</td>
<td></td>
<td>A repeated instance of Taxon to assign another SSIC node</td>
</tr>
<tr>
<td>9.2.2.1</td>
<td>ID</td>
<td>2710</td>
<td>SSIC ID number</td>
</tr>
<tr>
<td>9.2.2.2</td>
<td>Entry</td>
<td>Telecommunications: Afloat communications: circuitry and networks</td>
<td>SSIC node name</td>
</tr>
<tr>
<td>9.2.2</td>
<td>Taxon</td>
<td></td>
<td>A repeated instance of Taxon to assign another SSIC node</td>
</tr>
<tr>
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<td>3082</td>
<td>SSIC ID number</td>
</tr>
<tr>
<td>9.2.2.2</td>
<td>Entry</td>
<td>Operations &amp; readiness: reliability &amp; maintainability: hardware, Fleet, Surface certification</td>
<td>SSIC node name</td>
</tr>
<tr>
<td>9.2.2</td>
<td>Taxon</td>
<td></td>
<td>A repeated instance of Taxon to assign another SSIC node</td>
</tr>
<tr>
<td>9.2.2.1</td>
<td>ID</td>
<td>3520</td>
<td>SSIC ID number</td>
</tr>
<tr>
<td>9.2.2.2</td>
<td>Entry</td>
<td>Operations &amp; readiness: training &amp; readiness: electronics (other than navigational aids)</td>
<td>SSIC node name</td>
</tr>
<tr>
<td>9.2</td>
<td>Taxon Path</td>
<td></td>
<td>This element is repeated to use another taxonomy</td>
</tr>
<tr>
<td>9.2.1</td>
<td>Source</td>
<td>DTIC</td>
<td>The second taxonomy to be used (it is mandatory) is DTIC</td>
</tr>
<tr>
<td>9.2.2</td>
<td>Taxon</td>
<td></td>
<td>First assignment of a DTIC node</td>
</tr>
<tr>
<td>9.2.2.1</td>
<td>ID</td>
<td>25/05</td>
<td>ID number</td>
</tr>
<tr>
<td>9.2.2.2</td>
<td>Entry</td>
<td>Communications: Command, Control and Communications Systems</td>
<td>node name</td>
</tr>
<tr>
<td>9.2.2</td>
<td>Taxon</td>
<td></td>
<td>Second assignment of a DTIC node</td>
</tr>
<tr>
<td>9.2.2.1</td>
<td>ID</td>
<td>17/09</td>
<td>ID number</td>
</tr>
<tr>
<td>9.2.2.2</td>
<td>Entry</td>
<td>Navigation, Detection and Countermeasures: Active and Passive Radar Detection Equipment</td>
<td>node name</td>
</tr>
<tr>
<td>9.3</td>
<td>Description</td>
<td>ALIS is a networking system to connect many Aegis systems to a common interconnection bus and then connect these to a set of output systems like fire control. Neither SSIC nor DTIC fully support this subject matter although SSIC has closely related nodes.</td>
<td>Enter a comment on issues relating to assigning nodes from the external classification system</td>
</tr>
<tr>
<td>ID</td>
<td>Name</td>
<td>Value</td>
<td>Explanation</td>
</tr>
<tr>
<td>----</td>
<td>--------</td>
<td>--------</td>
<td>------------------------------------------------------</td>
</tr>
<tr>
<td>9.4</td>
<td>Keyword</td>
<td>ALIS</td>
<td>Enter keywords that will help others search or browse for this object</td>
</tr>
<tr>
<td>9.4</td>
<td>Keyword</td>
<td>LAN</td>
<td></td>
</tr>
<tr>
<td>9.4</td>
<td>Keyword</td>
<td>Aegis</td>
<td></td>
</tr>
<tr>
<td>9.4</td>
<td>Keyword</td>
<td>Interconnection</td>
<td></td>
</tr>
<tr>
<td>9.4</td>
<td>Keyword</td>
<td>Network</td>
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</tr>
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</table>
30.10. Security Classification

The Security Classification category group describes the security classification of an object. SCORM has been extended to include a Security Classification category based on the concerns of the ILE community that security classification is critical for a great deal of Navy learning content. The security requirements outlined in the DoD 5200.1 directive and DoD Discovery Metadata Standard (DDMS) used as the basis for the selection and definition of the elements included in the Security Classification category of this guide. Other authoritative sources can be used to further characterize the security associated with an object using the Extended Classification element.

The TLO used in this example is unclassified but we apply tags as if it were classified at the Secret level for the purposes of this example.

Table 40 Metadata values for SecurityClassification group for example TLO.

<table>
<thead>
<tr>
<th>ID</th>
<th>Name</th>
<th>Value</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.0</td>
<td>Security Classification</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.1</td>
<td>US Classification</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.1.1</td>
<td>Marking</td>
<td>Secret</td>
<td>Although the actual TLO is unclassified, we are assuming it is classified to have values for this example.</td>
</tr>
<tr>
<td>10.1.2</td>
<td>Derived From</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.1.2.1</td>
<td>Document Title</td>
<td>National Industrial Security Program Operating Manual (NISPOM)</td>
<td>Title of the document used as the source of rules and nomenclature for assigning the security classification.</td>
</tr>
<tr>
<td>10.1.2.2</td>
<td>Document ID</td>
<td>DoD 5220.22-M</td>
<td>Official document control number</td>
</tr>
<tr>
<td>10.1.2.3</td>
<td>Date</td>
<td>20010201</td>
<td>Originally published Jan 1995 but current version updated in Feb 2001</td>
</tr>
<tr>
<td>10.1.2.4</td>
<td>Agency</td>
<td>TECHi2</td>
<td>Optional</td>
</tr>
<tr>
<td>10.1.3</td>
<td>Declassify On</td>
<td>20101231</td>
<td>December 31, 2010 is the date that this information can be declassified.</td>
</tr>
<tr>
<td>10.1.4</td>
<td>Downgrade To</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.1.4.1</td>
<td>New Marking</td>
<td>Confidential</td>
<td>Originally classified as SECRET, this information can be downgraded to CONFIDENTIAL on the effective date</td>
</tr>
<tr>
<td>10.1.4.2</td>
<td>Effective Date</td>
<td>2008-12-31</td>
<td>December 31, 2008 is the date that this information can be downgraded to CONFIDENTIAL.</td>
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<td>Classified By</td>
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</tr>
<tr>
<td>10.1.5.1</td>
<td>Name</td>
<td>Christian E Marquise</td>
<td>Name of the OCA</td>
</tr>
<tr>
<td>10.1.5.2</td>
<td>Agency</td>
<td>TECHi2</td>
<td>Agency person belongs to</td>
</tr>
<tr>
<td>10.1.5.3</td>
<td>Date</td>
<td>20050729</td>
<td>Date assignment made</td>
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<td></td>
<td>Reason for the level of classification. Comes from an authorized list based on E.O. 12958</td>
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<td>Name</td>
<td>Value</td>
<td>Explanation</td>
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<tr>
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<td>-----------------------------</td>
<td>----------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>10.2</td>
<td>Non-US Classification</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.2.1</td>
<td>Marking</td>
<td>Secret</td>
<td>Although the actual TLO is unclassified, we are assuming it is classified to have values for this example.</td>
</tr>
<tr>
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<td>Non-US document title</td>
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<td>Document control number</td>
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<tr>
<td>10.2.2.3</td>
<td>Date</td>
<td>20040101</td>
<td>Document publication date</td>
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<td>10.2.2.4</td>
<td>Agency</td>
<td>MI-6</td>
<td>Non-US Agency that published the information</td>
</tr>
<tr>
<td>10.2.3</td>
<td>Country Trigraph</td>
<td>GBR</td>
<td>Valid country trigram from ISO/ANSI 3166</td>
</tr>
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<td>Joint Classification</td>
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<td></td>
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</tr>
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<td>Document publication date</td>
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<td>MI-6, KGB, CIA</td>
<td>Agencies that published the information</td>
</tr>
<tr>
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<td>USA, GBR, RUS</td>
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<td>COMINT</td>
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<td>REL TO USA, GBR, RUS</td>
<td>Indicates that release of this material is only authorized to certain countries or international organizations.</td>
</tr>
<tr>
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<td>Non-Intelligence Community Marking</td>
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<td></td>
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<td>LIMDIS</td>
<td>Indicates that release of this material is only authorized to certain people or official positions. These markings will usually be used IN PLACE OF other dissemination controls.</td>
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<tr>
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<td>Value</td>
<td>Explanation</td>
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<td>------------------------</td>
<td>-----------------------------------------------------------------------------</td>
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<td>10.7.2</td>
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<td>POTUS,SECDEF</td>
<td>Indicates the people or official positions that are authorized to receive this information.</td>
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<td>20101231</td>
<td>Date that the material can be declassified.</td>
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<td></td>
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<td></td>
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<td>TECHi2</td>
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<td>Classified By</td>
<td></td>
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<tr>
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<td>Name</td>
<td>Christian E Marquise</td>
<td></td>
</tr>
<tr>
<td>10.9.4.2</td>
<td>Agency</td>
<td>TECHi2</td>
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<tr>
<td>10.9.4.3</td>
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<td></td>
</tr>
<tr>
<td>10.9.4.4</td>
<td>Reason</td>
<td>MI-6, KGB, CIA</td>
<td></td>
</tr>
</tbody>
</table>
31.0 XML SCHEMA

The ILE metadata schema defined in this document lay out the elements and their allowed values to be used to annotate learning content. In order to be used in an operational IT system, this metadata must exist in a physical form that can be used for data exchange between databases and applications. This format will be XML.

IEEE has published a draft specification for XML schema of the LOM metadata, which SCORM is based on. Therefore, ILE metadata files should conform to IEEE standard 1484.12.3 XML Schema Definition Language Binding for LOM. A schema definition document (xsd) will be provided by the ILE government team for users who need to produce their own XML documents. Some users will have these documents automatically generated by authoring tools and will not have to use the XML schema definitions.
## 32.0 ACRONYMS

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5VM</td>
<td>5 vector model</td>
</tr>
<tr>
<td>ACM</td>
<td>Association for Computing Machinery</td>
</tr>
<tr>
<td>ADL</td>
<td>Advanced Distributed Learning</td>
</tr>
<tr>
<td>AICC</td>
<td>Aviation industry CBT (computer based training) committee</td>
</tr>
<tr>
<td>AIM</td>
<td>Authoring instructional materials</td>
</tr>
<tr>
<td>API</td>
<td>Application Programming Interface</td>
</tr>
<tr>
<td>CAM</td>
<td>Content aggregation model</td>
</tr>
<tr>
<td>CBT</td>
<td>Computer based training</td>
</tr>
<tr>
<td>CD3</td>
<td>Content design, development, and deployment</td>
</tr>
<tr>
<td>CIO</td>
<td>Chief information officer</td>
</tr>
<tr>
<td>CMS</td>
<td>Content management system</td>
</tr>
<tr>
<td>CNO</td>
<td>Chief of Naval Operations</td>
</tr>
<tr>
<td>COI</td>
<td>Community of Interest</td>
</tr>
<tr>
<td>CONOPS</td>
<td>Concept of Operations</td>
</tr>
<tr>
<td>COTS</td>
<td>Commercial off-the-shelf</td>
</tr>
<tr>
<td>CSO</td>
<td>Center for surface combat systems</td>
</tr>
<tr>
<td>CSS</td>
<td>Cascading style sheet</td>
</tr>
<tr>
<td>DDMS</td>
<td>Department of Defense Discovery Metadata Specification</td>
</tr>
<tr>
<td>DOD</td>
<td>Department of Defense</td>
</tr>
<tr>
<td>DODAF</td>
<td>Department of Defense Architecture Framework</td>
</tr>
<tr>
<td>DON</td>
<td>Department of Navy</td>
</tr>
<tr>
<td>DTIC</td>
<td>Defense Technical Information Center</td>
</tr>
<tr>
<td>EKM</td>
<td>Enterprise Knowledge Management</td>
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<td>Enabling learning object</td>
</tr>
<tr>
<td>EO</td>
<td>Enabling Objective</td>
</tr>
<tr>
<td>ERNT</td>
<td>Executive Review of Naval Training</td>
</tr>
<tr>
<td>EXCEL</td>
<td>Excellence through education and learning</td>
</tr>
<tr>
<td>FAM</td>
<td>Functional area manager</td>
</tr>
<tr>
<td>FDM</td>
<td>Functional data management</td>
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<tr>
<td>GIG</td>
<td>Global information grid</td>
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<tr>
<td>HCO</td>
<td>Human Capital Object</td>
</tr>
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<td>HCO-GB</td>
<td>HCO governance board</td>
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<td>HPC</td>
<td>Human performance center</td>
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<tr>
<td>HTML</td>
<td>Hypertext Markup Language</td>
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<tr>
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<td>Hypertext transfer protocol</td>
</tr>
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<td>Integrated learning environment</td>
</tr>
<tr>
<td>IMR</td>
<td>Integrated metadata repository</td>
</tr>
<tr>
<td>IT</td>
<td>Information technology</td>
</tr>
<tr>
<td>KM</td>
<td>Knowledge management</td>
</tr>
<tr>
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<td>Local area network</td>
</tr>
<tr>
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<td>Learning content management system</td>
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<td>Description</td>
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<td>--------------------------------------------------</td>
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</tr>
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</tr>
<tr>
<td>MDK</td>
<td>Media development kit</td>
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<td>MET</td>
<td>Mission essential tasks</td>
</tr>
<tr>
<td>MLE</td>
<td>My Learning Event</td>
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<td>MPT&amp;E</td>
<td>Manpower Personal Training and Education</td>
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<tr>
<td>NAICS</td>
<td>North American Industry Classification System</td>
</tr>
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<td>Net-centric enterprise services</td>
</tr>
<tr>
<td>NETC</td>
<td>Naval Education and Training Command</td>
</tr>
<tr>
<td>NCOM</td>
<td>Navy Content Object Model</td>
</tr>
<tr>
<td>NKO</td>
<td>Navy knowledge on-line</td>
</tr>
<tr>
<td>NMCI</td>
<td>Navy marine corps intranet</td>
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<tr>
<td>NPDC</td>
<td>Naval Personnel Development Command</td>
</tr>
<tr>
<td>O&amp;M</td>
<td>Operation and Maintenance</td>
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<tr>
<td>OPNAV</td>
<td>Office of Chief Naval Operations</td>
</tr>
<tr>
<td>POC</td>
<td>Point of Contact</td>
</tr>
<tr>
<td>RiT</td>
<td>Revolution in Training</td>
</tr>
<tr>
<td>RTE</td>
<td>Runtime Environment</td>
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<td>SCO</td>
<td>Sharable content object</td>
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<tr>
<td>SCORM</td>
<td>Sharable content object reference model</td>
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<tr>
<td>SME</td>
<td>Subject matter expert</td>
</tr>
<tr>
<td>SN</td>
<td>Sequencing and navigation</td>
</tr>
<tr>
<td>SOA</td>
<td>Services oriented architecture</td>
</tr>
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<td>SSIC</td>
<td>Standard Subject Identification Codes</td>
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<td>T&amp;E</td>
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<tr>
<td>TO</td>
<td>Terminal objective</td>
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<tr>
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<td>United states marine corps</td>
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<tr>
<td>USN</td>
<td>United states navy</td>
</tr>
<tr>
<td>XML</td>
<td>Extensible markup language</td>
</tr>
<tr>
<td>XSL</td>
<td>Extensible Stylesheet Language</td>
</tr>
</tbody>
</table>
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Navy Integrated Learning Environment (ILE) Technical Specifications and Guidelines

Version 2.0
5 August 2005
Navy Integrated Learning Environment (ILE) Technical Specifications
and Guidelines

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Abstract

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

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

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

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

ILE Architectural Overview

ILE currently consists of the following applications:

- Navy Knowledge Online (NKO) Portal-
  - Single point of entry to ILE.
  - Provides integration framework for legacy systems.
- Learning Management System (LMS)-
  - Contains the ILE master catalog for accessing informal education and training content.
- ThinQ Training Server Learning Management System
  - Primarily manages learner lesson plans and training day to day progress
  - Allows management of learning events
  - Access via NKO

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

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

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

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

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

  - Professional Development
Personal Development
Leadership
Certifications & Qualifications
Performance

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


**Other browser requirements:**
- W3C Web Standards located at the W3C Website, [http://www.w3c.org/WAI](http://www.w3c.org/WAI)
- Java virtual machine and JavaScript enabled
- Cookies enabled
- MSIE 5.00.3809 or Sun Micro Systems JRE 1.3 or higher. Content should work with both versions

**Workstation Minimum Hardware Specifications**

Content providers should ensure their content runs as intended on systems meeting the following minimum hardware specifications.
- IBM compatible PC running Windows, 98, ME, NT, XP and 2000
- Microprocessor Speed: Pentium 1 GHz
- Hard Drive: 20 GB
- RAM: 128 MB
- Sound Card: 16 bit
- Speakers
- CD-ROM Drive: 12x
- Monitor display resolution 1024 x 768
- Color Depth: 16 bit
- Fonts: Small

**Gold Disk Contents**
Afloat Technical Specifications – COMPOSE 3.0

Server Only Baseline Applications 3.0
Windows 2000 Advanced Server
Windows 2003 Standard Server 2003 SP1
Ipswitch WS-FTP Pro 8.01
Microsoft Data Access Components 2.8
Microsoft Inernet Explorer 6.0 SP1
Netscape 7.2
NicoMak WinZip 9.0 SR1
Real One Player 10.5 B6.0.12.1056
Macromedia Shockwave 10.1.0
Macromedia Flash Player 7.019.0
Adobe Acrobat Reader 7
Apple QuickTime Movie and Audio Viewer 6.5.2
Microsoft ISA Server Enterprise Edition
Microsoft ISA Server Standard Edition 2004 SP1
Microsoft Internet Information Server 6
Microsoft Exchange Enterprise Edition 2003 SP1
Microsoft Netweeeting 3.01
Microsoft Windows Media Player 10
Symantec AntiVirus Systems Center Console 10.0.0.359
Symantec Live Update Admin Tool 2.6
Symantec AntiVirus Corporate Edition 10.0.0.359
Symantec Mail Security 4.6.1_b107
Veritas Backup Exec for Advanced Server 10
Terminal Server 5.2

Workstation Baseline Applications 3.0
Microsoft Windows 2000 Professional
Microsoft Windows XP Professional SP2
Microsoft Internet Explorer 6.0 SP1
Symantec AntiVirus Corporate Edition 10.0.0.359
NicoMak WinZip 9.0 SR1
Ipswitch WS-FTP Pro 8.01
Adobe Acrobat Reader 7
Real One Player 10.5 B6.0.12.1056
Macromedia Shockwave 10.1.0
Flash Player 7.0.19.0
Apple QuickTime Movie and Audio Viewer 6.5.2
Microsoft Netmeeting 3.01
Microsoft Windows Media Player 10
Microsoft ISA Server Enterprise Edition 2004 SP1
ActivCard Gold 2.2 SP2
Personal Security Manager for Netscape
Netscape 7.2
Microsoft Office XP Professional
Microsoft Office 2003 Professional 2003 SP1
Java Runtime Environment 1.5.0.02

NOTE: Compliance with the COMPOSE 3.0 Afloat Technical Baseline for ILE Learning Content contained herein is required for content development contracted after the release date of this document to the maximum extent practicable. Currently there are potential conflicts between current NMCI Gold Disk and COMPOSE 3.0.

- Macromedia Flash and Shockwave Players versions
- No Macromedia Authorware Web Player on either baseline (Gold Disk - can be pushed down to the users)
- Real One Player not supported on NMCI Gold Disk
- Java Runtime Environment – Microsoft and Sun conflicts

Gold Disk or COMPOSE 3.0 Waiver
If the use of a newer technology is deemed necessary for delivering a more robust, interactive and engaging product, vendors can submit that technology for consideration of Gold disk or Blue disk inclusion. It is anticipated that the majority of these newer technologies would be in the form of a runtime module (web player, plug-in, etc.). Introduction of new delivery technologies must follow a strict process for submission, testing, approval and implementation:

1. Request must be submitted by a DON sponsor.
3. Request is reviewed by the Training Functional Area Manager (FAM)
4. The plug-in and any necessary installation instructions must be submitted via the DON sponsor for testing in NMCI lab.
5. The costs for inclusion and subsequent ‘push’ of the technology must be funded.

There is a significant expense involved with additions to the Gold Disk. The process for submission, testing and approval will require a minimum of 90 days to accomplish. All requests must be made through NETC, N63.
508 Accessibility
The Navy is committed to making all web-based learning content accessible to each person who uses the site. Section 508 of the Rehabilitation Act requires all Federal agency electronic and information technology is accessible to people with disabilities, including employees and members of the public. Content developers must ensure that content is Web-accessible to persons who may have disabilities. All ILE content should at a minimum meet all Priority 1 Checkpoints identified in W3C Web Accessibility Guidelines. In addition, developers must provide written documentation identifying which checkpoints were met. If, after best efforts, you cannot create an accessible page, provide a link to an alternative page that uses W3C technologies, is accessible, has equivalent information (or functionality), and is updated as often as the inaccessible (original) page. It is critical that the development team validate designs and page templates and the content of the web-based training throughout the development process to ensure that the web pages are accessible to all users. Web-based designs should be validated at every development milestone to avoid time consuming and potentially costly revamping efforts. Additionally, content can be made more accessible if developed with Cascading Style Sheets (CSS). ILE content developers are encouraged to read the W3C Web Accessibility Guidelines at the W3C Website, http://www.w3c.org/WAI.

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

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

- Mobile Code Policy Memo, 7 November 2000
- Mobile Code FAQ’s, 3 May 2002

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

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

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

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

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

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

**Server Side Scripting**

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

**Client Side Scripting**

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

**Cascading Style Sheets**

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

**Streaming Media**
Most Real Network Media and Windows Media files will be placed on a dedicated ILE streaming media sever. The current ILE architecture utilizes the Windows Media Services. The ILE architecture currently does not offer the capability to support Flash Remoting. During the content development process and prior to final content submission it is imperative that the content developer engages the ILE content management team for recommendations, ILE supported streaming media types and up-to-date instructions for coding media file URLs within their content. The ILE Content Management Team can be reached via the ILE Support Center at [https://ile-support.nko.navy.mil](https://ile-support.nko.navy.mil).

Due to current media vendor technical limitations “streaming media” will not run in an https/SSL environment. Therefore the streaming media files will be located on a server different then where the actual course content files reside, “content server”. In some cases, relatively few and small media files can be located and served up from the “content server”. Using the HTML “embed” tag or similar tags for Windows Media, Quick Time, and Flash files have been tested in the current ILE (https/SSL) environment and will work. NOTE that these files are NOT being streamed. Real Network Media files WILL NOT work in this scenario. Media files not using an HTML “embed” type tag may work if the media file can be downloaded to the client machine and then ran from the applicable media player. This is not the preferred way due to bandwidth considerations and client side computer settings.

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

**CONTENT SUBMISSION**

**Legacy Content**
Any content not originally intended for deployment within the Navy Integrated Learning Environment (ILE) (doesn’t meet SCORM 1.2, SCORM 2004, or AICC guidelines) can still be hosted within the ILE. Any legacy content, such as Computer-based training (CBT) or Web-based training (WBT) originally intended for CD or LAN delivery can be
submitted for evaluation by the ILE Content Management Team. Once it has been
determined that the ILE will be able to support the legacy content, the government
sponsor interested in hosting the content must complete and submit a *Legacy Content
Submission Form*, available at the ILE Support Center: [https://ile-support.nko.navy.mil](https://ile-support.nko.navy.mil).

**Navy ILE Content**
The following transactions may transpire for any content submitted and intended for
hosting in the Navy's Integrated Learning Environment (ILE). These transactions will
continue to evolve with the ILE:

**Announce Delivery Date(s)**
The government sponsor and content developer establishes the content development
milestones & delivery dates during the kickoff meeting. Expected delivery dates should
be communicated to ILE content management & support team during or immediately
after the kickoff meeting via the *Content Announcement Form*, available at the ILE
Support Center: [https://ile-support.nko.navy.mil](https://ile-support.nko.navy.mil). Providing delivery dates in advance
will help the ILE Content Management Team to gauge incoming content and establish
the channels of communication between all entities involved with delivering the content
on schedule.

**Content Development**
All forthcoming content should be developed according to the Content Design,
Development and Deployment Guidelines, Navy Content Object Model (NCOM), NMCI,
and any other ILE technical guidelines referenced at the ILE Support Center.

**Mobile Code Signed**
In an effort to protect DoD systems from the threat of malicious or improper use of
mobile code, we must assess and control the risks imposed by the technology. All
Category 1 and Category 2 Mobile code must be signed by an approved ILE mobile
code authority. The web-based, *ILE Mobile Code Signing Request Form* is available at
the ILE Support Center: [https://ile-support.nko.navy.mil](https://ile-support.nko.navy.mil).

**Content Submission**
The government sponsor and/or content developer must complete a content
submission form before any content will be hosted within the ILE. The web-based, *ILE
Content Submission Form* is available at the ILE Support Center: [https://ile-
support.nko.navy.mil](https://ile-support.nko.navy.mil). Once the ILE Content Management Team has received the
content submission form and deliverables, the government sponsor and developer will
receive instructions for government acceptance testing. Once content testing has been
completed and accepted, the government sponsor and/or content developer must
provide the final SCORM content package on a separate compact disc. This compact
disc must contain the only those files needed for running the content. The government
sponsor and/or content developer must also provide any additional disc(s) containing
the source files, storyboards, learning content designs, life cycle maintenance guide(s),
and any other source & development materials. The completed content submission
Government Acceptance Testing
The content developer and government sponsor must review the content for accuracy and completeness before it is deployed within the ILE. All aspects of the content should be beta tested by the content developer via the Navy’s ILE content staging site (aka the G.A.T. site). The ILE Content Management Team will approve access to the ILE content staging site. Access can be provided to government sponsors, SYSCOMS, and Navy learning centers. Any government contractor in need of access must obtain approval through the government sponsor. Access can be requested from the ILE content management & support team by completing the Content Reviewer Account Request Form, located at the ILE Support Center: https://ile-support.nko.navy.mil. In special circumstances, developers can also request assistance with troubleshooting content integration issues from the ILE Content Management Team. Content integration questions may be submitted via the Content Inquiry Form at https://ile-support.nko.navy.mil or by email: ile_support@netc.navy.mil. However, it is important to note that this support will be provided only as a means of validating the technical interoperability of the content and should not be viewed as a means of exercising a quality control process that would normally be the responsibility of content developer.

Content Deployment
Navy ILE content will only be accessible via NKO and Navy E-Learning once the content has been tested by the developer and approved by the government sponsor in the Navy’s ILE G.A.T. site. Once the content has been positioned on the correct content server and registered in the Navy Learning Management System catalog, a notification will be sent to the developer and government sponsor informing them that the content is available via NKO & Navy E-Learning.

Content Revisions
Any revisions to content should be coordinated through the ILE Content Management Team. Each revision will require the developer and government sponsor to follow the content submission process and complete a Content Revision Form, available at the ILE Support Center: https://ile-support.nko.navy.mil. When resubmitting content, the content developer and sponsor should specify that the submission is a minor update or major revision. This will affect versioning of the content and must be communicated to the ILE Content Management Team.

Deliverables
The following deliverables are required for Navy ILE content when applicable:

Content Package
Each SCORM-conformant content package should be delivered as a PIF (zip-format) on CD or electronically. All other content types (non-SCORM) submitted for hosting within the ILE can be provided in zip format (if possible). All other materials used for

package should be mailed to: N E T P D T C - N633, BLDG 839 RM 113, 6490 Saufley Field Road, Pensacola, FL 32509-5239.
content development (i.e. storyboards, learning designs, source files, etc.) should be provided as a separate deliverable on CD and mailed to: ILE Content Management, NETPDTC N633, 6490 Saufley Field Rd., BLD 839 RM 113, Pensacola FL 32509-5239.

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

**508 Accessibility Test Logs**
ILE content should, at a minimum, meet all Priority 1 Checkpoints. In addition, developers must provide written documentation identifying which checkpoints were met. If, after best efforts, developers cannot create an accessible page, they should alternatively provide a link to an alternative page that uses W3C technologies, is accessible, has equivalent information (or functionality), and is updated as often as the inaccessible (original) page. Developers creating content according to Section 508 Accessibility guidelines are required to test and validate their content using any Section 508 validation & reporting tool (e.g. Bobby, STEP 508, etc.). The test logs should be packaged and included with the content submission package.

**Assessment Answer Key(s)**
Developers must provide an answer key for all tests. This will allow the ILE Content Management Team to validate the assessment, and it also provides a valuable life cycle resource for future reference. The answer key can be provided as a text file, database, xml file, or word document.

**Content Submission Flow Chart**
COPYRIGHT

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

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

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

Content developed specifically for the Department of the Navy shall become the property of the US Government and be available to all Government entities without restrictions.
1. **Purpose.** The purpose of this document is to identify the specifications needed to create, review, store, search, and maintain learning objects within the Navy’s Integrated Learning Environment (ILE). The document serves as the baseline needed at the present time to advance the development of learning objectives and learning objective statements that will serve as a link between the SkillObjects™ and related work elements, the learning events, and the content.

2. **Policy.** Learning objectives will be designed, developed, implemented, and maintained within the Navy Education and Training Command using guidelines reflected in this Interim Guidance document. The ILE, Content Lead, is the claimancy’s process owner for this document. Learning objectives placed within the ILE are property of the government and it is the government’s responsibility
to ensure objective integrity, i.e., performance- or evidenced-bases are current, accurate, and relevant.

3. **Action.** The implementation of this guidance is the responsibility of the Navy Education and Training Command Echelon III Component Commands. All Echelon III Commands (EIIIs) will ensure new learning objectives that are written for warehousing within the ILE specifications identified in this document are followed. When legacy content is repurposed, the learning objectives must be rewritten to reflect the new specifications. As EIIIs meet with the ILE Content Lead to develop course/content prioritization lists, the new specifications should be written into the statements of work. In the event, training requirements cannot be sufficiently substantiated or articulated with the current verb list, the EIII representative should contact the ILE Content Lead so that verbs are added into the corporate system systematically.

4. **Background.** Learning objectives serve as the link to SkillObjects™ and related work elements; Enterprise Competencies (competencies that show the linkage between DoD and Navy mission-essential competencies); and content. As the Navy moves forward with its commitment to the ILE as the learning platform for SeaWarrior, there is an identified need to develop a common language or data model to capture, store, share, and reuse learning objectives which may then be assembled into learning objective statements (LOS) to support content-specific learning objects. Learning objective statements will be formulated utilizing SkillObjects™ taxonomy as the foundation for defining job/position requirements for position skills, unique knowledge, tools, resources, and abilities to represent the full spectrum of work proficiency required.

The data model includes structure, syntax, and semantics of the learning objective. This effort of statement specificity affords the opportunity to house learning objectives in repositories. Learning objectives (verb and object) stand alone. Learning objective statements (behavior, condition, and standard) are set in the context of the learning event and the content. See Figure 1.
Learning objective statements act as the triggers or catalysts for the assembly and aggregation of content assets to form Terminal and Enabling Learning Objects. These objects may then be logically connected to enterprise competencies structured from SkillObjects™ work elements are aggregates of required unique knowledges, skills, tools, abilities and resources.

Instructional designers use learning objectives statements as the cornerstone to designing content or curriculum. Traditionally, learning objective statements are used to:

- Offer a means to designers to select and organize activities and resources associated with the learning process;
- Provide a means by which assessment can measure a learner’s performance or evaluate a program’s worth;
- Identify the skills and knowledge that must be mastered in the learning event (Morrison, Ross, & Kemp, 2004);
- Serve as anchor points in sustaining proper alignment between competency gaps, TO/EO selection, content assembly, sequencing, delivery methodology and medium, student assessment, and program evaluation.

With the advent of learning content management systems and the SCORM specifications, designers now have the opportunity to search repositories and reuse learning objectives and content. Carefully crafted learning objectives comprised of discrete and precise components aligned to SkillObjects™ and related work elements are critical to content or curriculum design and development in the future for reasons as follows:
• Reduce costs associated with development and maintenance efforts
• Ensure the building of relevant content in the present systems
• Serve as the cornerstone in prescriptive learning events in future systems
• Identify measurable attributes for successful performance
• Align content to mission-specific requirements

5. **Research-based.** The guidance provided by this document is based on current learning research. There is a tremendous body of knowledge that supports sound instructional decisions. As can be found within any research are opposing views. To expedite the development of learning objectives and their specifications, the ILE Content team has elected to begin with a widely used taxonomy developed by Bloom, Englehart, Furst, Hill, & Krathwohl (1956), with additional input from other noted researchers (Gronlund, 1985, 1995; Dick, Carey, & Carey, 2001; Heinich, Molenda, & Russell, 1993; Kibler, 1981; Krathwohl, Bloom, & Masia, 1964; Mager, 1984; Morrison, Ross, & Kemp 2004; Rothwell & Kazanas, 2004; and Smith & Ragan, 1999).

6. **Assumptions.** Work, such as that of the Advanced Distributed Learning (ADL) groups and the SCORM suggest the following assumptions may be made about learning objectives. Objectives are independent of (but related to)
• any specific schema for skills, competencies or content
• any audience or performance gaps
• any specific technology or tool
• instructional methods or delivery mediums/media

Additionally, learning objectives stand alone. Learning objective statements are in context with the content. The development of the learning objective statement utilizes a decision tree methodology. The intention is the first step into the LOS design decision tree. See Encl 1.

7. **Intent.** Intent is determined by the performance gap as well as the audience characteristics. Intent is the first decision that needs to be made, i.e., “What do I want the learner to do?” The answer to this question determines the verb domain and category. There are three domains with a number of categories based on taxonomy of educational outcomes edited by Bloom and others (1956) from which to select, depending on the intent.

Once the intent has been established, a selection of verbs from the appropriate category will be available that corresponds to the desired behavior. Establishing the intent allows the user to select a verb by either a specific domain or category of learning within that domain hierarchy Figure 2 and Encl 2.
8. Components. Robert Mager (1962) was first to describe a learning objective [statement] as a three-component verbal statement. The three components are a description of the:
• behavior or action that will demonstrate or evidence learning
• conditions of demonstration of that action
• standard that will be applied to measure successful completion

These three components are identified in the remainder of this document as behavior, condition, and standard respectively.

(1) Behavior. What behavior can the learner demonstrate or what evidence can be provided to indicate that he or she has mastered the job/position-required knowledge or skills specified in the instruction?

The very basic behavior (learning objective) includes a verb and an object. A verb repository will exist within the ILE architecture that sorts and selects verbs by domain and category. See Encl 2.

Parameters for verb selection include:
• Verbs will be selected from a repository determined by identified categories that represent the cognitive, affective, and psychomotor domains. Encls 1 and 2
• Categories are hierarchical and based upon a synthesis of learning theory research.
• Guided by Intention, users may select the verb either by category or domain.
• The baseline Learning Objective Statement includes a controlled vocabulary verb list for each of the categories. The verb list is aligned to verbs utilized in SkillObject™ taxonomy.
• The category for a terminal objective must be equal to or higher than any of its enabling objectives.

(2) Condition. What resources are needed or under what conditions will the evaluation take place?

The condition describes the tools or information that the learner will be given in order to demonstrate completion. Conditions should include:
• The cue or stimulus that the learner will use to search information stored in memory. Some examples include: Given the definition . . . ; Given a set of alternatives. . . ; etc.
• The characteristics of any resource material required to perform the task, e.g., illustrations, software applications, physical objects, reference materials
• The scope and complexity of the task and relevant or authentic contexts for the real-world performance setting. Some examples include: Given an aerial map of the bombing target with resistance pockets identified. . . ; Given the Strategic Plans of three European allies . . . ; etc.

Setting the scope and complexity make the task appropriate for a given target audience. Scope and complexity also aid in the transfer of knowledge/skill from the instructional setting to the performance setting. (Dick, Carey, & Carey, 2001). The contextual analysis should describe the situation of job/position-related performance and thus assist with the determination of the condition.

Parameters for condition selection include:
• Conditions will be selected from a repository determined by categories: cue/stimulus (sensory data), resource materials (tools or physical/environmental restrictions), scope (resource boundaries), and complexity (levels of proficiency).

Encl 3
• When the condition category label, i.e., cue or stimulus, resource material, scope, or complexity, is selected a dropdown menu will require the user to further define the condition by identifying the parameter needed in the assembly of content. For example, Cue (the category) is selected. Verbal, textual/visual, touch, taste, or smell (the parameter) is selected from the dropdown list. A second “open” field input requires that the user identify specifically what the parameter is, e.g., definition, graphic of an odometer, rough surface, cream sauce, smoke, etc.
• Conditions are variable from one community of work to another. The parameter selection will include an “Other” parameter. When “Other” is selected, a second “open” field input will identify with specificity what the parameter is. For instance, within the electronics community the use of IETMS is a common resource. The user could compose the condition by selecting Cue: Textual, Electronic Manual; then Resource, Other, enter IETM, Module 4. However, by adding IETM to the Resource Material parameter list, the user could select Resource Material, IETM, and the Cue parameter would automatically fill.
Other parameters and open fields will be periodically sorted (quarterly is recommended if not more frequently, especially in the initial development stages) to determine frequency use to add to the provided lists.

Quarterly reports of these sorts will be sent by the Echelon III commands to the ILE Content Team Lead to add information to the ILE system.

Cues or stimulus are cognitive elements triggered by input from the environment into the sensory register.

Tools and resource materials are physical objects. Examples include: visual aids, printed materials, reference documents, software applications, job aids, tools, or equipment.

Resource material must be identified before scope is articulated.

Scope identifies the physical or environmental boundaries applied to the resource material. Examples include: delineation lines, inclusive pages/chapters/etc., data banks, formulas, checklists, EOS, hammers, meters, radio, etc.

Complexity is determined by contextual analysis or use case requirements and takes into consideration the proficiency of the primary audience.

Complexity is an optional identification field and generally this information does not appear within the assembled learning objective statement.

There are occasions – particularly with declarative knowledge objectives – when no conditions are necessary (Smith & Ragan, 1999). For example: List the steps in cutting a bolt.

(3) Standard. What is the measurement that will indicate successful or acceptable performance or proficiency?

The standard describes what behavior will be acceptable or the limits within which a behavior must fall. The standard identifies the minimum acceptable performance level.

With some cognitive skills, responses may vary. 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. See Encl 6

Mager (1962) as discussed in Smith and Ragan (1999) identifies some of the more common standards:

- Accuracy (Example: learner’s answer must be within X degrees)
- Number of errors (Example: with five mistakes or fewer)
- Number of correct responses (Example: with minimum score of 80%)
- Time (Example: not to exceed 30 minutes)
- Consistent with an established standard (Example: in order listed on the chart)
- Consistent with a stated standard (Example: includes one of the following identifiers: aviation, surface, undersea)
- Consequences (Example: patient walks away satisfied)
Parameters for standard selection include:
- Standards must be aligned to SkillObject™ performance criteria and will be selected from a repository determined by categories. Encl 4
- The standard is use case driven.
- Standards are identified at the assembly level. Each community has authority to define the standards appropriate to its body of knowledge.
- When the standard parameter is selected, a second “open field” requires input to clearly define the information in the textual statement. For instance, the parameter “Consistent with established standard” is selected. The open field requires that the user identify the specific amount of time, e.g., 30 seconds, 45 minutes, 1 hour, etc.
- Standards are highly variable in nature. The parameter selection will include an “other” category. When “other” is selected, a second response identifies with specificity what “other” represents.
- Other parameters and open fields will be periodically sorted (quarterly is recommended if not more frequently, especially in the initial development stages) to determine frequency use to add to the provided lists.
- Quarterly reports of these sorts will be sent by the Echelon III commands to the ILE Content Team Lead to add information to the ILE system.
- Checklists, rubrics, and other variable measurement tools will be identified by name in the definitive information field. For example, Given….the learner will…..by completing procedures identified on Equipment A Checklist. Encl 6.
- Standard specificity is based on the contextual analysis, the content, and the primary audience. For instance, the standard 90% or higher may be required for journeyman, but 70% or higher would be acceptable for an apprentice.
- Standards are written at the assembly level and are independent components from the learning objective.
- When no performance standard is stated, the assumption is a 100% correct response or performance is required. (Morrison, Ross, & Kemp, 2004). For more on mastery level, see the Assessment guidance, Ref C.
- Smith and Ragan (1999) recommend that standards be written after the assessment item specification plan is developed and that it is not always necessary to include the standard in the learning objective statement. Commands responsible for the assembly of content will determine if the standard is included in the learning objective statement or if it will appear as a separate statement in the content.
- Gronlund (1985, 1999) offers that cognitive objectives specify the learning outcome first in general terms, e.g., Conducts a successful briefing, and then indicate specific performance, e.g.,
  Conducts a successful briefing
  Prepares an agenda and distributes prior to the meeting
  Practices question and answer session
  Keeps the meeting focused on the agenda topics
- Eisner (1969) defines expressive objectives as those for which no specific outcome can be clearly stated. Expressive objectives are most appropriately
found in the affective domain. For example: To develop a sense of personal responsibility to the team. This type of objective is grounded in context and should be used judiciously and sparingly. Methodology for establishing standards can be taken from learner self-reports (e.g., debrief), physiologic indicators (e.g., heart rate, pupil dilation), overt behaviors during simulation or role play, even by facial expression and other body language as long as legitimate citation with strong validity and reliability can be established.

9. **Terminal Objective.** A terminal objective is a major objective for a topic or task and describes the overall learning outcome. For example:

Topic: Isolate the fault
Terminal objective: Isolate the fault in the high frequency radio system.
Terminal objective statement: Given a damaged high frequency radio system, the technician will isolate the fault within 30 minutes.

10. **Enabling Objective.** An enabling objective supports a terminal objective. It is written at a lower level (category) of knowledge than the terminal. It generally describes specific behaviors (single activities) that must be learned or performed. To continue the example above:

Terminal objective: Isolate the fault in the high frequency radio system.
Enabling objective: Trace the electrical flow of transistors in a radio unit.

10. **Traceability Matrix.** As part of the Instructional Media Design Package (IMDP) for content to be assembled, the designers will provide a traceability matrix that links the topics, objectives, assessment items, and content to tasks within SkillObjects™. See Figure 3.
practitioners in applying the SL (i.e., the foundational methodology for understanding what learning is, how people learn, and how learning translates to measurable performance) to learning-related decisions in the Navy. SL intersects the Learning Objectives Flowchart at three critical points:

1. **Execution of Needs Assessments**: Identified in chart as “Identify Tasks, Knowledges, Skills, Tools, and Resources”
2. **Execution of Gap Analyses**: Identified in chart as “Identify Training Gaps”
3. **Generation of Learning Objectives**: Identified in chart as similarly entitled

For each of these stages, practitioners should undertake a deliberate effort to select and execute a methodology that is in alignment with current and validated theories, technologies, and best practices. Basing methodology selection and execution on SL will drive the Navy toward better predictive value for the acquisition, transfer, and retention of learning content by our workforce. Thus, there is risk of unsuccessful alignment between LOs and job requirements; SL reduces this risk. Further, error amplification makes it very costly to go backwards to solve alignment problems. It is far better to reduce these risks early in the process through a reflective approach.

Science of Learning interventions are reflected in content development as:
- New content development as the result of a new training requirement or equipment
- Revision to existing content as the result of a change to a training requirement, equipment or periodic curriculum review
- Periodic maintenance for currency, accuracy, and relevancy
- Legacy conversion of existing content to a new delivery mode

If the content development is new, then a top down approach is taken in the Learning Objectives Flowchart. If the content development is revision, maintenance, or conversion, then a bottom up approach will be used.

### 11. Terminology

The following key words of the document are defined below.

**Checklist**. A list of specific behaviors, characteristics of a product, or activities, and a place for marking whether each is present or absent (Nitko, 2004).

**Competency**. Observable behaviors, outputs, or outcomes that demonstrate the knowledge, skills, and abilities (KSAs) needed to successfully perform a work role/occupational function.
- **Core competency**—representative of Navy Mission
- **Cross-functional competency**—generalized sets of attributes that link to job requirements, enable mission interoperability, and transferability across communities and job families
- **Specialty competency**—skills, knowledge, and abilities that lead to successful performance of a specific job
• *Enterprise competency*—linkage between DoD and Navy mission-essential competencies

**Learner.** The ILE exists not only to serve the active duty Sailor, but the civilians and family members as well. Throughout this document and other associated documents and in the learning literature, learner is the preferred generic term that refers to individuals who receive benefit from the integrated instructional systems.

**Measurable.** The learning objective statement is one of the foundational pieces found within the instructional design literature. It answers the universal question, “What is it the learner should be able to do (or know) after completing the instruction?” Grounded in behaviorism, its inception mandated that the objective statement be both measurable and observable. Advances in learning research now support the argument that objectives statements be measurable, which can be quantified with precision, but reduce the emphasis on observable.

**Performance Assessment.** Presents a task require the learner to do an activity that requires apply knowledge and skills from several learning events and uses clearly defined criteria to evaluate how well the learner has achieved this application. Checklists or rubrics are used to ensure consistency in measurement from one learner to another (Nitko, 2004).

**Rating Scale.** Consists of numerals, such as 0 to 3, or 1 to 5, that reflect the quality levels of performance. Each numeral corresponds to a verbal description of the quality level it represents (Nitko, 2004).

**Rubric.** A coherent set of rules used to evaluate the quality of a student’s performance. They guide the judgments and ensure that the rules are applied consistently from one learner to another. The rules may be in the form of a rating scale or a checklist.

**Traceable.** Contemporary instructional design has recognized the connectedness between learning objective statements, content, assessments, and tasks that a learner will eventually perform. Since the Navy has embraced utilization of O*NET taxonomy to describe work requirements in terms of tasks learned together, performed together, and evaluated together; construction of the LOS described in this document is defined in a structure which aligns learning interventions to identified job demands. The procedures described in this document tie the work of instructional design to component SkillObject™ knowledges, skills, and abilities.

**User.** The generic term that refers to those individuals or groups that have responsibility for input into and work within the instructional systems.
12. **Command Review.** It is the responsibility of the Echelon III commands to provide guidance for periodic review of objectives placed within the ILE. See Encl 5. Additionally, prior to providing objectives to a developer for assembly in content, the command responsible for the content should review objectives for currency, accuracy, and relevancy. The following guidelines (Morrison, Ross, & Kemp, 2004) are provided to use when examining objectives with content development.

First:

a) Check the learning objective to determine if it is complete and adequately describes the intended outcome.
b) Is it concise and avoids misinterpretation?
c) If it is a behavioral objective, ensure it includes a verb, object, condition, and may include a standard.
d) If it is a cognitive objective, it may have a general statement and supporting specific statement(s).

Second:

a) Determine whether the objective is aligned with the task analysis and performance goals.
b) Is the objective written at the appropriate level to match the skill or knowledge?

Third:

a) Standards may appear in the learning objective statement.
b) Standards must appear in the Assessment Item Specification Plan. See Ref C.

13. **Technical Requirements.**

All information placed in the Learning Objective repositories will meet the technical specifications as set forth by the Navy’s ILE Content and Architecture Systems Leads.

14. **ILE POC** is Jerry Best, HPC, N75, DSN: 380-4997, (COMM) (407) 380-4997. email: Jerome.best@navy.mil.
Encl 1: Domain and Verb List Decision Tree

INTENT

What is it the learner should be able

COGNITIVE
- Evaluation
- Synthesis
- Analysis
- Application
- Comprehension

AFFECTIVE
- Characterizing by a value complex
- Organizing
- Valuing
- Responding
- Receiving

PSYCHOMOTOR
- Naturalization
- Articulation
- Precision
Encl 2: Domains, Categories, and Verb Lists

**Cognitive Domain**

**Evaluation** (Requires synthesis, analysis, application, comprehension, and knowledge)

Judging the value of an idea, procedure, method; make qualitative judgments using criteria from internal and external sources.

- Appraise
- Argue
- Ascertain
- Assess
- Attach
- Avert
- Choose Or Select
- (Based On Evaluation)
- Compare
- Conclude
- Consult
- Contrast*
- Criticize
- Critique
- Decide
- Defend
- Describe *
- Discriminate *

- Edit
- Enlist
- Estimate
- Evaluate
- Explain *
- Hire
- Interpret
- Judge
- Justify
- Lead
- Make A Decision
- Measure
- Negotiate
- Offer
- Predict
- Rate
- Recommend
- Recruit
- Relate
- Resolve
- Revise
- Score
- Select
- Summarize (Based On Evaluation)
- Support
- Validate
- Value
- Write (A Review)

*by itself belongs to a lower category*
Synthesis (Requires analysis, application, comprehension, and knowledge)
Putting together elements or parts of a whole that reflects originality; to form a new whole, e.g., production of a unique communication (theme or speech), a plan of operations (research proposal), or a set of abstract relations (scheme for classifying information.

Analyze  Effect  Perform (in public)
Annotate  Establish  Plan*
Apply     Explain*  Predict
Arrange    Extend  Prepare
Assemble   Find  Prescribe
Assume     Formulate (an original  Present (an original
            idea)  report)
Categorize  Generalize  Produce*
Change     Generate  Project
Collect    Guide  Propose
Combine    Hypothesize  Rearrange
Combine and organize  Illustrate  Reason
Compile    Infer  Reconstruct
Compose    Integrate  Relate
Conceive   Invent  Reorganize
Conclude   Investigate  Resolve
Construct  Lay-out  Revise
Convert    Locate  Rewrite
Create     Make  Search
Criticize  Manage  Solve
Decide     Maneuver  Set up
Defend     Manipulate  Summarize
Derive     Mediate  Supervise
Develop*   Mitigate  Synthesize
Design     Modify  Tell
Determine* Mitigate  Synthesize
Devise     Monitor  Triage
Diagram    Observe  Use
Direct     Organize  War game
Discover   Originate  Write (an original
Document  Oversee  composition)
Draft

*by itself belongs to a lower category
**Analysis** (Requires application, comprehension, and knowledge)

Ability to break down values and organize them into clear ideas or patterns, detecting, and establishing relationships among them.

<table>
<thead>
<tr>
<th>Action</th>
<th>Action</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analyze</td>
<td>Differentiate between (by analysis)</td>
<td>Organize</td>
</tr>
<tr>
<td>Appraise</td>
<td>Discriminate</td>
<td>Outline*</td>
</tr>
<tr>
<td>Breakdown</td>
<td>Distinguish *</td>
<td>Point out</td>
</tr>
<tr>
<td>Calculate *</td>
<td>Draw conclusions</td>
<td>Probe</td>
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<tr>
<td>Categorize</td>
<td>Draw conclusions</td>
<td>Process</td>
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<tr>
<td>Challenge</td>
<td>Examine</td>
<td>Question</td>
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<tr>
<td>Classify</td>
<td>Experiment</td>
<td>Relate</td>
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<tr>
<td>Compare</td>
<td>Form generalizations</td>
<td>Select (judgment involved)</td>
</tr>
<tr>
<td>Contrast</td>
<td>Formulate</td>
<td>Separate *</td>
</tr>
<tr>
<td>Criticize</td>
<td>Generalize</td>
<td>Show relationships</td>
</tr>
<tr>
<td>Debate</td>
<td>Identify *</td>
<td>Solve</td>
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<tr>
<td>Deduce</td>
<td>Infer *</td>
<td>Subdivide *</td>
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<tr>
<td>Detect</td>
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<td>Survey</td>
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<tr>
<td>Determine</td>
<td>Interview</td>
<td>Test</td>
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<tr>
<td>Diagnose</td>
<td>Make inferences</td>
<td>Troubleshoot</td>
</tr>
<tr>
<td>Diagram</td>
<td>Outline*</td>
<td>Verify</td>
</tr>
</tbody>
</table>

*by itself belongs to a lower category
Application (Requires comprehension and knowledge)
Ability to use ideas, principles, procedures, and theories in specific and general situations.

Accumulate  Employ  Prepare
Activate    End      Present
Advice      Estimate Prioritize
Affect      Execute  Process
Allocate    Expand   Produce
Apply       Express  Program
Assert      Express in a discussion Proof
Assume      Facilitate  Prove
Build       Find (implies Prove (in math)
Calculate   investigation)  Provide
Call        Finish   Reclaim
Change      Gauge   Refer to
Check       Graph   Relate
Clear       Host     Resume
Collect information  Illustrate Retrieve
(supply correct equation  Implement Scan
formula)       Indicate Schedule
Compute      Initiate Sending
Condense     Interpret  Set up
Conduct      Investigate Ship
Construct   Keep records  Show
Convert      Locate*  Sign on (as in computers)
Counsel     Log     Situate
Delete      Log-in (as in computers) Sketch
Deliver     Log-out  Solve (problems
Demonstrate Make  expressed in words)
Derive      Manipulate Sort
Determine   Map     Start
Develop      Modify  Stop
Differentiate Operate Store
Differentiate between Organize Submit
Discover    Participate Supply
Discuss     Pause  Terminate
Dispense    Perform  Trace
Distinguish Persuade Transfer
Distinguish between Phone  Translate
Download    Plan   Upload
Dramatize   Practice Use
Draw        Predict (from known Write
Edit        factors)

*by itself belongs to a lower category
**Comprehension** (Requires knowledge)
Ability to grasp the meaning, intent, or relationship of facts, principles, or procedures. Translating material from one form to another (words or numbers), by interpreting material (explaining or summarizing), and by estimating future trends (predicting consequences or effects).

<table>
<thead>
<tr>
<th>Appraise</th>
<th>Explain (express in other terms)</th>
<th>Put in order</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change</td>
<td>Express</td>
<td>Recognize</td>
</tr>
<tr>
<td>Classify</td>
<td>Extend Figure</td>
<td>Report</td>
</tr>
<tr>
<td>Code</td>
<td>Find (locate)</td>
<td>Restate</td>
</tr>
<tr>
<td>Compile</td>
<td>Find (as in math)</td>
<td>Review</td>
</tr>
<tr>
<td>Compose</td>
<td>Find the difference</td>
<td>Rewrite</td>
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<tr>
<td>Confer</td>
<td>Format</td>
<td>Route</td>
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<tr>
<td>Correct</td>
<td>Forward</td>
<td>Select</td>
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<tr>
<td>Decipher</td>
<td>Generalize</td>
<td>Simplify</td>
</tr>
<tr>
<td>Decode</td>
<td>Give example</td>
<td>Solve</td>
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<tr>
<td>Defend</td>
<td>Identify</td>
<td>Subtract</td>
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<tr>
<td>Define (in students words)</td>
<td>Illustrate</td>
<td>Suggest</td>
</tr>
<tr>
<td>Describe</td>
<td>Locate</td>
<td>Summarize</td>
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<tr>
<td>Discriminate</td>
<td>Measure</td>
<td>Trace</td>
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<tr>
<td>Discuss</td>
<td>Obtain</td>
<td>Trace (on map, chart)</td>
</tr>
<tr>
<td>Distinguish</td>
<td>Outline</td>
<td>Transcribe</td>
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<tr>
<td>Encrypt</td>
<td>Paraphrase</td>
<td>Translate</td>
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<tr>
<td>Estimate</td>
<td>Predict</td>
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<tr>
<td>Evaluate</td>
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</tbody>
</table>
Knowledge Ability to recall, to bring the appropriate material to mind.

Advise  Duplicate  Realign
Allocate  Elaborate  Rebuild
Announce  Eliminate  Recall
Answer  Enumerate  Recite
Arrange  Exchange  Recognize
Assign  Express  Recollect
Authorize  Extract  Recommend
Brief  Fill in the blank (or complete)
Calculate  Finalize  Recreate
Categorize  Follow directions  Distribute
Certify  Gather  Reexamine
Choose from a list (judgment not included)  Group  Relate
Cite  Identify  Reorganize
Classify  Indicate  Repeat
Coach  Inform  Reproduce
Collate  Instruct  Respond
Compare  Label  Restate
Complete  Learn  Schedule
Confirm  Level  Select (judgment not involved)
Consolidate  List  Separate
Contrast  Locate (on a map or given document)  Sort
Correlate  Match  Specify
Define (give a dictionary definition)  Memorize  State
Describe  Name  Task
Designate  Notify  Teach
Differentiate  Order  Tell
Discriminate  Organize  Template
distinguish  Outline  Train
Distribute  Quote  Translate
Divide  Read  Tune
Duplicate  Elaborate  Rebuild
Eliminate  Recall
Enumerate  Recite
Exchange  Recognize
Express  Recollect
Extract  Recommend
Fill in the blank (or complete)  Recount
Gather  Reexamine
Group  Relate
Identify  Reorganize
Indicate  Repeat
Inform  Reproduce
Instruct  Respond
Label  Restate
Learn  Schedule
Level  Select (judgment not involved)
List  Separate
Match  Specify
Memorize  State
Name  Task
Notify  Teach
Order  Tell
Organize  Template
Outline  Train
Quote  Translate
Read  Tune
Realign  Recorded
Rebuild  Recount
Recall  Recollect
Recite  Recommend
Recognize  Record
Recreate  Reexamine
Relate  Reorganize
Repeat  Reproduce
Respond  Restate
Schedule  Select (judgment not involved)
Separate  Sort
Sort  Specify
State  Task
Tell  Teach
Template  Train
Translate  Tune
Underline  Update
Update
Affective Domain

Characterizing by a Value or Value Complex (Requires receiving, responding, valuing, and organizing)
Ability to internalize values developing a “life style”. The behavior is pervasive, consistent, and predictable.

Act  Devote  Prescribe
Advocate  Disclose  Preserve
Alert  Discriminate  Prioritize
Allow  Display  Promote
Alter  Encourage  Propose
Appreciate  Endure  Qualify
Approve  Enforce  Question
Assess  Ensure  Rally
Assume  Exemplify  Rationalize
Authenticate  Exonerate  Reassess
Behave  Favor  Reserve
Balance  Formulate  Respect
Belief  Function  Retain
Cancel  Imagine  Review
Choose  Incorporate  Revise
Command  Influence  Sell
Complex  Innovate  Serve
Conceive  Judge  Share
Conform  Justify  Support
Conjecture  Listen  Study
Conserve  Maintain  Uphold
Constitute  Modify  Use
Continue  Pattern  Validate
Coordinate  Perform  Verify
Defend  Practice  Vindicate
Develop
Devise
**Organizing** (Requires receiving, responding, and valuing)
Ability to bring together different values, resolve conflicts between them to build an internally consistent value system.

<table>
<thead>
<tr>
<th>Adapt</th>
<th>Defend</th>
<th>Order</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adhere</td>
<td>Establish</td>
<td>Organize</td>
</tr>
<tr>
<td>Align</td>
<td>Explain</td>
<td>Perceive</td>
</tr>
<tr>
<td>Alter</td>
<td>Formulate</td>
<td>Prepare</td>
</tr>
<tr>
<td>Arrange</td>
<td>Generalize</td>
<td>Rank</td>
</tr>
<tr>
<td>Attend closely</td>
<td>Group</td>
<td>Rate</td>
</tr>
<tr>
<td>Categorize</td>
<td>Identify</td>
<td>Recognize</td>
</tr>
<tr>
<td>Characterize</td>
<td>Integrate</td>
<td>Reconnoiter</td>
</tr>
<tr>
<td>Classify</td>
<td>Listen</td>
<td>Relate</td>
</tr>
<tr>
<td>Combine</td>
<td>Listen attentively</td>
<td>Show awareness</td>
</tr>
<tr>
<td>Compare</td>
<td>Modify</td>
<td>Show sensitivity</td>
</tr>
<tr>
<td>Complete</td>
<td>Monitor</td>
<td>Synthesize</td>
</tr>
<tr>
<td>Complex</td>
<td>Observe</td>
<td>Systemize</td>
</tr>
<tr>
<td>Coordinate</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Valuing** (Requires receiving and responding)
Ability to see worth or value in the subject, activity, and assignment. Student is motivated, not by the desire to comply or obey, but by the commitment to the underlying value guiding the behavior. Behavior is consistent and stable making value clearly identifiable.

<table>
<thead>
<tr>
<th>Accept</th>
<th>Endorse</th>
<th>Prefer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adopt</td>
<td>Enjoy</td>
<td>Propose</td>
</tr>
<tr>
<td>Approve</td>
<td>Ensure</td>
<td>Read</td>
</tr>
<tr>
<td>Choose</td>
<td>Exhibit</td>
<td>Report</td>
</tr>
<tr>
<td>Commit</td>
<td>Explain</td>
<td>Sanction</td>
</tr>
<tr>
<td>Complete</td>
<td>Express</td>
<td>Select</td>
</tr>
<tr>
<td>Describe</td>
<td>Form</td>
<td>Share</td>
</tr>
<tr>
<td>Desire</td>
<td>Initiate</td>
<td>Study</td>
</tr>
<tr>
<td>Differentiate</td>
<td>Invite</td>
<td>Work</td>
</tr>
<tr>
<td>Display</td>
<td>Join</td>
<td></td>
</tr>
<tr>
<td>Dispute</td>
<td>Judge</td>
<td>Justify</td>
</tr>
</tbody>
</table>
**Responding** *(Requires receiving)*  
Ability to participate. Seeks out and gains satisfaction from working or engaging in activity.

<table>
<thead>
<tr>
<th>Accomplish</th>
<th>Contribute</th>
<th>Participate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Achieve</td>
<td>Cooperate</td>
<td>Question</td>
</tr>
<tr>
<td>Acknowledge</td>
<td>Demonstrate</td>
<td>Permit</td>
</tr>
<tr>
<td>Advise</td>
<td>Describe</td>
<td>Praise</td>
</tr>
<tr>
<td>Agree</td>
<td>Discipline</td>
<td>Pursue</td>
</tr>
<tr>
<td>Aid</td>
<td>Discuss</td>
<td>React</td>
</tr>
<tr>
<td>Allow</td>
<td>Dispatch</td>
<td>Read</td>
</tr>
<tr>
<td>Announce</td>
<td>Encode</td>
<td>Refuse</td>
</tr>
<tr>
<td>Answer</td>
<td>Execute</td>
<td>Reply</td>
</tr>
<tr>
<td>Anticipate</td>
<td>Follow-up</td>
<td>Report</td>
</tr>
<tr>
<td>Apologize</td>
<td>Give</td>
<td>Request</td>
</tr>
<tr>
<td>Ask</td>
<td>Greet</td>
<td>Respond</td>
</tr>
<tr>
<td>Assist</td>
<td>Help</td>
<td>Resume</td>
</tr>
<tr>
<td>Communicate</td>
<td>Indicate</td>
<td>Seek</td>
</tr>
<tr>
<td>Complete</td>
<td>Inquire</td>
<td>Select</td>
</tr>
<tr>
<td>Complete assignment</td>
<td>Interpret</td>
<td>Show</td>
</tr>
<tr>
<td>Comply</td>
<td>Label</td>
<td>Visit</td>
</tr>
<tr>
<td>Conform</td>
<td>Notify</td>
<td>Volunteer</td>
</tr>
<tr>
<td>Consent</td>
<td>Obey</td>
<td>Welcome</td>
</tr>
<tr>
<td>Contact</td>
<td>Obey rules</td>
<td>Write</td>
</tr>
</tbody>
</table>

**Receiving** *(Ability to receive or to attend to particular phenomena or stimuli.)*  
Divided into three subcategories: awareness, willingness to receive, and controlled or selected attention.

<table>
<thead>
<tr>
<th>Acknowledge</th>
<th>Getting attention</th>
<th>Receive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ask</td>
<td>Give</td>
<td>Reply</td>
</tr>
<tr>
<td>Attend</td>
<td>Hold</td>
<td>Select</td>
</tr>
<tr>
<td>Be aware</td>
<td>Holding attention</td>
<td>Show alertness</td>
</tr>
<tr>
<td>Choose</td>
<td>Identify</td>
<td>Tolerate</td>
</tr>
<tr>
<td>Describe</td>
<td>Listen</td>
<td>Use</td>
</tr>
<tr>
<td>Directing attention</td>
<td>Listen locate</td>
<td>View</td>
</tr>
<tr>
<td>Follow</td>
<td>Name</td>
<td>Watch</td>
</tr>
</tbody>
</table>
**Psychomotor Domain**

**Naturalization** (Requires imitation, manipulation, precision and articulation)
Response is automatic. Ability to experiment, creating new motor acts or ways of manipulating materials out of understandings, abilities, and skills developed. One acts "without thinking."

- Acquire
- Arrange
- Assemble
- Blend
- Break up
- Carry
- Carry out
- Cause
- Clean
- Combine
- Complement
- Complete
- Compose
- Conduct
- Connect
- Constitute
- Construct*
- Contrive
- Control
- Correct
- Create
- Design
- Disconnect
- Dismantle
- Disperse
- Acquire
- Distribute
- Do
- Drive
- Enact
- Encircle
- Enclose
- Establish
- Execute
- Fit
- Handle
- Hold
- Improve
- Incorporate
- Initiate
- Insert
- Invent
- Join
- Lift
- Link
- Load
- Maintain
- Make
- Manipulate
- Merge
- Open
- Operate
- Originate
- Pace
- Perform
- Produce
- Progress
- Raise
- Refine
- Reject
- Relate separate
- Rewire
- Stoop
- Transfer
- Transport
- Unite

*by itself belongs to a lower category*
**Articulation** (Requires imitation, manipulation, and precision)
Higher level of precision: Ability to modify movement patterns to fit special requirements or to meet a problem situation.

<table>
<thead>
<tr>
<th>Articulation</th>
<th>Lead</th>
<th>Relieve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acclimatize</td>
<td>Lead</td>
<td>Relieve</td>
</tr>
<tr>
<td>Accommodate</td>
<td>Lead</td>
<td>Relieve</td>
</tr>
<tr>
<td>Adapt</td>
<td>Modulate</td>
<td>Reorient</td>
</tr>
<tr>
<td>Adjust</td>
<td>Mutate</td>
<td>Reshuffle</td>
</tr>
<tr>
<td>Alter</td>
<td>Mutate</td>
<td>Reshuffle</td>
</tr>
<tr>
<td>Ambush</td>
<td>Navigate</td>
<td>Retool</td>
</tr>
<tr>
<td>Attack</td>
<td>Neutralize</td>
<td>Revert</td>
</tr>
<tr>
<td>Bend</td>
<td>Occupy</td>
<td>Revise</td>
</tr>
<tr>
<td>Break</td>
<td>Orient</td>
<td>Spin</td>
</tr>
<tr>
<td>Bypass</td>
<td>Oscillate</td>
<td>Square</td>
</tr>
<tr>
<td>Change</td>
<td>Pack</td>
<td>Suppress</td>
</tr>
<tr>
<td>Conduct</td>
<td>Patrol</td>
<td>Square</td>
</tr>
<tr>
<td>Deploy</td>
<td>Prevent</td>
<td>Swing</td>
</tr>
<tr>
<td>Direct</td>
<td>Program</td>
<td>Swirl</td>
</tr>
<tr>
<td>Draw</td>
<td>Protect</td>
<td>Tailor</td>
</tr>
<tr>
<td>Evade</td>
<td>Queue</td>
<td>Temper</td>
</tr>
<tr>
<td>Fit</td>
<td>Readjust</td>
<td>Train</td>
</tr>
<tr>
<td>Fix</td>
<td>Rearrange</td>
<td>Transcend*</td>
</tr>
<tr>
<td>Flip</td>
<td>Reconcile</td>
<td>Transpose</td>
</tr>
<tr>
<td>Grasp</td>
<td>Reconstitute</td>
<td>Turn</td>
</tr>
<tr>
<td>Infiltrate</td>
<td>Reconstruct</td>
<td>Twirl</td>
</tr>
<tr>
<td>Inverse</td>
<td>Recover</td>
<td>Twirl</td>
</tr>
<tr>
<td>Invert</td>
<td>Reduce</td>
<td>Twist</td>
</tr>
<tr>
<td>Lay</td>
<td>Regulate*</td>
<td></td>
</tr>
</tbody>
</table>

*by itself belongs to a lower category
**Precision** (Requires imitation and manipulation)

Skill has been attained. Proficiency is indicated by a quick, smooth, accurate performance, requiring a minimum of energy. The overt response is complex and performed without hesitation.

<table>
<thead>
<tr>
<th>Access</th>
<th>Dispatch</th>
<th>Log</th>
<th>Record</th>
<th>Tap</th>
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</thead>
<tbody>
<tr>
<td>Accomplish</td>
<td>Displace</td>
<td>Lubricate</td>
<td>Reestablish</td>
<td>Test</td>
</tr>
<tr>
<td>Achieve</td>
<td>Display</td>
<td>Make safe</td>
<td>Refine</td>
<td>Tighten</td>
</tr>
<tr>
<td>Activate</td>
<td>Dispose</td>
<td>Maneuver</td>
<td>Refuel</td>
<td>Trace</td>
</tr>
<tr>
<td>Actuate</td>
<td>Disseminate</td>
<td>Maintain</td>
<td>Regulate</td>
<td>Transcend</td>
</tr>
<tr>
<td>Adjust</td>
<td>Drive</td>
<td>Manage</td>
<td>Release</td>
<td>Transfer</td>
</tr>
<tr>
<td>Administer</td>
<td>Egress</td>
<td>Master</td>
<td>Relocate</td>
<td>Transmit</td>
</tr>
<tr>
<td>Advance</td>
<td>Elevate</td>
<td>Mount</td>
<td>Remove</td>
<td>Transport</td>
</tr>
<tr>
<td>Align</td>
<td>Emplace</td>
<td>Move</td>
<td>Repair</td>
<td>Treat</td>
</tr>
<tr>
<td>Archive</td>
<td>Employ</td>
<td>Navigate</td>
<td>Replace</td>
<td>Troubleshoot</td>
</tr>
<tr>
<td>Arm</td>
<td>Energize</td>
<td>Obtain</td>
<td>Replenish</td>
<td>Type</td>
</tr>
<tr>
<td>Assemble</td>
<td>Engage</td>
<td>Open</td>
<td>Reset</td>
<td>Unload</td>
</tr>
<tr>
<td>Attach</td>
<td>Enter</td>
<td>Operate</td>
<td>Retrieve</td>
<td>Update</td>
</tr>
<tr>
<td>Attain</td>
<td>Enter</td>
<td>Order</td>
<td>Return</td>
<td>Utilize</td>
</tr>
<tr>
<td>Automatize</td>
<td>Establish</td>
<td>Outdo</td>
<td>Rise</td>
<td>Write</td>
</tr>
<tr>
<td>Balance</td>
<td>Evacuate</td>
<td>Outmatch</td>
<td>Rotate</td>
<td></td>
</tr>
<tr>
<td>Beat</td>
<td>Exceed</td>
<td>Outperform</td>
<td>Save</td>
<td></td>
</tr>
<tr>
<td>Become proficient</td>
<td>Excel</td>
<td>Outrank</td>
<td>Scale</td>
<td></td>
</tr>
<tr>
<td>Breach</td>
<td>Exchange</td>
<td>Outweigh</td>
<td>Score</td>
<td></td>
</tr>
<tr>
<td>Calibrate</td>
<td>File</td>
<td>Overcome</td>
<td>Secure</td>
<td></td>
</tr>
<tr>
<td>Camouflage</td>
<td>Fill out</td>
<td>Overhaul</td>
<td>Self-regulate</td>
<td></td>
</tr>
<tr>
<td>Center</td>
<td>Fire</td>
<td>Park</td>
<td>Send</td>
<td></td>
</tr>
<tr>
<td>Charge</td>
<td>Fit</td>
<td>Pass</td>
<td>Service</td>
<td></td>
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<tr>
<td>Clean</td>
<td>Fuel</td>
<td>Perform</td>
<td>Set up</td>
<td></td>
</tr>
<tr>
<td>Clear</td>
<td>Ground</td>
<td>Place</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Climb</td>
<td>Harden</td>
<td>Plot</td>
<td>Shut down</td>
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<tr>
<td>Close</td>
<td>Hoist</td>
<td>Police</td>
<td>Sight</td>
<td></td>
</tr>
<tr>
<td>Collect</td>
<td>Initialize</td>
<td>Position</td>
<td>Signal</td>
<td></td>
</tr>
<tr>
<td>Connect</td>
<td>Input</td>
<td>Post</td>
<td>Splint</td>
<td></td>
</tr>
<tr>
<td>Cover</td>
<td>Insert</td>
<td>Press</td>
<td>Squeeze</td>
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<td>Debrief</td>
<td>Inspect</td>
<td>Pressurize</td>
<td>Stockpile</td>
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<tr>
<td>Debug</td>
<td>Install</td>
<td>Process</td>
<td>Store</td>
<td></td>
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<tr>
<td>Decontaminate</td>
<td>Install</td>
<td>Procure</td>
<td>Stow</td>
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<tr>
<td>Deliver</td>
<td>Integrate</td>
<td>Provide</td>
<td>Strike</td>
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<tr>
<td>Destroy</td>
<td>Intercept</td>
<td>Publish</td>
<td>Submit</td>
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<td>Diagnose</td>
<td>Isolate</td>
<td>Qualify</td>
<td>Succeed</td>
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<tr>
<td>Dig</td>
<td>Issue</td>
<td>Raise</td>
<td>Supervise</td>
<td></td>
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<tr>
<td>Disassemble</td>
<td>Jack</td>
<td>Range</td>
<td>Support</td>
<td></td>
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<tr>
<td>Disconnect</td>
<td>Key</td>
<td>Rank</td>
<td>Surpass</td>
<td></td>
</tr>
<tr>
<td>Disengage</td>
<td>Launch</td>
<td>Reach</td>
<td>Sweep</td>
<td></td>
</tr>
<tr>
<td>Dismantle</td>
<td>Load</td>
<td>Receive</td>
<td>Take</td>
<td></td>
</tr>
</tbody>
</table>
**Manipulation** (Requires imitation)

Ability to continue practicing a skill or sequence until it becomes habitual. The response is more complex than at the previous level, but learners still are not "sure of themselves."

<table>
<thead>
<tr>
<th>Acquire</th>
<th>Fit (parts together)</th>
<th>Pace</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advance</td>
<td>Follow</td>
<td>Perform</td>
</tr>
<tr>
<td>Assemble (higher level skills)</td>
<td>Guide</td>
<td>Produce</td>
</tr>
<tr>
<td>Break up</td>
<td>Handle</td>
<td>Progress</td>
</tr>
<tr>
<td>Carry</td>
<td>Hover</td>
<td>Raise</td>
</tr>
<tr>
<td>Clean</td>
<td>Improve</td>
<td>Regulate</td>
</tr>
<tr>
<td>Complete</td>
<td>Insert</td>
<td>Rewire</td>
</tr>
<tr>
<td>Conduct</td>
<td>Land</td>
<td>Steer</td>
</tr>
<tr>
<td>Control</td>
<td>Lift</td>
<td>Stoop</td>
</tr>
<tr>
<td>Disconnect</td>
<td>Load</td>
<td>Take off</td>
</tr>
<tr>
<td>Dismantle</td>
<td>Maintain</td>
<td>Track</td>
</tr>
<tr>
<td>Disperse</td>
<td>Make</td>
<td>Transfer</td>
</tr>
<tr>
<td>Distribute</td>
<td>Maneuver</td>
<td>Transport</td>
</tr>
<tr>
<td>Do</td>
<td>Manipulate</td>
<td>Traverse</td>
</tr>
<tr>
<td>Drive</td>
<td>Open</td>
<td>Use</td>
</tr>
<tr>
<td>Execute</td>
<td>Operate</td>
<td></td>
</tr>
</tbody>
</table>

**Imitation** (Ability to learn complex skills overtly.)

Repeating an act that has been demonstrated or explained, via trial and error until an appropriate response is achieved

<table>
<thead>
<tr>
<th>Assault</th>
<th>Disorganize</th>
<th>Outline</th>
<th>Shorten</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assemble</td>
<td>Dissect</td>
<td>Perforate</td>
<td>Simulate</td>
</tr>
<tr>
<td>Attempt</td>
<td>Disturb</td>
<td>Perform</td>
<td>Sketch</td>
</tr>
<tr>
<td>Begin</td>
<td>Divide</td>
<td>Pierce</td>
<td>Slice</td>
</tr>
<tr>
<td>Blueprint</td>
<td>Draft</td>
<td>Pull</td>
<td>Split</td>
</tr>
<tr>
<td>Break up</td>
<td>Draw</td>
<td>Practice</td>
<td>Smell</td>
</tr>
<tr>
<td>Calibrate</td>
<td>Duplicate</td>
<td>Proceed</td>
<td>Start</td>
</tr>
<tr>
<td>Carry</td>
<td>Enlarge</td>
<td>Reinforce</td>
<td>Stay</td>
</tr>
<tr>
<td>Carry out</td>
<td>Fall</td>
<td>Remove</td>
<td>Strengthen</td>
</tr>
<tr>
<td>Carve</td>
<td>Feel</td>
<td>Repair</td>
<td>Stretch</td>
</tr>
<tr>
<td>Construct</td>
<td>Follow</td>
<td>Repeat</td>
<td>Swim</td>
</tr>
<tr>
<td>Copy</td>
<td>Fortify</td>
<td>Replace</td>
<td>Taste</td>
</tr>
<tr>
<td>Creep</td>
<td>Hear</td>
<td>Replicate</td>
<td>Throw</td>
</tr>
<tr>
<td>Cut</td>
<td>Hold</td>
<td>Represent</td>
<td>Try</td>
</tr>
<tr>
<td>Delineate</td>
<td>Imitate</td>
<td>Reproduce</td>
<td>Turn</td>
</tr>
<tr>
<td>Depart</td>
<td>Increase</td>
<td>Respond</td>
<td>Twist</td>
</tr>
<tr>
<td>Depict</td>
<td>Jump</td>
<td>Run</td>
<td>Visualize</td>
</tr>
<tr>
<td>Detect</td>
<td>Lift</td>
<td>Scan</td>
<td>Wear</td>
</tr>
</tbody>
</table>
Diagram  Mimic  Scatter
Disassemble  Mock  See
Discompose  Move  Separate
Disjoint  Organize  Shift

**Note:** * Indicates that the verb by itself is from a lower category; the verb needs to be combined with a verb from the current category to be part of that category. Following is an example using the verb “identify” in the Cognitive Domain.

**Knowledge** (by itself, belongs to the Knowledge category)

Given six food elements differing in nutritional value, the culinary specialist will be able to identify the nutritional value for each food element. This task will be done with at least 80% accuracy.

**Analysis:** (Combined with a verb in the Analysis category, the verb from Analysis takes precedent.)

Given 10 meal groups made of a combination of six food elements, differing in nutritional value, the culinary specialist will be able to identify the nutritional value for each food element and classify them into sets that contain different food groups. These sets will be arranged in ascending order from most nutritional to less nutritional in value. This task will be done with at least 80% accuracy.

**When a verb is found on two categories—with equal weight**

Sometimes the same verb is found in two categories, e.g., classify is listed in both Comprehension and Analysis. The difference considers the content and the task. Comprehension requires the learner to understand the relationship between elements or groups and maybe add some element(s) to existing groups; classifying an element among existing options.

Analysis requires the learner to come up with the classification based on specific characteristics supported by the analysis of such elements. The differences between one category (Comprehension) and the other (Analysis) is explained in the conditions and behavior expected from the audience.
Encl. 3  Condition Decision Tree
CON  What will the learner be given or

CUE OR STIMULUS

Verbal

Textual/Visual

RESOURCE

EPSS

Equipment

IETM

Job aid

COMPLEXITY

Apprentice

Journeyman

Master

Other
Encl 4: Standard Decision Tree

STANDARD  What is the measurement that will indicate successful or acceptable performance?

Accuracy  
  Number of errors  
    Number of correct responses  
      Consistent with established standard  
        Consistent with stated standard  
          Consequences  
            Other  
              Cognitive - general  
                Cognitive - specific  
                  Expressive

Parameter = Accuracy
Open field = definitive information

Parameter = Accuracy
Open field = definitive information
**Encl 5: Process Review Guide**

1. **WORK PROCESS:** Learning Objectives

2. **FUNCTIONAL CATEGORY:** 11. Personnel and/or Organizational Management – Curriculum Development, Maintenance Review, and Control

3. **BRIEF DESCRIPTION OF WORK PROCESS:** To ensure that procedures for designing, developing, implementing, and reviewing learning objectives within the confines of the ILE facilitate a quality learning experience for our Sailors.

4. **REFERENCES:** Please cite the appropriate reference(s) associated with the Process Requirements in paragraph 6 below. There are a number of references that govern learning products.
   
   (a) Navy Guide to Content Design, Development, and Deployment, Part 2, Content Design
   
   (b) Integrated Learning Environment Guidance, ILEGUI1553-ISD-1, Instructional Systems Design and Instructional Design Processes
   
   (c) Integrated Learning Environment Guidance, ILEGUI1553-ISD-2, Interim Assessment Guidance

Because technology advances at a rate faster than instructions can generally be issued, commands are advised to check the following sites frequently:

- Human Performance Center Spider: [https://www.spider.hpc.navy.mil/](https://www.spider.hpc.navy.mil/)
- SECNAVINST 5720.47A Department of the Navy Policy for Content of Publicly Accessible World Wide Web Sites

5. **WORK PROCESS SME(s): ILE POC** is Jerry Best, HPC, N75, DSN: 380-4997, (COMM) (407) 380-4997, email: Jerome.best@navy.mil.
6. **PROCESS REQUIREMENTS:**

**COMMENTS**
List main discussion points in the form of a question that will assist the Reviewer or SME when reviewing the process.

**a. At the Echelon III level**

1. Has the EIII provided written guidance to each subordinate command on how learning objectives will be designed, developed, maintained, and reviewed in accordance with the ILEGUI1553-ISD-3 document?
2. Does the EIII have in place a transition plan or guidance to support the review of legacy learning objectives and to refine legacy content to meet the ILE requirements?
3. Does the EIII command have a periodic review schedule to assist commands with the new methodology?

**b. At the Subordinate Commands level**

1. Did the subordinate command develop or adopt a procedure to design learning objectives incorporating the science of learning and human performance concepts?
2. Did the subordinate command prepare and maintain a traceability matrix for newly developed courses?
3. Does the subordinate command have a plan in place to periodically review learning objectives items to check alignment with assessment, content, and SkillObjects™?
4. Does the subordinate command have prepared checklists and grading rubrics for learning objectives for use by test administrators for performance tests?
7. **QUALITY ASSURANCE KEY METRICS:** Identify the key metrics for measuring performance. These metrics should clearly indicate how “success” of the assessment will be defined and measured, and provide a quick view of how well the assessment development and implementation process is progressing in achieving its intended purpose.

Data collection for metrics should include at a minimum the following:

- Completion of the documentation identified in ILEGUI1553-ISD-1, 2, and 3
- Learner identification procedures
- Traceability Matrix (Crosswalk for linkage with SkillObjects™)
- Percentage of legacy learning objectives refined for warehousing within the ILE repository
- Timelines for refresh of the learning objectives
Encl 6. Checklists and Rating Scales

Example of a checklist for assessing performance in setting up and using a microscope.

<table>
<thead>
<tr>
<th>Learner’s Actions</th>
<th>Sequence of Actions</th>
<th>Learner’s Actions</th>
<th>Sequence of Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Takes slide</td>
<td>1</td>
<td>Skills in which learner needs further training</td>
<td></td>
</tr>
<tr>
<td>Wipes slide with lens paper</td>
<td>2</td>
<td>In cleaning objective</td>
<td>✓</td>
</tr>
<tr>
<td>Wipes slide with cloth</td>
<td></td>
<td>In cleaning eyepiece</td>
<td></td>
</tr>
<tr>
<td>Wipes slide with finger</td>
<td></td>
<td>In focusing low power</td>
<td>✓</td>
</tr>
<tr>
<td>Places drop or two of culture on slide</td>
<td>3</td>
<td>Noticeable characteristics of learner’s behavior</td>
<td></td>
</tr>
<tr>
<td>Adds few drops of water</td>
<td>4</td>
<td>Awkward in movements</td>
<td>✓</td>
</tr>
<tr>
<td>Wipes cover glass with lens paper</td>
<td>5</td>
<td>Slow and deliberate</td>
<td></td>
</tr>
<tr>
<td>Wipes off surplus fluid</td>
<td></td>
<td>Unable to work without specific directions</td>
<td>✓</td>
</tr>
<tr>
<td>Places slide on stage</td>
<td>6</td>
<td>Very rapid</td>
<td></td>
</tr>
<tr>
<td>Looks through eyepiece with right eye</td>
<td></td>
<td>Characterization of the learner’s mount</td>
<td></td>
</tr>
<tr>
<td>Looks through eyepiece with left eye</td>
<td>7</td>
<td>Poor light</td>
<td>✓</td>
</tr>
<tr>
<td>Turns to objective of lowest power</td>
<td>9</td>
<td>Poor focus</td>
<td></td>
</tr>
<tr>
<td>Turns to high power objective</td>
<td>21</td>
<td>Excellent mount</td>
<td></td>
</tr>
<tr>
<td>Holds one eye closed</td>
<td>8</td>
<td>Unable to find object</td>
<td>✓</td>
</tr>
</tbody>
</table>


When crafting a procedure checklist, first observe and study experts performing so you can identify all the appropriate steps. Then:
1. List and describe clearly each specific sub-performance or step in the procedure you want the learner to follow.
2. Add to the list specific errors that learners commonly make.
3. Order the correct steps and the errors in the approximate sequence in which they should occur.
4. Make sure you include a way either to check the steps as the learner performs them or to number the sequence in which the learner performs them.
Example of a rating scale for briefing a solution to a tactical problem

<table>
<thead>
<tr>
<th>Score level = 3</th>
<th>Score level = 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tactical knowledge</strong></td>
<td><strong>Tactical knowledge</strong></td>
</tr>
<tr>
<td>Shows understanding of the situation</td>
<td>Shows nearly complete understanding of the situation</td>
</tr>
<tr>
<td>Uses appropriate methods to assess the situation</td>
<td>Uses some of the appropriate methods to assess the situation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Strategic knowledge</th>
<th>Strategic knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uses relevant outside information of a formal or informal nature</td>
<td>Uses some outside information</td>
</tr>
<tr>
<td>Identifies all the important elements that impact the situation</td>
<td>Identifies most of the important elements that impact the situation</td>
</tr>
<tr>
<td>Selects an appropriate strategy to conduct the maneuver</td>
<td>Selects a successful alternative strategy to conduct the maneuver</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Communication</th>
<th>Communication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gives a complete response with a clear, unambiguous explanation</td>
<td>Gives a fairly complete response with reasonably clear explanations</td>
</tr>
<tr>
<td>Includes an appropriate and complete diagram</td>
<td>Includes an appropriate and nearly complete diagram</td>
</tr>
<tr>
<td>Presents strong supporting arguments to decisions</td>
<td>Presents supporting arguments with some minor gaps</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Score level = 1</th>
<th>Score level = 0</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tactical knowledge</strong></td>
<td><strong>Tactical knowledge</strong></td>
</tr>
<tr>
<td>Shows limited understanding of the situation</td>
<td>Shows no understanding of the situation</td>
</tr>
<tr>
<td>Uses or fails to use appropriate methods of assessment</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Strategic knowledge</th>
<th>Strategic knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attempts to use outside information</td>
<td>Uses irrelevant outside information</td>
</tr>
<tr>
<td>Fails to identify important elements that impact the situation</td>
<td>Fails to indicate which elements are appropriate to the situation</td>
</tr>
<tr>
<td>Selects an inappropriate strategy for the maneuver</td>
<td>The strategy does not address the maneuver</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Communication</th>
<th>Communication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Has some satisfactory elements, but lacks significant parts in explanation</td>
<td>Communicates ineffectively</td>
</tr>
<tr>
<td>Includes a diagram that is unclear or difficult to interpret</td>
<td>Diagrams misrepresent the maneuver</td>
</tr>
<tr>
<td>Appears unprepared, “winging it”</td>
<td></td>
</tr>
</tbody>
</table>

Encl 7: References


INTEGRATED LEARNING ENVIRONMENT INTERIM GUIDANCE 1553-ISD-1

Subj: INTERIM GUIDANCE FOR NAVY INSTRUCTIONAL SYSTEMS DESIGN AND INSTRUCTIONAL DESIGN PROCESSES

Ref: (a) Navy Guide to Content Design, Development, and Deployment (CD3)
     (b) Integrated Learning Environment Guidance, ILEGUI1553-ISD-2, Interim Assessment Guidance
     (c) Integrated Learning Environment Guidance, ILEGUI1553-ISD-3, Interim Learning Objective Statement
     (d) MIL-HDBK-29612-2A, Instructional Systems Development/Systems Approach to Training and Education (31 August 2001)
     (e) MIL-PRF-29612B, Performance Specification Training Data Products (31 August 2001)
     (f) DI-SESS-81520B, Instructional Media Design Package
     (g) ILE Implementation Team Charter
     (h) Human Performance Professional Working Guidelines
     (i) NETCINST 5040.1, Naval Education and Training Command Area Visit Program
     (j) Executive Review of Navy Training, 2001
     (k) OPNAV Instruction 1500.73, Development, Acquisition, and Management of Navy Interactive Courseware

Note: A guidance document for the specific processes involving legacy content will be released in 1st qtr 06.

Encl: (1) ILE Implementation Team
     (2) Sample Command Process Review document
     (3) Relationship of the four quadrants of the Human Performance System Model (HPSM) with the Human Performance Improvement (HPI) Model.
     (4) Government-Commercial-off-the-Shelf Analysis Process
     (5) Sample Statement of Work (SOW)
     (6) Sample Statement of Objectives (SOO)
     (7) Sample Data Requirements List (CDRL)
     (8) Sample Training Project Management Development Plan (TPMDP)
Instructional Systems Design is the process that governs how independent entities within a larger organization will operate as a single, cohesive unit. In the simplest of terms, ISD (reading the acronym from right to left instead of left to right) is the process used to design systems (people and technology) that are responsible for the instructional elements of a larger organization.

- Systems Thinking

The approach outlined in the ISD/ID Processes document is grounded in two major constructs:

### MISSION: The Integrated Learning Environment (ILE)

The ILE transformation strategy and architecture bring together the program management, functional, and technical integration of processes, products, and people involved in capturing, validating, and deploying instructional...
• Quality

**Systems Thinking.** The first construct comes from Systems Thinking and is based on three fundamental principles (Haines, 1998):

- Openness: a system that accepts inputs from its environment, acts on the inputs to create outputs, and releases the outputs to its environment.
- Interrelationship: the workings or changes on one component within a system that cause a change or impact a change in another component or components.
- Interdependence: the health or working efficiency of one component is dependent upon the working efficiency of another component or components.

Systems thinking views organizational problems as systems problems and seek systems-integrated solutions. The ILE Implementation Team (See Encl 1) seeks to identify and solve patterns of problems by detecting patterns of relationship and interdependence and looks for leverage points that can lead to beneficial changes throughout the integrated systems of naval education and training.

The world of systems thinking is a circular entity of feedback loops, not a linear process with a finite end. See Figure 1, Systems Thinking Model.

---

![Figure 1. Systems Thinking Model](image)

**Quality.** The second major construct is the orchestrated commitment to quality. The adoption of a quality-management system is a strategic decision that is implemented throughout the entire system. Day-to-day operations, processes, and people are guided by a loyalty to the organization and to producing “quality products.” The Naval Education and Training Command (NETC) learning organization can neither produce nor accept anything less for its Sailors.
The approach of linking the two constructs – Systems Thinking and Quality – is introduced in the American National Standard: Quality Assurance for Application of ANSI/ISO/ASQC Q9001 or Q9002 to Education and Training Institutions.

By adopting systems thinking and quality, NETC can provide to all those engaged in managing, producing, and delivering learning the processes, tools, and measures to ensure content meets training needs. However, while content specifies what is to be learned and how it is to be assessed, content does not include a provision for quality control of the internal processes.

**The Revolution in Content Development.** It is important to understand that the Revolution in Training (RiT) has necessitated an equal degree of revolution and change for the content used by the Navy and the processes for creating such content. In brief, the new Navy Content Object Model (NCOM) details how all Navy content will now be designed, developed and distributed in a very modular, dynamic and mass customized way.

The most significant changes for ID and ISD are as follows:

- The design and development of learning objectives is now a fully distinct and separate activity from that of designing and developing content. The recently completed Navy Learning Objective Statement specification (NLOS) provides the syntax and semantics for capturing and expressing learning objectives and these are also now fully connected to the Human Competency Objects and Skill Objects data.
- The content development process and content development contracts, will start with the receipt of a set number of learning objectives as per NLOS and as per NCOM there is a well defined and 1:1 relationship that specifies that one Enabling Learning Object (ELO) is the content necessary to support one and only one Enabling Objective (EO), and similarly one Terminal Learning Object (TLO) is made up the ELOs necessary to support one and only one Terminal Objective. NCOM also specifies that a SCORM Shareable Content Object (SCO) is at the ELO level.
- Perhaps the most important change to note that there is now a very distinct separation between the design and development of the “raw content” and the design and development of the ELOs and TLOs which are the instructionally sound assemblies of these raw assets. The actual content is referred to in NCOM and SCORM as the Raw Assets, or the smallest level of granularity and the actual content itself. (text, graphics, illustrations, audio, video, simulations, test questions, etc.) All ELOs and TLOs are the result of selecting the right raw assets and then assembling them with the addition of sequencing and navigation (as per SCORM 2004 and NCOM). This will also work in reverse in the sense that when ELOs and TLOs are developed and handed off to the Navy, they will be disaggregated back down to the raw asset level when they are imported into the Navy content management.
systems and stored in Navy content repositories. Similarly this separation, disaggregation or disassembly will pull out and store separately all other aspects of the ELOs and TLOs, including their metadata, sequencing information, navigation, etc. This is in stark contrast to the previous models and ISD/ID where the content process began by creating learning objectives, developing all or most of the actual content and creating finished consumable learning content in the form of courses and courseware.

See the Navy Content Design Development and Distribution document (commonly referred to as CD3) for a much more in depth and detailed explanation of the full Navy Content Object Model and other guidance for Navy content, and the recently completed Navy Learning Objective Statement specification (NLOS) document for similar details on learning objectives.

This document provides guidelines for a comprehensive design and development process and to provide configuration management guidelines for ongoing support of Integrated Learning Environment (ILE) Program designed products. The processes defined within this document apply to all ILE Echelon III Commands. This document is not intended to be a recipe for the design effort described herein, rather it identifies key elements and additional resource documents that may be used, as appropriate, in order to move management decisions to the lowest level possible without negatively impacting or degrading the systems within the ILE environment. In all cases, both the design team and the client and/or customer must agree upon and execute a specific approach for each design project.

Command Review Process. The Area Visit Team, led by the NETC Inspector General and augmented with subject matter experts in operational processes from Echelon III and IV commands, assists EIIIs and their subordinate commands with process improvement via the Area Visit Program (AVP). The AVP is similar to the Mission Capability Assessments (MCA) NETC conducted prior to the Revolution in Training (RIT) and is closely modeled after the current NAVINSGEN Area Visit Program. The focus of the site visits is to assess the success of the RIT by reviewing work processes and conducting focus groups. The advantage of the AVP over the old MCA is that multiple training commands across echelons in an area will be visited vice a single command. The areas are drawn similar to the current CNI regions. In addition, the majority of NETC training commands will be visited on a two-year cycle. See NETCINST 5040.1

Internal quality control and audits will ensure a continued assessment of not only the content, but also of the supporting organizational systems and processes. Each Echelon III and subordinate commands (i.e., training commands, schools, systems) within the ILE will have fair benchmarks that have been clearly defined and articulated by the ILE Management Team. Additionally, the benchmarks will be measurable. See Encl 2, Sample Command Process Review. The NETC Area
Visit team will collect data and lessons learned, to identify areas for process improvement, and to disseminate improved processes.

2. **Policy.** The Instructional Systems Design process, grounded in systems thinking and a commitment to quality, serves as the operational tenet for all components conducting business within the ILE. The purpose for adopting this approach is to place decision-making at the most appropriate level within the organization.

- The ILE Program Management Team will make decisions that impact the entire learning environment, its interrelationships, and interdependencies.
- The ILE ISD/ID Processes document will provide guidance for the Echelon III (EIIIs) commands to determine the level of responsibility and decision-control parameters within their respective command and their subordinate commands. Each process will be outlined and defined with a procedure and the required documentation.
- EIIIs will adapt the processes outlined in the ISD/ID guidance to their specific organizational mission and requirements. Further, EIIIs will maintain documentation to support the adaptations made.
- Internal audits provided by the NETC Area Visit program will verify that the adaptations, procedures, and documentation align with the ILE guidance. See Figure 2, Decision-making Authority and Parameters.

![Diagram showing the flow of ISD/ID Process Document, Command Review, and Echelon III's involvement in adapting ISD/ID to specific needs and preparing guidance.]

**Figure 2. Decision-making Authority and Parameters**

Note: The Area Visit Program Review may be conducted either at the Echelon III command headquarters or at any of the training sites. However, representation comes from EIII/IV levels.
The goal is to move management decisions to the lowest level possible. Level 1 decisions affect the ILE system and are made at the ILE Implementation Team or Headquarters level. They are non-negotiable and systems operational. Changes to these processes must be carefully considered so as to not negatively impact or degrade the systems within the ILE. Level 2 decisions are made by the Echelon III (EIII) Commands. EIIIs have the authority to interpret and execute the design and development process within their command.

Content placed within the ILE is the property of the government and it is the government’s responsibility to ensure initial requirements have been properly defined (i.e., project scope) and are being performed, and that ongoing measurement and evaluation (see the Human Performance System Model (HPSM) Quadrant 4, Evaluation) takes place to provide feedback and indicators as to how well performance goals are being met.

The ILE, Content Lead, is the claimancy’s process owner for this document.

3. **Action.** The implementation of this guidance is the responsibility of the Navy Education and Training Command Echelon III Component Commands. All Echelon III Commands (EIIIs) will ensure new content designed and developed for warehousing within the ILE meets the specifications identified in this document as well as other ILE documents, e.g., Functional Requirements Document, Technical Specifications, etc.

When legacy content is revised or repurposed, the content must be rewritten to reflect the new specifications. (Note: a guidance document for the specific processes involving legacy content will be released in 1st qtr 06.) As EIIIs meet with the ILE Content Lead to develop course/content prioritization lists, the new specifications must be written into the statements of work.

**Delegation of Authority.** Implementation and evaluation of developed ILE content will be conducted at the EIII level. As the Client that provides the funding for content projects, EIIIs have the latitude to delegate analysis, design, development, implementation, and evaluation activities of ILE content to subordinate commands and contracted parties as they see fit. Government designates responsible for training and education content are responsible for ensuring the content product’s quality and timely delivery. The Echelon IV and below subordinate commands are the customers of the content development effort. The relationship between client and customer may overlap; however, once oversight authority is delegated, the client entity should not interrupt the production process without good cause. Interruptions and changes at this stage require convening and approval from a Change Board.

In the event that content to support training requirements cannot be sufficiently designed and developed in accordance with this guidance, the EIII representative should contact the ILE Content Lead.
4. **Background.** The Navy’s human capital strategy, “Sea Warrior,” is one component of the Navy’s modernization agenda. The Revolution in Training has brought about a sweeping change in the way the Navy views the delivery and focus of its learning programs to ensure current and future readiness by delivering executable capabilities in a fiscally responsible manner.

As part of Sea Power 21 and Sea Warrior, the Chief of Naval Operations (CNO) initiated the Revolution in Training (RIT) to revamp the Navy’s organization, methods, and information technologies, and to create an entirely new way of training and educating Sailors. The ultimate goal of the RIT is to transform the Navy’s education and training commands into a single, agile and efficient operation, housed within a responsive learning environment. This new organization will provide a richness and depth of opportunity to develop, support, and credential the professional and personal knowledge of Sailors so they can succeed in their careers and in life.

To achieve this goal, the RIT has three guiding principles:
1. Develop a systematic approach to education and training that uses precepts and methods based on the science of learning, with human performance as the guiding metric of success.
2. Develop a continuum of learning to support Sailors throughout their lives, whether active duty or retired.
3. Support Fleet mission areas by matching a Sailor’s education, training, and job assignments to the skills needed by Fleet missions and the Sailor’s desires for career development.

As stated in the ILE Functional Requirements Document, *Content is the most critical component of the ILE. The “right content” is tied to readiness, validated by meeting mission requirements, and is directly linked to authoritative sources. Critical to content is the need to have processes in place to ensure updates are quickly realized across the entire system from source material to learning content, as needed.*

SkillObject taxonomy provides the framework for the ILE to define job/position requirements for position skills, unique knowledge, tools, resources, skills and abilities. Using SkillObjects to develop Learning Objective Statements (LOS) establishes content linkage with the full spectrum of work proficiency required for mission readiness and professional expertise.

The SkillObject Framework provides work, worker, and workplace descriptors. Figure 3 illustrates the SkillObject framework and composite relationships.
Utilization of SkillObjects provides the fundamental unit for content development which aligns mission-driven, work-based requirements to prescriptive learning solutions.

5. **Research-based.** The guidance provided by this document is based on current instructional systems design principles and instructional design research and practice. The Science of Learning, Human Performance Theory, and Navy’s Human Capital Strategy are also utilized to provide research-oriented guiding principles. There is a tremendous body of knowledge that supports sound instructional decisions. As can be found within any research are opposing views. To expedite the design and development of content, the ILE Content team has elected to begin with a widely used taxonomy developed by Bloom, Englehart, Furst, Hill, & Krathwohl (1956), with additional input from other noted researchers (Gronlund, 1995; Dick, Carey, & Carey, 2001; Heinich, Molenda, & Russell, 1993; Kibler, 1981; Krathwohl, Bloom, & Masia, 1964; Mager, 1984; Morrison, Ross, & Kemp 2004; Rothwell & Kazanas, 2004; and Smith & Ragan, 1999).

6. **Assumptions.** Utilization of the Instructional Systems Design Model combined with the Human Performance System Model assumes a sound basis for analysis of learning requirements, development of appropriate solutions, implementation best practices, and authoritative formative and summative evaluation strategies. Other assumptions include availability of and access to professional expertise and skill sets, utilization of synchronous and asynchronous collaborative learning methodologies, integration with subject matter experts, and incorporation of standardized content review procedures for analysis, design, development, implementation, and evaluation of learning requirements and learning solutions.

7. **Human Performance Technology.** Human Performance Technology is a systematic method for finding cost-effective ways to help people perform their jobs better. It is a discipline that applies systems thinking with the goal of aligning and improving organization performance. It examines the whole organization and
its environment (including human factors), not just individual jobs and tasks. It focuses both on the systems within an organization and on the individuals who provide input to those systems. It does not focus solely on training or knowledge/skills-related issues. See Ref H. This systematic method involves a 4-step process, which includes:

- Examine whether things are working as they should.
- If they are not, determine why.
- Decide what to do in order to make them work as they should.
- After implementation, measure and evaluate the effectiveness of the chosen solution.

The Executive Review of Naval Training (ref J) identified the 4-Quadrant Human Performance System Model, see Figure 4, as the process structure for implementation of a performance-based systems capability. This cyclical model defines organization and individual performance requirements, establishes how best to achieve this performance, develops the necessary tools or products to enable it, implements the solution set, and provides feedback based on an evaluation of the outcomes. By following this systematic iterative process the Navy can function while continually learning, adapting, and rejuvenating itself.

A Human Performance System Model

<table>
<thead>
<tr>
<th>Quadrant 1: Define Requirements</th>
<th>Quadrant II: Define Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Establish Performance Standards &amp; Requirements</td>
<td>Design Human Performance Solutions</td>
</tr>
<tr>
<td>Implement &amp; Test Intervention; Evaluate “Product of Plan”</td>
<td>Develop, Build, &amp; Integrate Tools</td>
</tr>
</tbody>
</table>

Figure 4. Human Performance System Model

Quadrant 1: Define Requirements. The goals of Q1 are to establish the human performance standards and requirements and to identify inhibitors to performance. In this phase, job requirements are linked from individual job tasks all the way up to the specific Navy Mission Essential Task Lists (NMETLs) and Joint Military Essential Tasks (JMETs) they support. This effort also establishes
the linkage to civilian job equivalents. This effort ultimately leads to the Five Vector Model.

Quadrant 2: Define Solutions. The goals of Q2 are to design human performance solutions, determine return on investment, and to draft solution recommendations. Performing gap analysis, gathering data on solutions, comparing solutions, and developing the situational analysis report are all found in this quadrant.

Quadrant 3: Development Components. The goal of this quadrant is to design, develop, and integrate the tools established in the previous quadrant. The steps performed in this stage will depend on the component to be developed. Examples of components that can be produced during this stage include content development or performance support tools. This document details the efforts of Q3 associated with content design and development.

Quadrant 4: Execute and Measure. The goal of this quadrant incorporates execution and measurement of the chosen solution(s). This stage includes collecting data on measures of performance and measures of effectiveness, analyzing the results, comparing the results with the baseline and reporting the results. The cyclical nature of the HPSM feeds the results of Q4 back to Q1.

**Human Performance Improvement (HPI) Process.** The HPI process model, see Figure 5, is the Human Performance Center’s recommended approach to applying the practice of human performance technology. It is a results-based, systematic approach to identifying, assessing, and resolving performance issues within the framework of the organization as a system. The HPI model is essentially an extension of the HPSM, providing a more detailed and thorough explanation of the steps involved in assessing performance deficiencies.
Figure 5. Human Performance Improvement Process

Because the HPI process focuses improvement efforts on the organization and focuses on accomplishments rather than behaviors, the Navy must shift away from the tendency to think only within the training realm, and must begin to think of starting at the top (organization level) rather than at the bottom (individual Sailor) when applying performance improvement methodologies.

The HPSM is a simple graphic that unintentionally hides what is a complex set of processes with many layers of interpretation. The HPI process serves as a more thorough guide to the steps for improving performance. (See Encl 3 for a breakdown of the relationship of the four quadrants of the HPSM with the HPI process.)

Following the HPSM, one eventually comes to Quadrant III, Develop Components. It should be understood that not all performance problems may be solved with training. However, the remainder of this document deals with the design and development of content as a learning intervention or training solution.
8. **Science of Learning.** The ILE ISD/ID Model supports the Navy human capital strategy by specifying a standard content development process based on the Science of Learning and its underlying disciplines. Science of Learning draws from research on human development, learning and transfer, cognitive psychology, social psychology, anthropology, and neuroscience (Bransford, et al, 2000). Content developed based on the ILE ISD/ID Model (IIM) supports the Navy’s overarching goal to deliver the skill sets necessary to prepare Sailors to go on to team training. To support the Navy’s goal to modernize its professional education, the ILE will house IIM-based content that will allow implementation of learning solutions that include modalities of e-learning, coaching sessions, simulations, and blended learning solutions in addition to the traditional classroom-based method.

The Science of Learning Division of the Human Performance Center (HPC) has defined three primary categories of Science of Learning (SL) interventions.

- **Conversions.** Using SL theories, technologies, and best practices to mitigate the impact of changing the delivery medium of content (synchronous or asynchronous via the web; videoteletraining; mobile team training; computer-based or enhanced, etc.)
- **Migrations.** Using SL theories, technologies, and best practices to move content in response to emerging needs (adding a new module, adapting the content to changing performance gaps, etc.)
- **Innovations.** Using SL theories, technologies, and best practices to maximize the impact of innovative learning endeavors (e.g., changing a content from individualized to team-based to better produce a full-up-round graduate, feasibility of comprehensive OBT/EPSS systems, etc.)

Additionally the Human Performance Detachments may assist Echelon Ills and subordinate commands with:
- **Curricular Checkups.** Reviewing legacy content in advance of some subsequent manipulation to make certain that any flaws get corrected rather than carried into a new iteration.

9. **Instructional Design Process.** The ILE strategy identified in this document integrates the processes of Analysis, Design, Development, Implementation, and Evaluation (commonly referred to as the ADDIE model) with the HPSM 4-Quadrant Model in order to align learning requirements and learning solutions with measurable, performance-based learning objectives. Figure 6 illustrates the relationship between the ADDIE Model and the HPSM Model.
The ILE Content Team has elected to integrate the instructional design model (ADDIE) process steps with the Human Performance System Model (See Figure 4). Process Maps and accompanying component identification/clarification are provided for each HPSM Quadrant/ID construct in order to establish a standardized procedural framework for prescriptive content development and evaluation of learning interventions.

This document serves as the baseline needed at the present time to guide the development of content under the auspices of SkillObjects™, work-related elements, learning events, and learning objectives. Legacy content will be reviewed and re-engineered under a separate ID document.

10. ILE Design and Development Paradigm. The shift from developing self-contained courses to creating shareable content requires sophisticated skills sets that are achieved through formal training and experience. Using available personnel who, though willing, do not have necessary training and experience, is inefficient and risky. Unskilled personnel working in a web-enabled collaborative environment could unintentionally cause problems with content integrity. Therefore, the ILE Content Lead mandates that all personnel working with content that will be housed within the ILE have the skill sets identified in Table 1 or that the command responsible for the personnel provide the necessary training and certifications prior to assigning the individual to work on the collaborative design or development systems.
Table 1. Recommended Instructional Design & Development (IDD) Skill Sets and Qualifications

<table>
<thead>
<tr>
<th>Team</th>
<th>Academic/Educational Qualifications</th>
<th>Skills/Abilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content-Subject Matter Expert (SME)</td>
<td>• Degree or certification in specific content area assigned and/or&lt;br&gt;• Extensive knowledge of content area assigned and&lt;br&gt;• Extensive job-related/work experience in specific content area assigned</td>
<td>• Analyze accuracy of content&lt;br&gt;• Identify currency of content as related to training need&lt;br&gt;• Analyze relevance of content as related to training need&lt;br&gt;• Analyze suitability of content for target audience&lt;br&gt;• Analyze completeness of content relative to training need&lt;br&gt;• Associate learning objectives to tasks</td>
</tr>
<tr>
<td>Design</td>
<td>• Degree or certification in Instructional Design or Instructional Technology and&lt;br&gt;• Strong academic and research background and/or&lt;br&gt;• Extensive knowledge of content design and development and&lt;br&gt;• Extensive job-related/work experience in content/instructional design and/or teaching/training</td>
<td>• Write/identify correct learning objectives&lt;br&gt;• Create/identify assessments at various levels of the Bloom’s Taxonomy&lt;br&gt;• Analyze content/learning categories relative to training needs&lt;br&gt;• Embed adult learning principles in content/learning modules&lt;br&gt;• Apply standard instructional design principles&lt;br&gt;• Apply design principles associated with shareable content objects&lt;br&gt;• Sequence content for learning effectiveness</td>
</tr>
<tr>
<td>Technical (programmers)</td>
<td>• Degree in Computer Science or Information Technology or relative Technical Certification(s) and/or&lt;br&gt;• Extensive knowledge of</td>
<td>• Proficiency with various operating systems such as Windows 2000/20003 server, Exchange 2000/2003 server, UNIX and protocols</td>
</tr>
</tbody>
</table>
### Team | Academic/Educational Qualifications | Skills/Abilities
--- | --- | ---
**Network Operations** | • network operations, hardware and software installation, setup, configuration and usage and  
• Extensive job-related/work experience in technology, especially complex management systems | • Thorough knowledge and understanding of Windows 2000/XP, Active Directory, browsers, firewalls, routers, hubs, switches, Web Server Administration & Maintenance, etc.

**Developers (instructional technologists, media specialists)** | • Degree in Instructional Technology or relative Technical Certification(s) and/or  
• Experience and knowledge in web development tools and web type products and designs and  
• Extensive job-related/work experience in technology | • Proficiency in standard navigation principles  
• Proficiency in standard design principles  
• Proficiency in web type products, designs, and tools such as ASP.NET, C++, XML, Web Services and Database Access, Layout Skills, Web User Interface Design, Web Graphic Design, Web Savvy, Creative Services, HTML, Data base Integration, etc.

11. **Analysis.** What triggers a learning intervention? Is there a mission/job/equipment/personal performance issue? Do we begin with "raw material" and seek to instill the knowledge, skills, and abilities required for identified job performance? Does the learner need to progress from one level of proficiency to a higher level of proficiency? Is there a requirement for transition from one job to another, related (or unrelated) job? Does a mission require a unique skill set? Does new equipment/technology deployment generate a skill set requirement?

Any and all information found that defines, describes, or quantifies a learning or training requirement(s), is the **INPUT** to the instructional analysis process. The Analysis Process Chart, Figure 7, provides the minimal steps that must be
followed to provide new content based on the linkage among SkillObjects, tasks, and learning objectives.
Given a learning or training requirement, the following process steps with accompanying resources are followed or applied:

1. Identify the job/competency/intent to be trained.
2. Determine if the performance standard exists. If not, then create the performance standard.  
3. Identify the required level of proficiency for the skill set required
4. Identify the Critical Tasks, Knowledge, Skills, tools, and resources (based upon Importance, Consequence of error, and Frequency data)
5. Group tasks by SkillObject
6. Using the Importance Metric, prioritize core tasks, subtasks, and procedures.
7. Identify the training characteristics (e.g. how long it takes to learn, coordination/teaming requirements, chain of command, likely performance errors and remediation strategies)
8. Identify the training conditions (e.g. use case/context, may include platform, environmental, battle, time pressure, stress level, changing equipment/tools)
9. Utilize the Job Similarity Metric, the Key Job Capabilities Metric, and the Job Critical Skills Metric to identify the training gaps.

26 Not all training requirements will be jobs. For example, if an EI directive is issued to conduct emotional well-being training, then the performance standard for that competency would have to be created.
10. Identify the desired outcomes (cognitive, affective, psychomotor, verbal, social) for each core task, core subtask, or procedure
11. Utilize the LOS Verb Repository for the appropriate Learning Object Statement verb
12. Identify criterion for acceptable performance (quality, quantify, speed)
13. Generate the Learning Objective Statement (the OUTPUT from the Learning Analysis Process)

To design and develop content based on this analytical process, the team that provides the analytics must be skilled and focused in specific areas. Table 2 describes the team that should be assembled to conduct the Analysis process. The command charged with analysis may or may not have the expertise in house. In the event the command does not have resident expertise, they are advised to reach back to the ILE Content Lead or HPC and request assistance.

Table 2. Analysis Team Roles

<table>
<thead>
<tr>
<th>Team Member</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training/Education SMES</td>
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<td>Learning Objective Development</td>
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<tr>
<td>Skills Analysts</td>
<td>SkillObject Data Analytics &amp; Alignment</td>
</tr>
<tr>
<td>Human Performance Technologist</td>
<td>Performance analysis</td>
</tr>
<tr>
<td>Science of Learning Practitioner</td>
<td>Performance-based learning assessment</td>
</tr>
<tr>
<td>Human Systems Integration Specialist</td>
<td>Human Factors analysis</td>
</tr>
<tr>
<td>(as needed)</td>
<td></td>
</tr>
</tbody>
</table>

Some of the members of this team may also assist with one or more of the follow-on processes. The HPT serves as Team Lead for the Analysis process and is responsible for the accuracy of the Analysis process documents.

Table 3. Analysis Process Implementation Responsibility

<table>
<thead>
<tr>
<th>Process Block</th>
<th>Responsibility Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Policy and Guidance</td>
<td>Level 1 – ILE Operational</td>
</tr>
<tr>
<td>Identify Job to be Trained</td>
<td>Level 2 – EIII Executable</td>
</tr>
<tr>
<td>Identify Level AJM</td>
<td>Level 2 – EIII Executable</td>
</tr>
<tr>
<td>Identify Critical Tasks</td>
<td>Level 2 – EIII Executable</td>
</tr>
<tr>
<td>Group Tasks by SkillObject</td>
<td>Level 2 – EIII Executable</td>
</tr>
<tr>
<td>Prioritize Core Tasks, Core Subtasks &amp; Core Procedures</td>
<td>Level 2 – EIII Executable</td>
</tr>
</tbody>
</table>

Table 3. Analysis Process Implementation Responsibility (continued)

<table>
<thead>
<tr>
<th>Process Block</th>
<th>Responsibility Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify Training Characteristics</td>
<td>Level 2 – EIII Executable</td>
</tr>
<tr>
<td>Identify Training Conditions</td>
<td>Level 2 – EIII Executable</td>
</tr>
<tr>
<td>Identify Training Gaps</td>
<td>Level 2 – EIII Executable</td>
</tr>
<tr>
<td>Identify Outcomes for Each Core Task, Core Subtask &amp; Core Procedure</td>
<td>Level 2 – EIII Executable</td>
</tr>
<tr>
<td>Identify Performance Standards</td>
<td>Level 2 – EIII Executable</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>Generate Learning Objective Statements</td>
<td>Level 2 – EIII Executable</td>
</tr>
<tr>
<td>Command Review</td>
<td>Level 1 – ILE Operational</td>
</tr>
</tbody>
</table>

EIIIs have the authority to interpret, adapt, and execute the analysis process steps for their subordinate commands. Level 2 decisions should be documented and the processes provided to the subordinates.

12. Design. Projects which take the time at the beginning of the effort to conduct an accurate analysis and create a solid design plan are more efficient and effective than those which launch into development with little attention to the preliminary steps. One would not build a house without architectural drawings. Content development is too labor intensive and expensive to approach development without a solid plan.

The design phase ensures the systematic development of the content. The overall objective of design is to conduct a systematic planning and ideation process prior to the development of content. Instructional design is distinguished from other forms of instructional planning by the level of precision, care, and expertise that is employed in the process. Instructional design involves the consideration of many factors that may affect or be affected by the implementation of an instructional plan. At its most basic level, the instructional design phase ensures the systematic development of the content.

The sequence of the design process shown in Figure 8 provides a macro-level view of the overall process and its interaction with the analysis and implementation processes. In practice, these events may be performed sequentially, some may be unnecessary based on the content and strategies, iteration among events may be required, or a different sequence may be used. Various factors affect the sequence or scope of events such as service needs, scope, or complexity of the design project, etc. The events in the design process to be applied and their sequence should be documented in the project management plan.

NOTE: Figure 8 can be used in lieu of or in conjunction with to document and manage processes/sub-processes associated with design. Key or unique design engineering and related technical and administrative support processes can also be depicted in a flowchart format and managed or assessed using related process worksheets.
Design Process Summary

The Government Project Lead (PL) has overall responsibility for managing the design process defined in this procedure. Design plans influence the process for a specific project; however, responsibilities and activities needed to define technical requirements, documentation, and all necessary review and verification/validation activities also need to be defined. Design changes are identified, documented, reviewed, and approved by authorized personnel before their implementation and configuration control is carried out and maintained. The PL reviews all data related to the planning process, initiates appropriate corrective/preventive action, and provides trend data and related recommendations to Customer or the ILE Content Lead.

A number of organizations and individuals provide input to the design process. The Macro-level Design Process Flowchart (Figure 8) depicts the high level steps of the process and shows how outputs from analysis when combined with the addition of Human Performance attributes influence the design process. This document provides overarching guidance for the design of ILE content. After
analysis, should the decision be made to proceed with design, the following steps will provide the necessary inputs to development.

- Review Analysis Output
- Write Product Specifications and Scope
- Produce the Design Package
- Conduct the Learning Hierarchy Analysis
- Determine Instructional Strategy
- Conduct a Media Analysis
- Design the Capability Solution
- Send the solution on to the Development Team

Before the Design Process can begin, the following questions must be addressed:

1. Has an analysis been conducted?
2. Is adequate Mission Information available?
3. What are the Human Performance attributes?
4. Does a Business Case exist?

If the answer to any of these questions is negative, then they must be addressed by the PL with the Design Team and Customer before design can commence.

**Review Analysis Outputs**

While reviewing analysis outputs Instructional Designers will learn as much as they can about the environment in which the learners will be trained, about the learners themselves, and about the tasks for which the learners must be prepared.

The following steps are employed to Review Analysis Outputs:

- Review facilities analysis, if applicable
- Validate existing job/task statements and develop a Training Task List of validated tasks that require a training solution for the performance of skills sets. This list provides a component of baseline data to help make decisions about courseware development and contains sorted tasks that require training
- Review training technology options
- Validate universal and joint mission tasks by working with the HP and SME
- Conduct a resource search (e.g., Reusable Learning Objects, assets, existing courseware or content, etc.) Ref K, and Encl 4
- Review configuration audit of the training hardware and software
- Once these steps are accomplished, a Broad Scope of the Training Solution (i.e., description of the training solution that is provided to the development team) is developed. The purpose of this document is to provide requirements to identify needed resources (i.e., people, money, equipment, etc.). The document provides a
broad scope of the affective, psychomotor, and cognitive domains, provides tasks with operational definitions (e.g., recall/recognition, concept acquisition, rules/principles, problem-solving), learning outcomes, inputs to the cost model, possible delivery requirements, learner target population, prerequisite requirements, primary/secondary target audience information, and categorized learning levels. It also provides functional characteristic requirements including a preliminary description of the training system, SCORM (for more information go to http://www.adlnet.org), Section 508 (for more information go to www.section508.gov), and System Security Authorization Agreement (SSAA) certification requirements (refer to DoD Instruction 5200.40 and DoD Manual 8510.1-M), and technical specifications.

- The final step in the process is to determine if the project will be developed fully or in-part “in-house” or outsourced and then identify funding requirements.

**Write Product Specifications and Scope**

Product specifications and scope delineate the parameters and focus of the design project.

Whether the project is designed “in house” or outsourced, both require development of a Statement of Work (SOW)/Statement of Objectives (SOO) and Data Requirements Lists (CDRLs). If the project is to be outsourced (contractor), then it is mandated that the Project Lead contact the ILE Content Lead and the ILE Acquisition Lead before proceeding. In addition to a SOW/SOO and CDRLs, a selection and evaluation plan will be developed. Once the work order/contract has been awarded, the process moves into design activities.

Templates and sample SOW, SOO, and CDRL can be found in the 29612 and Encls 5-7.

**Produce Design Package**

The design package serves as the blueprint for the project because it contains all of the management documentation.

The following steps are employed to produce the Design Package:

- Develop the Training Program Management and Development Plan (TPMDP) (*DI-ILSS-81070*). The TPMDP delineates all phases of the systems approach to training, milestones for phases and products, time and resource requirements, management structure and functions, their interrelationships with the required training products, program development tasks, and other related tasks for training development. In other words, the TPMDP provides the “recipe” that will be followed to conduct the design process.
Build the Plan of Action and Milestones (POA&M). Decision-making during design affects deliverables and the supporting activity schedule because the design must not only be effective but also achievable within the context of the business need, timeframe, and personnel and resources needed to perform the work. Whatever the delivery medium or media, the same basic principles for developing a project schedule is used. When completed, the schedule decreases the chance of “scope creep” that could prevent meeting project deadlines. The following three activities comprise the process of creating a project schedule:

- Document general project information
- List project deliverables
- Schedule project activities

Develop the Instructional Media Design Package (IMDP) (DI-SESS-81520B). The IMDP provides design documentation for the development and production of content. Included within the IMDP may be a requirement to develop a “Proof of Concept” to test the design and a “Prototype” to test the functional feasibility of the content or simulation product. If required, accommodations for one or both must be built into the schedule.

Develop an Analysis, Design, and Validation Report that includes a risk/mitigation strategy.

Once all deliverables have been completed and accepted, the project moves to conduct of a learning hierarchy analysis. Templates and sample TPMDP, POA&M, and IMDP can be found in the 29612 and Encls 8-10.

Conduct Learning Hierarchy Analysis

The learning hierarchy analysis is the instructional content blueprint that defines the relationships between performance (tasks), training (objectives), and media. A learning hierarchy analysis essentially describes the superordinate, ordinate, subordinate, and sequential relationships between learning objectives (LOs).

The following steps are accomplished to conduct the Learning Hierarchy Analysis:

Identify instructional delivery options:
- Determine instructional method (i.e., lecture, demonstration, exhibit, indirect discourse, assigned reading, etc.)
- Select student interaction methods (i.e., questioning, programmed questioning, student questioning, seminar, discussion, etc.)
- Choose a knowledge application (i.e., performance, case study, scenario, problem-solving, etc.)
- Create learning events to support learning objective statements

Identify the learning hierarchy by:
- Categorizing LOs by learning type
- Prioritizing LOs
○ Clustering LOs by performance, chronological, cause and effect, critical, simple-to-complex, and/or known-to-unknown order
○ Sequencing LOs by dependent, supportive, independent, and conflicting relationships and to minimize risks

- Establish the instructional sequence of content for the Learning Management System (LMS)
- Develop a Learning Hierarchy Validation Report

Once the learning hierarchy analysis deliverables have been completed and accepted, the project moves into determining instructional strategies. Templates and sample Learning Hierarchy Validation Report can be found in the 29612 and Encl 11.

Determine Instructional Strategies

According to Reigeluth (1983) instructional strategies are composed of three different aspects: organizational strategy characteristics (i.e., how instruction will be sequenced, what particular content will be presented, and how the content will be presented), delivery strategy characteristics (i.e., what instructional medium will be used and how learners will be grouped), and management strategy characteristics (e.g., scheduling and allocation of resources to implement instruction).

The following steps are completed to Determine Instructional Strategies.

- Determine strategy for learner participation
- Identify learner feedback strategies
- Select learner pacing requirements
- Choose an assessment strategy for each LO
- Develop an Instructional Strategy Report (DI-SESS-81520B)

Once the instructional strategy and associated deliverables have been completed and accepted, the project moves into conduct of the media analysis. Templates and sample Instructional Strategy Report can be found in the 29612 and Encl 12.

Conduct Media Analysis

A media analysis is the process of aligning media attributes with cognitive and sensory requirements within programmatic constraints. There are many types of media to be considered (i.e., computer-based, web-based, video, performance support systems, etc.) when making an appropriate selection.

The following steps are completed to conduct a Media Analysis:

- Develop media model
  ○ Identify media attributes
• Establish media pool candidates
• Determine media feasibility
• Identify training system alternatives
  • Conduct cost/benefit analysis
  • Apply resource constraints to alternatives (i.e., budget, schedule, and performance)
  • Identify risk/mitigation strategies
• Conduct media asset search
• Select media
• Produce Media Analysis Report (DI-SESS-81519B)

Once the media analysis deliverables have been completed and accepted, the project moves into design of the capability solution. A template and sample Media Analysis Report can be found in the 29612 and Encl 16 & 17.

Design Capability Solution
The capability solution is a document that specifies requirements from other ILE functional areas (i.e., logistics, engineering, scheduling, etc.) to identify, early on, the impact on efforts within other ILE components.

The following steps are employed to Design the Capability Solution:

• Compile all design documents
• Develop the Design Capability Solution Report
• Deliver the Design Capability Solution Report to the COR
• Register the document with ILE Program Documentation
• Disseminate the Design Capability Solution to appropriate ILE components (i.e., Architecture and Delivery Systems IPT, Risk Management IPT, Scheduling, Evaluation IPT, Human Resources, etc.)

A template and sample Design Capability Solution Report can be found in Encl 17.

It is readily apparent that the Design Process is a complex activity that requires a high level of expertise and experience. Table 4 describes the team that should be assembled to create the content design. The command charged with design may or may not have the expertise in house. In the event the command does not have resident expertise, they are advised to reachback to the ILE Content Lead or HPC and request assistance.

Table 4. Design Team Roles

<table>
<thead>
<tr>
<th>Team Member</th>
<th>Role</th>
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<td>Training/Education SMES</td>
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<td>SkillObject Data Analytics &amp; Alignment</td>
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<td>Human Performance Technologist</td>
<td>Performance analysis</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>Science of Learning Practitioner</td>
<td>Performance-based learning assessment</td>
</tr>
<tr>
<td>Human Systems Integration Specialist (as needed)</td>
<td>Human Factors analysis</td>
</tr>
</tbody>
</table>

Some of the members of this team may also assist with one or more of the follow-on processes. The Instructional Designer serves as Project Lead for the Design process and is responsible for the accuracy and specificity of the Design process documents.

Table 5 identifies who has implementation responsibility during the design process. Refer to the Design Process (Figure 8) for additional information on where each step falls within the overall flow.
The Development Phase takes the plans created in the design phase and builds the content. Development is creating the learning events that will assist the learners in reaching the goals of the content. The overall objective of the development process is to effectively translate inputs from the analysis and design processes. In practice, these events may be performed sequentially, some events may be skipped, or a different sequence may need to be used. Various factors affect the sequence or scope of the events such as service needs, scope or complexity of the training project, or other factors. Events to be applied and their sequence should be documented in the project management plan. (MIL-HDBK-29612-2A Sec 8.1.1)

The Development Macro-level Process Flowcharts (see Figure 9-11) take output from the design process, applies them throughout the development process, and then outputs to implementation. Design inputs are used to update the TPMDP, the document that provides overarching guidance for development of the courseware product.
This is the change request process that can occur at any time during the development process.

Yes

Review Input from Design SOO/SOW

Changes Required?

No

Propose Changes

Figure 9. Preliminary Development Processes

In the event development of a prototype is required, the development team will forward the prototype to the PL as a proof of concept test to ensure it meets technical specifications, performance requirements, and operates in the ILE.
As content is developed, it is forwarded to the PL for design verification and validation. If changes are required, the content is returned to the developer for revision.
Figure 11. Content Validation Process

The corrected content is returned to the PL for review until it is accepted. For efficiency it is recommended that PLs make an effort to document the corrections needed on a one pass cycle to avoid scope creep and costly overruns.

Development Process Summary

The Government Project Lead (PL), has overall responsibility for managing the development process defined in this procedure. Design plans influence the development process for a specific project; however, responsibilities and activities needed to define technical requirements (development input), documentation (development output), and all necessary development review and verification/validation activities also need to be defined. Content development changes are identified, documented, reviewed, and approved by authorized personnel before their implementation so that product configuration is maintained. The PL reviews data related to the development planning process, initiates appropriate corrective/preventive action and provides trend data and related recommendations to the ILE Content Lead or the Customer for review and action.

Development Planning
During development planning the PL shall determine
a. Steps to be used in the development phase
b. Appropriate review, verification, and validation processes

c. Lines of responsibility and authority

Review Design Materials

While reviewing design materials, the PL for the Development Phase will learn as much as they can about the content that must be developed based on the design. Information contained within design materials will provide inputs to the Traceability Matrix that links topics, objectives, assessment items, and content to Skill Objects. The following items provide a checklist of information that should be provided as design outputs:

- Skill Objects
- Learning Analysis Outputs including:
  - Learning Objective Statements
  - Levels of Learning
  - Interactivity
  - Performance Measures
  - Suggested Media
- Test Strategy and Test Items
- Evaluation Plan
- Instructional Strategy
- Instructional Methods and Selected Media
- Implementation Plan
- Designed Training Information Management System
- Delivery Method
- Lesson Specification Report
- Identified Requirements for Supplemental Instructor Training, Classroom Requirements, Technical Training Equipment (TTE) etc.
- IMDP - Content Flow/Sequence
- Navy Master Task List (NMTL)/Master Training Task List (MTTL)/Job Task Analysis (JTA) - Designed Curricula
- Major Flaws Resolved - Proof of Concept
- Statement of Work (SOW) Issued

Design outputs and Statements of Work/Statements of Objectives (SOW/ SOO) are reviewed and forwarded to the Development Lead to determine if the inputs require any changes to the development plan.

Develop Content

The Design Capability Solution is implemented during development (see Figure 9). Prior to full scale development, the PL determines whether a prototype will need to be developed. If a prototype is required, it is developed in accordance
with the IMDP *(DI-SESS-81520B)*. The prototype performance is verified and accepted by the Contracting Officer Representative (COR/TPOC). Once the prototype is accepted, or in the event a prototype is not required, a GFI/GFE review is conducted, the delivery method of the content is determined, and full-scale development commences. At suitable points in the process, systematic reviews shall be performed in accordance with planned arrangements to:

a. Evaluate the ability of the results of design and development processes to meet requirements
b. Identify any problems and propose necessary actions

Participants in such reviews shall include representatives of functions concerned with design and development. Records of results of the reviews and any necessary actions shall be maintained.
The COR/TPOC verifies and accepts the content.

The following checklist is representative of information that would be provided by the development team as inputs to the implementation phase.

- Developed content and associated instructional materials
- Updated implementation plan
- Validated instructional materials
- Content performance validated in accordance with specifications
- Content compliance verified in accordance with instructions, specifications, or policy

**Content Validation**
Validation shall be performed in accordance with planned arrangements (see Figure 11) to ensure the resulting product meets requirements. Developed content is forwarded to the Government Quality Assurance authority to test technical and performance specification compliance. The Government QA will:

- Apply CM constraints
- Determine Editorial compliance with the following:
  - Copyright Law
  - Chicago Style Manual
  - Section 508, USC
  - DID 81523B
  - MILPRF 28001
  - Security Requirements
  - SECNAVINST 5510.40
  - DoDINST 5200.40
  - DITSWG
- Conduct Safety Review of the SOW
- Determine Functional Compliance with the SOW
- Determine C3 Site Compliance to LMS/LCMS
Test NMCI/IT21 Compliance through the FAM, EDS and Bench testing
DoD Instruction 5200.40
DoD Manual 8510.1-M
Determine ILE Compliance with the ILE Content CD3 Guidelines
Test SCORM Compliance

Once validated, the content is then forwarded to the Customer for implementation.

34.0 14. CHANGE CONTROL BOARD

In the event significant changes are required, the PL will forward recommended changes to the ILE Content Lead, who in turn will convene a Change Board for Review to consider the recommended changes to the content or associated. If changes are approved, the ILE Content Lead will determine:

c. If funds are available for the recommended changes
d. Whether the contractor or developing entity has the qualified staff to implement the changes

If the changes are funded and can be accomplished, the PL will modify the contract and update the CM database to reflect the recommended changes. If the changes will affect the original design strategy of the content, the PL will determine whether the risk to the end product is acceptable. If the capabilities of the end product are not affected as a result of the changes, the modifications are made to the Production Management Plan. If the changes are not funded, the PL will commence the Risk Mitigation process (TBD).

Table 6 describes the team that should be assembled to develop content. The command charged with design may or may not have the expertise in house. In the event the command does not have resident expertise, they are advised to reachback to the ILE Content Lead and request assistance.

Table 6. Development Team Roles

<table>
<thead>
<tr>
<th>Team Member</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training/Education SMES</td>
<td>Content Owners</td>
</tr>
<tr>
<td>Instructional Designers</td>
<td>Design and Development Congruency</td>
</tr>
<tr>
<td>Instructional Developers</td>
<td>Content Development</td>
</tr>
<tr>
<td>Technicians</td>
<td>Programming</td>
</tr>
<tr>
<td>Media Specialists</td>
<td>Prepares instructional media</td>
</tr>
<tr>
<td>HP Technologist</td>
<td>Checks that the development is following the design and supporting the analysis</td>
</tr>
</tbody>
</table>
Table 7 identifies who has implementation responsibility during the development process. Refer to Figures 9-11 Development Process (Macro) for additional information on where each step falls within the overall flow.

Table 7. Development Process Implementation Responsibility

<table>
<thead>
<tr>
<th>Process Block</th>
<th>Responsibility Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Policy and Guidance</td>
<td>Level 1 – ILE Operational</td>
</tr>
<tr>
<td>Review Design Deliverables</td>
<td>Level 2 – EIII Executable</td>
</tr>
<tr>
<td>Develop Production Management Plan</td>
<td>Level 2 – EIII Executable</td>
</tr>
<tr>
<td>Develop Content</td>
<td>Level 2 – EIII Executable</td>
</tr>
<tr>
<td>Validate Content Materials</td>
<td>Level 2 – EIII Executable</td>
</tr>
<tr>
<td>Corrections: Accept or Review</td>
<td>Level 2 – EIII Executable</td>
</tr>
<tr>
<td>Command Review</td>
<td>Level 1 – ILE Operational</td>
</tr>
</tbody>
</table>

EIIIs have the authority to interpret, adapt, and execute the content development process steps for their subordinate commands. Level 2 decisions should be documented and the processes provided to the subordinates.

15. Implementation

With the establishment of the Navy Integrated Learning Environment (ILE) as the repository for all learning content, it is necessary to expand the ADDIE instructional design conceptual framework to incorporate procedures that address the integration of learning content into the ILE.

Implementation/Integration is the fourth step in the ADDIE instructional design conceptual framework, and in the fourth quadrant of the Human Performance System Model (HPSM). The instructional product is delivered during implementation in a traditional classroom, a lab, computer (computer-based training) or via the web (e-learning) or through a combination of these methods. Implementation is the process of delivering the instructional content to the learners in a traditional classroom, a lab, computer (computer-based training), via the web (e-learning), etc. or through a combination of one or more of the delivery modes. The purpose of this phase is the effective and efficient delivery of instruction. This phase must promote the

The expected outputs, milestones, and deliverables of implementation is to ensure that the delivered product is housed in the ILE. Implementation begins with delivery of the instructional product. Procedures are in place for housing the product in the ILE. (see Ref A). There should be no variation in this process. The ILE Content Lead or designee is responsible for housing content in the ILE.

Formative evaluation, an important process which occurs during and between the instructional design phases, is most important to the Implementation Component. Consisting of design reviews, expert reviews, learner validation, and ongoing
Application of the formative evaluation strategies occurs during the implementation phase; learners' validation of the instructional material is sought and may require design and/or content modification (Smith & Ragan, 1999). During Implementation, Kirkpatrick's (1998) Levels I and II data are collected. In Kirkpatrick's evaluation model, Level I measures reaction or how well the participants liked the instructional content. Level II measures learning, specifically the degree to which the learners have achieved the learning objectives (increase/change in skills, knowledge, or attitude) as evidenced by end-of-learning event assessment.

The steps of the Implementation process are shown in Figure 12.

Figure 12. Implementation Process Flow

Implementation Phase Summary

1. Instructional content is delivered in the format for which it was developed (e.g., instructor-led, lab, computer-based, web-based, etc.).

   a. Assemble an integration team for the purpose of quality assurance and rapid response for issue resolution.
   b. Complete delivery preparations. This includes but is not limited to training the instructors or facilitators, checking the instructional systems, preparing the infrastructure, etc.
   c. Initiate formative evaluation activities for content accuracy and effectiveness
d. Begin delivery of the instructional content. Align student management issues to capitalize on the "Just in time, just for me" nature of ILE content

2. Monitor results according to plan (Formative Evaluation)

a. Ensure proper integration of ILE content (strategic and technical integration).
b. Identify time critical issues (Hotwash) on a consistent basis
c. Begin the formative evaluation plan developed during the design process. Evaluation data includes collecting feedback and/or observation data and student assessment data.
d. Analyze these data to allow the project lead to make informed decisions about the efficiency and effectiveness of the instructional product.

3. Revise as necessary

a. Use the formative evaluation data (e.g., feedback, observation, assessment) to assess whether there are learning deltas that the instructional content does not fill.
b. If such deltas do exist, the project lead, with the advice of implementation team members, can request revisions.
c. Ensure content development/medication version control is captured. Populate the Content Object Repository Discovery and Registration/Resolution Architecture (CORDRA).

The complexity of the implementation phase requires that most everyone involved in the initial planning stages of the project come together for this effort. Table 8 identifies the members and roles that must be present during the fourth phase.

Table 8. Implementation Team Roles

<table>
<thead>
<tr>
<th>Team Member</th>
<th>Roles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content Project Lead</td>
<td>Revision requirements</td>
</tr>
<tr>
<td>ILE Systems Architect</td>
<td>Systems integration</td>
</tr>
<tr>
<td>Echelon 3 Client Representative</td>
<td>Project oversight and concurrence</td>
</tr>
<tr>
<td>ILE Logistics</td>
<td>Student management</td>
</tr>
<tr>
<td>Science of Learning Practitioner</td>
<td>Formative evaluation assistance</td>
</tr>
<tr>
<td>Human Performance Technologist</td>
<td>Performance analysis</td>
</tr>
<tr>
<td>Instructional Designer</td>
<td>Formative evaluation assistance, revision requirements</td>
</tr>
<tr>
<td>Content Subject Matter Expert</td>
<td>Content revision requirements</td>
</tr>
<tr>
<td>Evaluation Specialist (HPT)</td>
<td>Formative and summative evaluation</td>
</tr>
<tr>
<td>Echelon 3 Customer Representative</td>
<td>Project implementation, oversight, evaluation and concurrence</td>
</tr>
</tbody>
</table>
Table 9 identifies who has implementation responsibility during the development process. Refer to Figure 12 for additional information on where each step falls within the overall flow.

Table 9. Implementation Process Implementation Responsibility

<table>
<thead>
<tr>
<th>Process Block</th>
<th>Responsibility Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Policy and Guidance</td>
<td>Level 1 – ILE Operational</td>
</tr>
<tr>
<td>Review Content Deliverables</td>
<td>Level 2 – EIII Executable</td>
</tr>
<tr>
<td>Assemble Integration Team</td>
<td>Level 2 – EIII Executable</td>
</tr>
<tr>
<td>Begin Delivery</td>
<td>Level 2 – EIII Executable</td>
</tr>
<tr>
<td>Monitor Implementation and Formative Evaluation</td>
<td>Level 2 – EIII Executable</td>
</tr>
<tr>
<td>Oversee Revisions</td>
<td>Level 2 – EIII Executable</td>
</tr>
<tr>
<td>Populate CORDRA</td>
<td>Level 2 – EIII Executable</td>
</tr>
<tr>
<td>Command Review</td>
<td>Level 1 – ILE Operational</td>
</tr>
</tbody>
</table>

EIIIs have the authority to interpret, adapt, and execute the content development process steps for their subordinate commands. Level 2 decisions should be documented and the processes provided to the subordinates.

16. Evaluation

The final phase in the ADDIE model that eventually feeds back to analysis is evaluation. Varying levels or types of evaluation actually occur throughout the entire instructional design process - within phases, between phases, and after implementation. During the formal evaluation phase, the summative evaluation plan, formulated during the design phase, is executed.

Evaluation measures the effectiveness and efficiency of the instructional content and specifically the application of knowledge in the workplace. The evaluation phase assesses instructional content has been in use for a period of time (three months, six months, a year) and periodically thereafter. Data collected during evaluation provides decision makers with information upon which to make a decision about the instruction (such as whether to purchase an instructional package or continue/discontinue instruction). In the summative evaluation phase, Kirkpatrick’s Level III, IV, and V data can be collected. At a minimum, Level III data should be collected.

Level III measures whether the performance or behavior of the learner has changed because of the learner applying the learning content after returning to the job. Both surveys or interviews may be used to conduct this type of evaluation. Since direct supervisors can best gauge changes in performance, it is important to survey and/or interview them.

Conduct summative evaluation after the instructional content has been in use for a period of time.
Level IV measures the impact on the organization that results from learners applying their newly learned knowledge or skills. Evaluation at this level requires defining metrics. Support for measuring Level IV is available from Mission Performance Analysis.

Level V measures return on investment (ROI). This is simply determining the amount of money spent on course development compared to how much was realized by level four results (Benefits – Cost/Cost x 100%). Support for measuring Level V is available from Activity-Based Costing Records at the Echelon 3 and Type Commander levels (content development/implementation costs, performance benefits and cost conversion) (Phillips, and Phillips, 2002).

As in the evaluation component of the implementation phase, data from summative evaluation is a valuable resource with which to revise and improve the instructional content.

Figure 13 shows the steps that will occur during the formal evaluation phase.

Figure 13. Evaluation Process Flow
The evaluation phase has two major steps.

1. Measure/Evaluate against desired goals (Summative Evaluation)
   a. Implement the summative evaluation strategy (plan) developed in the design phase. This includes collecting data and analyzing the data. The member of the project team with expertise in data collection instrument development will oversee development and/or selection of the instruments.
   b. Conduct the evaluation with the instruments and collect the data. The project team member with expertise should conduct the data analysis.
   c. Use the results of this analysis to make recommendations for changes/improvement to the instructional content and to capture lessons learned.
   d. Use the data analysis to prepare a Training Evaluation Report (DI-SESS-1524B)

2. Provide feedback to customer and other stakeholders

The Human Performance Center is responsible for the activities in Quadrant 4, Execute and Measure. Commands should reachback to the HPC for assistance with objective evaluation plans, collecting data, and analyzing results. It is recommended that the evaluation not be conducted by the team that led the design or development efforts.

Table 10 identifies the team members and roles that are needed during the evaluation phase.

<table>
<thead>
<tr>
<th>Team Member</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>ILE Logistics</td>
<td>Student management</td>
</tr>
<tr>
<td>Science of Learning Practitioner</td>
<td>Formative evaluation assistance</td>
</tr>
<tr>
<td>Human Performance Technologist</td>
<td>Performance analysis</td>
</tr>
<tr>
<td>Instructional Designer</td>
<td>Formative evaluation assistance, revision requirements</td>
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<tr>
<td>Evaluation Specialist (HPT)</td>
<td>Formative and summative evaluation</td>
</tr>
<tr>
<td>ILE Systems Architect</td>
<td>Systems integration</td>
</tr>
</tbody>
</table>

During the analysis phase the HPT served as the lead. It was during this phase that the preliminary evaluation plan was created. The HPT once again resumes leadership to ensure that the learning intervention or content that was identified as needed from the requirements has been delivered.

Table 11 identifies who has implementation responsibility during the evaluation process.
17. Terminology. The following key words of the document are defined below.

**Client.** The command who has responsibility for providing the funding for the content development effort. The client is the one who “orders” a product. The client may oversee the project’s development or may designate a subordinate command to assume that responsibility. If the responsibility is delegated, the client should “pay the bills” and see that the legal processes are followed but stay out of the actual project processes.

**Content.** A generic term defined as subject matter. Content may exist in the form of small learning content objects, in larger units of instructional modules, or in courses.

**CORDRA** (Content Object Repository Discovery and Registration/Resolution Architecture) is designed to be an enabling model to bridge the worlds of learning content management and delivery, and content repositories and digital libraries. CORDRA aims to identify and specify (not develop) appropriate technologies and existing interoperability standards that can be combined into a reference model that will enable several key capabilities.

- Content, once authored, can be made widely available (subject to appropriate rights management).
- Content can persist outside of the realm of a single course.
- Content can be discovered.
- Once discovered, there will be standard mechanisms to access the content (access is not specified, it might include transfer or delivery).
- Content can be managed (e.g., has ownership, rights, persistence) and deploying organizations will be able to tailor management to their needs.
• Implementations of the model will be open and flexible and will coexist and interoperate with existing systems.

Customers. The command(s) and training site(s) who will make use of the developed content. EIIIs may elect to designate a subordinate command (who would also be a customer) to oversee the project’s development. When double-hated, subordinate commands must remember that they have a responsibility to all who will make use of the content, not just their own single entity. While customers do not have “purchasing” funds, they have a fiscal responsibility to ensure that money is spent judiciously.

Formative evaluation (Smith & Ragan, 1999) evaluating instructional materials to determine the weakness in the instruction so that revisions can be made to make them more effective and efficient.

Learner. The ILE exists not only to serve the active duty Sailor, but the civilians and family members as well. Throughout this document and other associated documents and in the learning literature, learner is the preferred generic term that refers to individuals who receive benefit from the integrated instructional systems.

Learning Objective. Consisting of a verb, a performance standard, and a condition, Learning Objectives are used by the Navy ILE to serve as the connective tissue to link work elements in SkillObject taxonomy with content.

Learning Objective Statements. Combine Learning Objective Statements with content in context appropriate to the learner and learning requirement (i.e. the right information to the right learner at the right time with the right methodology)

SkillObjectTM Used by the Navy to describe work and worker characteristics, a SkillObject is an aggregate of 2-10 tasks that are learned together, performed together, and evaluated together, with accompanying knowledges, skills, abilities, required resources, and other essential capabilities.

Summative evaluation. (Smith & Ragan, 1999) evaluating instructional materials after implementation into the instructional contexts for which they were designed. The purpose of summative evaluation is to determine the effectiveness of the instructional materials and to provide data for decision makers about whether to adopt or continue use of the materials.

Stakeholders. Learners, process owners, requirements setters (Fleet), content experts, , and all other users or receivers who are either directly or indirectly impacted by the value of the ILE product.

Traceable. Contemporary instructional design has recognized the connectedness between learning objective statements, content, assessments, and tasks that a
learner will eventually perform. Since the Navy has embraced utilization of O*NET taxonomy to describe work requirements in terms of tasks learned together, performed together, and evaluated together; construction of the LOS described in this document is defined in a structure which aligns learning interventions to identified job demands. The procedures described in this document tie the work of instructional design to component SkillObject™ knowledges, skills, and abilities.

**User.** The generic term that refers to those individuals or groups who have responsibility for input into and work within the ILE’s instructional systems.

17. **Command Review.** It is the responsibility of the Echelon III commands to provide guidance for periodic review of content placed within the ILE. To assist with process improvement, NETC offers assistance via the Area Visit Program (AVP). The purpose of the program is to determine if NETC is attaining its strategic goals and objectives by helping commands focus on processes across echelons, providing standardization to subordinates, reviewing metrics, assessing risk and opportunities, assessing programs, assessing command climates and looking for value-added.

Command Review instruments will be developed for each process component of ILE Content, e.g., ISD/ID process, Learning Objectives Statements, Assessments, etc.

18. **Technical Requirements.**

All content will meet the technical specifications as set forth by the Navy’s ILE Content and Architecture Systems Leads.

19. **ILE POC** is Jerry Best, HPC, N75, DSN: 380-4997, (COMM) (407) 380-4997. email: Jerome.best@navy.mil.

K. Moran  
VADM    USN

Distribution:

CNO (N00T)  
All NETC  
SYSCOM
Encl 1. ILE Implementation Team

The power behind the ILE is the various teams executing their assigned responsibilities in support of the education and training mission requirements.

Leading the Revolution in Training charge is the ILE Implementation Team. Its purpose is to provide the managerial, procedural, and business framework to analyze, define, develop and implement a learning environment consisting of the people, integrated systems and processes that provide the capability for My Learning Plan, My Learning Event, and delivered My Way.

Following are short descriptions of the various ILE Implementation Team Leads. For a more in-depth discussion, see Ref G, *ILE Implementation Team Charter*.

The Implementation Team Lead (ITL) is the designated individual with responsibility for and authority to accomplish business objectives for ILE development, production, and sustainment to meet the end user’s operational needs. The ITL shall be accountable for credible cost, schedule, and performance reporting to the Commander, Naval Education and Training Command (CNETC).

**Acquisition Lead (A-Lead).** The A-Lead will work with the procuring activities including FISC contracting offices, NAVAIR Orlando, NAVSEA, and other SYSCOMS to survey current contract vehicles and also plan, coordinate, assist, or manage any required acquisition projects.

**Content Lead (C-Lead).** The C-Lead will be an acquisition professional who is assigned authority, responsibility, and accountability for the development, adequacy, and accuracy of all instructional design requirements, content
specifications and standards, content contract requirements, quality assurance, and content business processes for the ILE.

**Systems Engineering, Architecture and Integration (S-Lead).** The S-Lead is assigned authority, responsibility and accountability for the adequacy and accuracy of all architecture analysis, planning, systems engineering activities for the ILE from initial tasking to the completed delivery and acceptance of all ILE materiel, data and services.

**Business Applications (B-Lead).** The B-Lead is assigned authority, responsibility, and accountability for the adequacy and accuracy of all business systems and software requirements for the ILE from initial tasking to the completed delivery and acceptance of all ILE material, data and services.

**Logistics and Life Cycle Support (L-Lead).** The L-Lead is assigned authority, responsibility and accountability for the adequacy and accuracy of all Logistics requirements for the ILE from initial tasking to the completed delivery and acceptance of all ILE material, data and services.

**Financial Management (F-Lead).** The F-Lead is responsible to provide advice and guidance and assist the ITL in monitoring team performance against cost goals. The F-Lead is assigned authority, responsibility, and accountability for the adequacy and accuracy of all inputs to the ITL.

**Strategic Learning and Organizational Change Management (X-Lead).** The X-Lead is responsible to develop a Change Management Plan and learning opportunities for Navy personnel to better understand how ILE enables Sea Warrior goals and objectives and supports the Navy’s Human Capital Strategy.

**Rapid Response Cell (R-Lead).** The R-Lead is responsible to provide quick response advice and guidance and assist the Team in answering critical questions. The R-Lead will receive tasking from the ITL/DITL, and assemble the right skill mix on a case-by-case basis to respond.
1. **WORK PROCESS**: Learning Objectives

2. **FUNCTIONAL CATEGORY**: 11. Personnel and/or Organizational Management – Curriculum Development, Maintenance Review, and Control

3. **BRIEF DESCRIPTION OF WORK PROCESS**: To ensure that procedures for designing, developing, implementing, and reviewing learning objectives within the confines of the ILE facilitate a quality learning experience for our Sailors.

4. **REFERENCES**: Please cite the appropriate reference(s) associated with the Process Requirements in paragraph 6 below. There are a number of references that govern learning products.

   (a) Navy Guide to Content Design, Development, and Deployment, Part 2, Content Design
   
   (b) Integrated Learning Environment Guidance, ILEGUI1553-ISD-1, Instructional Systems Design and Instructional Design Processes
   
   (c) Integrated Learning Environment Guidance, ILEGUI1553-ISD-2, Interim Assessment Guidance

Because technology advances at a rate faster than instructions can generally be issued, commands are advised to check the following sites frequently:

- Human Performance Center Spider: https://www.spider.hpc.navy.mil/
- SECNAVINST 5720.47A Department of the Navy Policy for Content of Publicly Accessible World Wide Web Sites

5. **WORK PROCESS SME(s)**: ILE POC is Jerry Best, HPC, N75, DSN: 380-4997, (COMM) (407) 380-4997. email: Jerome.best@navy.mil.
6. **PROCESS REQUIREMENTS:**

**COMMENTS**
List main discussion points in the form of a question that will assist the Reviewer or SME when reviewing the process.

a. **At the Echelon III level**

(1) Has the EIII provided written guidance to each subordinate command on how learning objectives will be designed, developed, maintained, and reviewed in accordance with the ILEGUI1553-ISD-3 document?
(2) Does the EIII have in place a transition plan or guidance to support the review of legacy learning objectives and to refine legacy content to meet the ILE requirements?
(3) Does the EIII command have a periodic review schedule to assist commands with the new methodology?

b. **At the Subordinate Commands level**

(1) Did the subordinate command develop or adopt a procedure to design learning objectives incorporating the science of learning and human performance concepts?

(2) Did the subordinate command prepare and maintain a traceability matrix for newly developed courses?

(3) Does the subordinate command
have a plan in place to periodically review learning objectives items to check alignment with assessment, content, and SkillObjects™?

(4) Does the subordinate command have prepared checklists and grading rubrics for learning objectives for use by test administrators for performance tests?

7. **QUALITY ASSURANCE KEY METRICS:** Identify the key metrics for measuring performance. These metrics should clearly indicate how “success” of the assessment will be defined and measured, and provide a quick view of how well the assessment development and implementation process is progressing in achieving its intended purpose.

Data collection for metrics should include at a minimum the following:

- Completion of the documentation identified in ILEGUI11553-ISD-1, 2, and 3
- Learner identification procedures
- Traceability Matrix (Crosswalk for linkage with SkillObjects™)
- Percentage of legacy learning objectives refined for warehousing within the ILE repository
- Timelines for refresh of the learning objectives
Encl 3. Relationship of the four quadrants of the Human Performance System Model (HPSM) with the Human Performance Improvement (HPI) Model

I. Define Requirements
   - Define Performance Standards and Requirements
   - Determine Customer Goals
   - Identify Performer Groups
   - Assess the Cost of the Problem

II. Define Solutions
   - Design Human Performance Solutions
   - Select Analytical Model
   - Gather Data to Test Cause Hypothesis
   - Analyze Data to Determine Cause Hypothesis

Performance Analysis
   - Determine Desired Performance
   - Calculate Performance Gap
   - Determine Actual Performance

Root Cause Analysis
   - Classify the Root Cause
   - ID Candidate Interventions
   - Recommend Appropriate Interventions

Note: See Human Performance Professional Working Guidelines for a complete discussion of the interrelationships of these processes.
Note: See Human Performance Professional Working Guidelines for a complete discussion of the interrelationships of these processes.
Encl 4. Government-Commercial-off-the-Shelf Assessment Process

MAIN PROCESS – GOTS/COTS Courseware Assessment Process

I. Process Name: GOTS/COTS Courseware Assessment Process (GCAP)

II. Mission:

To objectively and efficiently select off-the-shelf (OTS) courseware that most effectively closes identified skill gaps and meets training and education needs.

III. Background:

The purpose of the GOTS/COTS Courseware Assessment Process (GCAP) is to identify and select existing courseware that meets the training and educational needs of the client organization. The motivation for this process is the idea that it is more cost-effective to acquire existing Off-The-Shelf (OTS) courseware than to develop courseware. Two types of OTS courseware are considered: government off-the-shelf (GOTS) and commercial off-the-shelf (COTS).

A needs assessment in the context of a larger training and education program is the preceding process that provides the input to the GCAP. The needs assessment includes the position and goals of the client organization; identified roles; Knowledge, Skills, Abilities, and Tools (KSATs); and skill gaps.

The GCAP is designed to:
1. Analyze inputs
2. Translate inputs to specific courseware requirements
3. Discover, evaluate, and recommend solutions that meet the training needs by adopting existing courseware, adapting existing courseware, developing new courseware, or by some combination of the three.

This process does not include the actual acquisition of courseware. The client organization will be responsible for acquisition if such a recommendation is accepted.

Each GCAP iteration provides for the selection of courseware to satisfy one or more training or education needs. This selection is conducted by a team whose recommended specializations include:

- Team Leadership
- Subject Matter Expertise
- Instructional Design
- Web Design / Development/ Delivery
- Technical Integration / Standards Compliance
- Library Science / Information Retrieval
- Measurement and Evaluation
Note: It is recommended that the Team Lead be an Instructional Designer (ID).

To maximize efficiency, the GCAP provides a mechanism to reuse information from one iteration to the next:
- During each iteration, a search is conducted for new courseware providers and the historical data is updated.
- Each client organization may have general requirements for OTS courseware, regardless of content area, to be passed from one iteration to the next.

IV. Metrics:

CWD is working on valid main process metrics

V. Supplier:

Client Organization

VI. Input:

- Assessment – Identified Roles, KSATs, and Skill Gaps
- Most recent list of courseware providers
- Post-delivery courseware evaluation

VII. Process:

A. Process starts with – identified training and education needs.

B. Process Steps (Sub-Processes)
   1. Plan
   2. Specify Courseware Requirements
   3. Develop Keyword Filter
   4. Discover Candidates
   5. Evaluate Candidates
   6. Recommend

C. Process ends with – a recommendation for courseware acquisition, adaptation, or development or some combination of the three to meet the training and education needs of the client organization.

VIII. Output:

- Recommendation
- Updated list of courseware providers
Note: For more information about GCAP, contact Space and Naval Warfare Systems Command (SPAWAR), Civilian Workforce Development (CWD) office.
Encl 5. Sample Statement of Work (SOW)

At the present time, refer to

(d) MIL-HDBK-29612-2A, Instructional Systems Development/Systems Approach to Training and Education (31 August 2001)

(e) MIL-PRF-29612B, Performance Specification Training Data Products (31 August 2001)
Encl 6. Sample Statement of Objectives (SOO)

At the present time, refer to
    (d) MIL-HDBK-29612-2A, Instructional Systems Development/Systems Approach to Training and Education (31 August 2001)
    (e) MIL-PRF-29612B, Performance Specification Training Data Products (31 August 2001)
Encl 7. Sample Data Requirements List (CDRL)

At the present time, refer to
   (d) MIL-HDBK-29612-2A, Instructional Systems Development/Systems
       Approach to Training and Education (31 August 2001)
   (e) MIL-PRF-29612B, Performance Specification Training Data Products (31
       August 2001)
Encl 8. Sample Training Project Management Development Plan

At the present time, refer to

(d) MIL-HDBK-29612-2A, Instructional Systems Development/Systems Approach to Training and Education (31 August 2001)

(e) MIL-PRF-29612B, Performance Specification Training Data Products (31 August 2001)
Encl 9. Sample Plan of Action and Milestones

At the present time, refer to
(d) MIL-HDBK-29612-2A, Instructional Systems Development/Systems Approach to Training and Education (31 August 2001)
(e) MIL-PRF-29612B, Performance Specification Training Data Products (31 August 2001)
Encl 10. Sample Instructional Media Design Package

At the present time, refer to

(d) MIL-HDBK-29612-2A, Instructional Systems Development/Systems Approach to Training and Education (31 August 2001)

(e) MIL-PRF-29612B, Performance Specification Training Data Products (31 August 2001)
Encl 11. Sample Learning Hierarchy Analysis

At the present time, refer to

(d) MIL-HDBK-29612-2A, Instructional Systems Development/Systems Approach to Training and Education (31 August 2001)

(e) MIL-PRF-29612B, Performance Specification Training Data Products (31 August 2001)
Encl 12. Sample Instructional Strategies Report

At the present time, refer to

(d) MIL-HDBK-29612-2A, Instructional Systems Development/Systems Approach to Training and Education (31 August 2001)

(e) MIL-PRF-29612B, Performance Specification Training Data Products (31 August 2001)
Encl 13. Sample Media Selection Report

At the present time, refer to
   (d) MIL-HDBK-29612-2A, Instructional Systems Development/Systems Approach to Training and Education (31 August 2001)
   (e) MIL-PRF-29612B, Performance Specification Training Data Products (31 August 2001)

Figure 7. Analysis Process Flow for SkillObject-based Content
Figure 8. Macro-level Design Processes
This is the change request process that can occur at any time during the development process.

Figure 9. Preliminary Development Processes
Figure 10. Development Processes Continued
Figure 11. Content Validation Process
Figure 12. Implementation Process Flow
Figure 13. Evaluation Process Flow
Encl 15. References


Haines,


35.0 GOVERNMENT REFERENCE DOCUMENTS

The following documents are referenced or provided as guidance to more specifically define the design and development process. The latest version of the document applies.

- Course Prioritization Worksheet
- Navy ILE Content Design, Development, and Deployment, V1.2
- Learning Center Content Style Guide, V1.0
- ILEGUI1553-ISD-3 – ILE Interim Guidance for Navy Learning Objective Statements Specifications
- ILEGUI1553-ISD-1 – ILE Interim Guidance for Assessments
- DI-ILSS-81070 – Training Program Development and Management Plan (Recommended updates TBD)
- DI-SESS-81517B – Training Situation Document (Recommended updates TBD)
- DI-SESS-81518B – Instructional Performance Requirements Document (Recommended updates TBD)
- DI-SESS-81519B – Instructional Media Requirements Document (Recommended updates TBD)
- DI-SESS-81520B – Instructional Media Design Package (Recommended updates TBD)
- DI-SESS-81521B – Training Program Structure Document (Recommended updates TBD)
- DI-SESS-81522B – Course Conduct Information Package (Recommended updates TBD)
- DI-SESS-81523B – Training Conduct Support Document (Recommended updates TBD)
- DI-SESS-81525B – Test Package (Recommended updates TBD)
- DI-SESS-81526B – Instructional Media Package (Recommended updates TBD)
- DI-SESS-81527B – Training System Support Document (Recommended updates TBD)
- MIL-HDBK-29612-2A
- DoD Instruction 5200.40 - Department of Defense Information Technology Security Certification and Accreditation Process (DITSCAP)
- DoD Directive 8500.1 – Information Assurance (IA)
- CNO Msg 252250Z FEB 02 – NMCI Legacy Applications Transition Process
- CNO Msg 252230Z JUL 03 (N09) – Strategy for Managing Navy Applications and Databases within NMCI
- SECNAVINST 5239.3 – Department of the Navy Information Systems Security (INFOSEC) Program
• SECNAVINST 5000.36 – Department of the Navy Data Management and Interoperability
• NETCINST XXXX.X – Naval Education Training Center Instruction – Navy Integrated Learning Environment (ILE) Technical Specifications and Guidelines
NETCINST XXXX.X – Naval Education Training Center Instruction - Navy Integrated Learning Environment (ILE) Guidance for NMCI/IT-21 Standards and Certification (NPDC)
Encl 16. Sample Media Selection Report
Encl 17. Sample Media Analysis Report Template
INTEGRATED LEARNING ENVIRONMENT GUIDANCE 1553-ISD-2

Subj: INTERIM GUIDANCE FOR ASSESSMENTS

Ref: (a) Navy Guide to Content Design, Development, and Deployment, Part 2, Content Design
(b) Advancement-In-Rate Exam Item Writing Standards Manual, Special Publication January 2000, NETPDTC

Encl: (1) Factors Determining the Stakes of an Assessment
(2) Assessment Design Chart
(3) Procedure for Designing Assessment Items
(4) Characteristics of Good Assessment Practices
(5) Learning Outcomes and Assessment Types
(6) Assessment Requirement for Software Applications
(7) Assessment Process Review Guide

1. **Purpose.** To provide interim guidance for designing, developing, and implementing assessments within the confines of the ILE.

2. **Policy.** Decisions pertaining to how assessments will be designed, developed, and implemented within Component Commands (Echelon IIIs) are the responsibility of the respective Command. The one ILE technical requirement is that the software application(s) selected must be approved for use by the ILE, Business Applications Lead.

3. **Action.** All Navy Education and Training Command Echelon III Commands (EIIIs) shall first determine how assessments will be used to support the instructional goals of their education and training requirements. Second, the EIII will determine the appropriate delivery mechanisms (e.g., paper-based, computer-/browser-based) required to meet instructional goals. If an instructional or technical requirement cannot be met by the currently existing software applications, then the EIII will forward the requirement to the ILE Implementation Team, Business Applications Lead, for assistance.

4. **Assessment Integrity.** Assuring that assessment items are stored within the ILE systems in the most appropriate manner to prevent breaches in security is an Echelon III command responsibility. EIII commands should provide written policy
to subordinate commands as to how assessment items/banks will be administered. If the results of a learner’s performance on the assessment instrument will affect the movement of the learner’s position on the Five-Vector Model, the assessment is considered “High Stakes.” See enclosure (1).

a. All High-Stakes assessment items will be stored within the ILE in a manner that ensures the items will be seen only by the learner while engaged in the intended high-stakes assessment instrument.

b. All High-Stakes assessment items will be adequately protected from compromise by ensuring that they can be accessed only by designated personnel. Preferably, High-Stakes assessment items will be partitioned in a manner that maintains separation between high-stakes and lower-stakes items.

c. Additionally, if at all possible, assessment items for High-Stakes assessments will not be the same as or very similar in wording to those items residing in lower-stakes item banks.

5. **Breach of Security or Compromise.** Echelon III commands are to identify preventive measures that may be taken to eliminate compromise or breaches in security.

   a. The ILE systems afford commands a number of ways to reduce breaches in security. Non-technology-based solutions are encouraged as well (e.g., posting Core Values in the testing labs; discussing cheating with learners; requiring learners to sign a Page 13 before taking the exam; requiring identification checks before entering the exam room; providing a proctor in the exam room; apprising learners of the consequences of test integrity violations, etc.).

   b. In the event of a test security breach or compromise, the command responsible for the test should take appropriate action as provided by EIII guidance. Any technology-based test security breach must be reported and described in sufficient detail to the ILE Implementation, Business Applications Lead, and its Infrastructure Team Lead as soon as possible. In the event of a High-Stakes breach, the ILE Infrastructure Team may elect to secure the bank until a resolution can be identified.

6. **Life-Cycle Maintenance of Assessment Items and Banks.** Echelon III commands are to provide guidance to their subordinate commands regarding the periodic review of assessment items. The review should include a table that matches the objective, the assessment items, the content, and the associated reference publication. The reviewing team should check to ensure that the information contained within the assessment items reflects the instructional content and the learning objectives. See enclosure (2).
7. **Assessment Considerations.**

a. **Instructional Goals.**

(1) Assessment, in its broadest use, describes the processes and tools designed to solicit data from learners and to make inferences about what those learners know or can do. Designing an assessment strategy is integral to offering effective education and training opportunities.

(2) Most instructional design models begin with the development of learning objectives or descriptions of intended learning outcomes. Decisions about what to assess and how to assess are part of the initial design process. ELLIs should include Science of Learning Practitioners and Human Performance Technologists during the assessment design phase to ensure that current learning theories and performance requirements are supported by the assessment selections.

b. **Assessments and the Science of Learning.** Current learning-science research includes assessment as one of the important elements affecting how people learn. Based on the *How People Learn* (HPL) reports, Bransford (2001) describes assessment as one of the lenses through which learning environments should be analyzed to facilitate learning. Using assessments in this manner means more than frequent testing or providing only pre- and post-tests. ELLIs should ensure that assessments “... provide multiple opportunities to make learners’ thinking visible, provide them with feedback, and offer opportunities for them to revise and learn about their own learning” (Bransford, 2001, p. 1). Gagné (1972) suggests in the Events of Instruction that learners be provided with:

- **Event 6: Eliciting performance** (learners interact with the content to determine if they are ready to proceed). These embedded tests or self-checks are not graded and provide feedback and/or remediation....

- **Event 8: Assessing performance** (determines if the learners have achieved the instructional goal). The scores in Event 8 are recorded in the learning management system (LMS) and it is recommended that the assessment event not occur during the lesson itself (Smith & Ragan, 1999). Opportunities for review should be provided before Event 8.

See enclosure (3).

c. **Assessments and Performance.** The assessment design will include the performance standards and metrics (reference (a) applies).
(1) Performance assessments should address or mirror a close approximation of the job competencies the test is meant to measure. Content validation should confirm job relatedness and relevance. The design team should provide checklists or measurement rubrics for the performance test administrator to accurately record results and feedback.

(2) Performance tests used to complete or validate a Skill Object on the Five-Vector Model will be recorded in the LMS.

d. **Terminology.**

Assessment refers to the actual instrument or test designed to obtain information, whether a written test for determining what a learner knows or a performance test requiring a learner to demonstrate skills.

Assessment Item is the individual question or task. This item can stand alone within the instructional design of the course (e.g., a knowledge-check or self-check during instruction or a question to test mastery at the end of the course). Assessment items can be developed in various formats, including closed-choice (e.g., multiple choice, matching), open-ended (e.g., fill-in, essay), and real or simulated performance tasks. See reference (b) and enclosures (4) and (5) for more information.

Assessment Instrument refers to items that are grouped together to form tests, quizzes, exams, or simulations.

Feedback provides guidance on performance as a result of the assessment event, and addresses how the learners might have misinterpreted an item. Feedback can also make suggestions or recommendations to the learner on how to improve an action or response.

8. **Technical Requirements.**

a. SCORM does not address assessment issues via the Content Aggregation Model (CAM). During the planning phase the design team will consider how assessment instruments will be aggregated and sequenced.

b. Functional requirements for testing are addressed through the Run-time Environment of the learning management system (LMS) and/or the learning content management system (LCMS). At a minimum, EIIIs should collect data including the following:

(1) Learner identification
(2) Content tracking
(3) Item analysis
(4) Validity and reliability information for high-stakes exams
(5) Learner reaction or satisfaction to the learning event
(6) Number of attempts

c. EIIIs will use enclosure (6) to assist in determining and documenting viable assessment solutions.

9. **About Checks and Balance.**

10. **ILE POC** is Dr. Frankie Bratton-Jeffery, NETC N9, DSN: 922-4033; COMM: (850) 452-4033; email: Frankie.Jeffery@navy.mil Alternate POC is Kirk Schultz, N341, DSN: 922-1001, ext 2230, (COMM) (850) 452-1001, ext 2230, email: lee.schultz@navy.mil.
Navy ILE Content
XML Specification

Version 1.2
17 January 2005
## Revision History

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36.0 CORE CONTENT ORGANIZATION

This section describes the Content Organizational Model. There are some overarching structural rules and guidelines that have guided the creation of this XML binding. They must be described first to help understand the intentions of the XML binding.

36.1. Content Components

There are three primary components of a content package:
- Organization
- Content Elements
- Physical Files

The majority of focus for the content package resides within the definition of the XML for both the content organization and content element definition. The physical files are included in the Content Packaging section discussed later.

The three primary constructs to the XML definition are as follows:

- Content organization definition – Instructional or other taxonomical organization of the content to be managed, delivered, and/or generated.

- Content element definition - Text, media references and interactions located within any type of content that may be created (though content elements are primarily defined as raw data, they may also include rich interactions). These are the raw “bits” of information that comprise any form of learning or knowledge

- Metadata – The Metadata Profiles represents a mapping of the IEEE Learning Technology Standards Committee (LTSC) Learning Object
Metadata (LOM) elements for each of Content Model Components. In general, metadata can be applied to Containers, Content Elements, and Content Aggregations to describe them in a consistent fashion such that they can be identified, categorized, searched for and discovered within and across systems to further facilitate sharing and reuse.

Policies governing the application of metadata to the components of the Content Organizational Model should be defined within organizations that wish to enable reuse based on the requirements of those organizations.

37.0 CONTENT ORGANIZATIONAL MODEL

37.1. Content Structure

Content structure is comprised of collections used to organize the content to be delivered. The collections serve multiple purposes, such as standard course organization, assessments, and external file collections. There are five primary types of content structure that can be utilized within the content model. Each of these can have one or more sub-components that will be described at a later point. Five levels is typically the recommended depth of structure, though additional levels are possible. They are as follows:

- Item
- Assessment
- Survey
- External Object
- External Link

37.1.1. Item

An item is the most common content collection. The item is used to define standard content structure such as course hierarchy or document outlines. Because it is primarily used to just group and organize other sets of collections or content elements, it does not have many rules-based attributes associated. A single item must be the first defined component of any content package. There can be multiple levels of items within a package.

An example of how the basic item can be used within a content package is listed below:

Package
- Item
  - Item
    - Assessment
  - Item
    - Item
      - {content elements}
  - Survey
  - Item
    - Item
You’ll notice in the example that there are three primary purposes of the Item element:
- Contain a nested organization of itself (items can contain other items)
- Contain other structure types (items can contain assessments, surveys, etc.)
- Contain content elements (though these will be individually defined sets of text, media, etc., they are referenced here generally as {content elements})

When managed within Evolution®, the items will be mapped to specific structural types based upon the organization and depth of the structure of the items within the path. The mapped taxonomy is listed below in order of highest to lowest:
- Course
- Module
- Learning Object
- Topic
- Group

37.1.2. Assessment

An assessment is a specialized collection used to define a scored evaluation of questions and interactions for end-users of the content. An assessment has attributes associated with it to help define its capabilities and constraints, such as mastery score, number of allowable attempts if interactive, etc. An assessment can only have one sub-collection associated with it. That sub-collection is an assessment section. Assessment sections are used for question grouping for pooling, randomization, and weighting.

An example of how the basic assessment can be used within a content package is listed below:

Package
- Item
  - Assessment
    - Assessment section
      - {questions}
    - Assessment section
      - {questions}

Assessments can reside within or at the same level of any item defined within the package. The only location that an assessment cannot be used is as the highest collection within the package (which must be an item) or at the lowest level (same level where content elements are defined – though they can be accessed through a hyperlink at that level).

37.1.3. Survey

A survey is a specialized collection used to define a non-scored evaluation of questions and interactions for end-users of the content. An assessment has attributes associated with it to help define its capabilities and constraints, such as anonymous submittal, expiration date, etc. A survey can only have one sub-collection associated with it. That sub-collection is a survey section. Survey sections, similar to assessment sections, are
used for question grouping. Since they are not scored, they do not provide the same weighting or randomization.

An example of how the basic survey can be used within a content package is listed below:

Package
  - Item
    - Survey
      - Survey section
        - {questions}
      - Survey section
        - {questions}

Surveys can reside at or within the same level of any item defined within the package. The only location that a survey cannot be used is as the highest collection within the package (same level where content elements are defined – though they can be accessed through a hyperlink at that level).

37.1.4. **External Object**

An external object is a specialized collection used to associate one or more (working in unison) external files as consumable content within the package. The intent of this structural component is to ensure that content originating from another source (HTML, MS Office, etc.) can be integrated and utilized within the package. An external object can only have one sub-collection associated with it. That sub-collection is a container. The container defines a collection of one or more binary files that are managed as a single accessible object with an identified launch file.

An example of how the basic external object can be used within a content package is listed below:

Package
  - Item
    - External Object
      - Container
        - {external files}

External objects can reside within or at the same level of any item defined within the package. The only location that an external object cannot be used is as the highest collection within the package (which must be an item) or at the lowest level (same level where content elements are defined – though they can be accessed through a hyperlink at that level).

37.1.5. **External Link**

An external link is the simplest form of a collection, as it is only intended to reference content located outside the package through some URI. The primary difference between the external object and the external link is that that the object defines or references external files located directly within the package. An external object can only have one sub-collection associated with it. That sub-collection is a link. The link defines a URI that will be managed as a single accessible point within the package.

An example of how the basic external link can be used within a content package is listed below:

Package
External links can reside within or at the same level of any item defined within the package. The only location that an external link cannot be used is as the highest collection within the package (which must be an item) or at the lowest level (same level where content elements are defined – though they can be accessed through a hyperlink at that level).

37.2. Content Elements

Content elements are defined as the informational items within the content package. These informational items are comprised of text, media, interactive items, questions, and rich media objects. They are specifically comprised of the following items:

- **Text**
  - List
  - Paragraph
  - Table

Text can contain inline XHTML formatting markup to include the items in the table below. The implementation of this markup must adhere directly to the W3C standards for XHTML implementation.

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<td>The &lt;b&gt; tag displays the enclosed text in bold type.</td>
</tr>
<tr>
<td>&lt;em&gt;&lt;/em&gt;</td>
<td>The &lt;em&gt; tag is used to emphasize text. The enclosed text is usually displayed in italics.</td>
</tr>
<tr>
<td>&lt;i&gt;&lt;/i&gt;</td>
<td>The &lt;i&gt; tag italicizes the enclosed text.</td>
</tr>
<tr>
<td>&lt;strong&gt;&lt;/strong&gt;</td>
<td>The &lt;strong&gt; tag is used to strongly emphasize the enclosed text, usually in a bold font.</td>
</tr>
<tr>
<td>&lt;sub&gt;&lt;/sub&gt;</td>
<td>The &lt;sub&gt; tag displays the enclosed text as a subscript.</td>
</tr>
<tr>
<td>&lt;sup&gt;&lt;/sup&gt;</td>
<td>The &lt;sup&gt; tag displays the enclosed text as a superscript.</td>
</tr>
<tr>
<td>&lt;u&gt;&lt;/u&gt;</td>
<td>The &lt;u&gt; tag underlines the enclosed text.</td>
</tr>
</tbody>
</table>

Text may also contain embedded media and hyperlinks in accordance to the defined structure listed within the specification details below.

- **Media (non-interactive)**
Content elements above are structured as raw data that can be formatted/utilized differently for different outputs. Because they are just data elements, they are not bound by technology restraints.

### 37.2.1. Complex Content Element Structures

All elements defined in the section above are merged to form complex elements. Complex elements allow users to bind more than one element to a single piece of instruction for ease of maintenance, tracking, and reuse. An example of a complex element would be that of an image. An image not only contains a file, or reference to a file, but it also contains a unique identifier, title, caption, and other components such as descriptive text. The Content Organizational Model section below defines each component of a complex element. From this point forward, any reference to a content element will be that of a complex content element.

A list of all complex elements contained within the Content Organizational Model is provided directly below.

- Audio
- Bibliography
- Description
- DragDrop
- Fill in the Blank
37.3. Content Reusability

All structure, elements, and physical media can be referenced multiple times within a single content package to reduce duplication. Each collection and element has a corresponding reference associated with it (example: assessment is assessmentref). This allows immediate content reuse (linking) and prescriptive capabilities for assessments embedded within the package.

38.0 THE CONTENT ORGANIZATION XML BINDING

This section describes the eXtensible Markup Language (XML) Content Organizational Model. There are some specific rules that have guided the creation of this XML binding:
The XML binding will adhere to the XML 1.0 specification 27 of the W3C; and

- The XML binding must maintain the definitional structure of the Content Organizational Model.

An XML Schema (XSD) that implements this abstract can be found at http://schemas.outstart.com/xsd/evolution_v1.o.xsd. The elements of the XML Schema definition are described in each of the following subsections. Figures containing diagrams showing hierarchical views of the elements described by the XSD are included with the descriptions of the elements. These diagrams use a hierarchical notation to show parent/child relationships between elements. The following table describes the symbols within the diagrams.

The following table shows symbols that denote the contents of the element. Elements may contain other elements, or they may be “leaf nodes” and contain data. This table also shows symbols that relate directly to the “Multiplicity” specified for each element. This describes the number of times the element can occur within its parent element, or in the case of the top most element in the document, how many times the element occurs in the XML document.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A at this time</td>
<td>N/A at this time</td>
</tr>
</tbody>
</table>

The following table lists the data types that are used to represent the elements and attributes inside of an evomanifest.xml record.

<table>
<thead>
<tr>
<th>Data Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Container</td>
<td>This type is used to indicate that the element contains sub elements and does not actually contain any data value.</td>
</tr>
<tr>
<td>String</td>
<td>A set of characters. The smallest permitted maximum will also be specified.</td>
</tr>
<tr>
<td>Timespan</td>
<td>A length of time in seconds shown in the following numerical format: SS.SS. Seconds shall contain 2 digits, with an optional decimal point and 1 or 2 additional digits.</td>
</tr>
<tr>
<td>ID</td>
<td>Element used to uniquely identify an object within an XML instance document.</td>
</tr>
<tr>
<td>IDRef</td>
<td>A reference to an ID.</td>
</tr>
<tr>
<td>Boolean</td>
<td>A string with two values: “true” or “false”.</td>
</tr>
<tr>
<td>Vocabulary</td>
<td>A restricted vocabulary list exists for the element. The element data value must be a value from the vocabulary list. Vocabulary words must be complete and exact matches to the</td>
</tr>
</tbody>
</table>
38.1. <package> Elements

**Description:** The first, outermost element in the Manifest. This element encloses all the reference data. All namespace declarations should be declared inside the <package> element.

**Data Type:** The element is a container element and only contains other elements.

**Multiplicity:** The package is the top-level element for the topic package. It must only have a single instance within a manifest.

**Attributes:**
- None

**Elements:**
- <item>
- <assessment>
- <survey>
- <externalobject>
- <externallink>
- <metadata>

**Example:**
38.1.1. <item> Element

Description: An item is a standard object hierarchical node in the package. Up to 5 nested item tags are available for creation. Each item node contains the same properties.

Data Type: This element is a container element and only contains other elements.

Multiplicity: This element may occur 0 or 1 time within the <package> element. It is bound by the choice model for the <package> element whereas 1 and only 1 element can be created.

Attributes:
- identifier (required): An identifier, provided by an author or authoring tool that is unique. Data type=ID. The identifier must be created as a globally unique value defined within the IETF RFC 2396 and IETF RFC 2141.

- display (optional): The display type for the item. Data type=Vocabulary
  - Vocabulary List:
    - Visible
    - Hidden

Elements:

- `<label>`
- `<longdesc>`
- `<comments>`
- `<keywords>`
- `<children>`
- `<metadata>`

Example:

```
diagram

source
```

```xml
<br:element name="item">
  <xs:annotation>
    <xs:documentation>An item is a standard object hierarchical node in the package.</xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:complexContent>
      <xs:extension base="baseObjectType">
        <xs:sequence>
          <xs:element name="children" minOccurs="0">
            <xs:complexType>
              <xs:choice>
                <xs:choice minOccurs="0" maxOccurs="unbounded">
                  <xs:element ref="item"/>
                  <xs:element ref="survey"/>
                  <xs:element ref="assessment"/>
                  <xs:element ref="externalobject"/>
                </xs:choice>
              </xs:choice>
            </xs:complexType>
          </xs:element>
        </xs:sequence>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>
</br:element>
```
38.1.2. <assessment> Element

**Description:** The assessment represents an assessment container object. An assessment represents the root of a scoreable event.

**Data Type:** This element is a container element and can only contain other elements.

**Multiplicity:** This element may occur 0 or 1 time within the <package> element. It is bound by the choice model for the <package> element whereas 1 and only 1 element can be created.

**Attributes:**

- identifier (required): An identifier, provided by an author or authoring tool that is unique. Data type=ID. The identifier must be created as a globally unique value defined within the IETF RFC 2396 and IETF RFC 2141.

- display (optional): The display type for the assessment. Data type=Vocabulary
  - Vocabulary List:
    - Visible
    - Hidden

**Elements:**

- <label>
- <longdesc>
- <comments>
- <keywords>
- <duration>
<numtries>
<passingscore>
<shuffled>
<weight>
<children>
<metadata>

Example:

diagram

source
<xs:element name="assessment">
  <xs:annotation>
    <xs:documentation>The assessment represents an assessment container object.</xs:documentation>
    <xs:documentation>An assessment represents the root of a scorable event.</xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:complexContent>
      <xs:extension base="baseObjectType">
        <xs:sequence>
          <xs:element name="duration" type="xs:nonNegativeInteger" default="0" minOccurs="0"/>
          <xs:element name="numtries" type="xs:nonNegativeInteger" default="0" minOccurs="0"/>
          <xs:element name="passingscore" type="xs:decimal" default="0.0" minOccurs="0"/>
          <xs:element name="shuffled" type="xs:boolean" default="false" minOccurs="0"/>
          <xs:element name="weight" type="xs:nonNegativeInteger" default="1" minOccurs="0"/>
          <xs:element name="children" minOccurs="0" maxOccurs="unbounded" ref="assessmentsection"/>
        </xs:sequence>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>
</xs:element>
38.1.3. **<survey> Element**

**Description:** The survey is a top-level survey container object. Surveys are non-scoreable events that track submitted information from the system user.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or 1 time within the `<package>` element. It is bound by the choice model for the `<package>` element whereas 1 and only 1 element can be created.

**Attributes:**

- identifier (required): An identifier, provided by an author or authoring tool that is unique. Data type=ID. The identifier must be created as a globally unique value defined within the IETF RFC 2396 and IETF RFC 2141.
- display (optional): The display type for the assessment. Data type=Vocabulary
  - Vocabulary List:
    - Visible
    - Hidden

**Elements:**

- `<label>`
- `<longdesc>`
- `<comments>`
- `<keywords>`
- `<anonymous>`
- `<completionmessage>`
- `<expirationdate>`
- `<numtries>`
- `<children>`
- `<metadata>`
Example:

The survey is a top-level survey container object. Surveys are non-scoreable events that track submitted information from the system user.

```xml
<xs:element name="survey">
  <xs:annotation>
    <xs:documentation>The survey is a top-level survey container object. Surveys are non-scoreable events that track submitted information from the system user.</xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:complexContent>
      <xs:extension base="baseObjectType">
        <xs:sequence>
          <xs:element name="anonymous" type="xs:boolean" default="false" minOccurs="0"/>
          <xs:element name="completionmessage" minOccurs="0">
            <xs:simpleType>
              <xs:restriction base="xs:string">
                <xs:maxLength value="4000"/>
              </xs:restriction>
            </xs:simpleType>
          </xs:element>
          <xs:element name="duration" type="xs:integer" default="0" minOccurs="0"/>
          <xs:element name="expirationdate" minOccurs="0">
            <xs:simpleType>
              <xs:restriction base="xs:dateTime"/>
            </xs:simpleType>
          </xs:element>
          <xs:element name="numtries" minOccurs="0">
            <xs:simpleType>
              <xs:restriction base="xs:nonNegativeInteger"/>
            </xs:simpleType>
          </xs:element>
          <xs:element name="children" minOccurs="0">
            <xs:complexType>
              <xs:choice maxOccurs="unbounded">
                <xs:element ref="surveysectionref"/>
                <xs:element ref="surveysection" maxOccurs="unbounded"/>
              </xs:choice>
            </xs:complexType>
          </xs:element>
        </xs:sequence>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>
</xs:element>
```
38.1.4. <externalobject> Element

**Description:** The external object is a reference to a file or file grouping located within the package. The external object allows any type of content to be available, not just native content authored within the package.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or 1 time within the <package> element. It is bound by the choice model for the <package> element whereas 1 and only 1 element can be created.

**Attributes:**

- identifier (required): An identifier, provided by an author or authoring tool that is unique. Data type=ID. The identifier must be created as a globally unique value defined within the IETF RFC 2396 and IETF RFC 2141.

- display (optional): The display type for the assessment. Data type=Vocabulary
  
  - Vocabulary List:
    - Visible
    - Hidden

**Elements:**

- <label>
- <longdesc>
- <comments>
- <keywords>
- <container>
- <containerref>
- <metadata>

**Example:**
38.1.5. <externallink> Element

**Description:** The external link is a reference to a file path, URL, or other URI located external to the package. The target of the reference will not be included in the package upon transfer and will existing target URI when accessed.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or 1 time within the <package> element. It is bound by the choice model for the <package> element whereas 1 and only 1 element can be created.
Attributes:

- identifier (required): An identifier, provided by an author or authoring tool that is unique. Data type=ID. The identifier must be created as a globally unique value defined within the IETF RFC 2396 and IETF RFC 2141.

- display (optional): The display type for the assessment. Data type=Vocabulary
  - Vocabulary List:
    - Visible
    - Hidden

Elements:

- <label>
- <longdesc>
- <comments>
- <keywords>
- <link>
- <metadata>

Example:

```xml
<xs:element name="externallink">
  <xs:annotation>
    <xs:documentation>The externallink is a reference to a file path, URL, or other URI located external to the package.</xs:documentation>
    <xs:documentation>The target of the reference will not be included in the package upon transfer and will existing target URI when accessed.</xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:complexContent>
      <xs:extension base="baseObjectType">
        <xs:sequence>
          <xs:element name="link">
            <xs:complexType>
              
```
38.1.6. <metadata> Element

**Description:** The <metadata> element defines a collection of metadata assigned to the specific parent object in the manifest. The metadata container references a single XML file located within the package developed in strict adherence to the IEEE Learning Object Metadata Standards 1484.12.1 and 1484.12.3.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or 1 time within an element.

**Attributes:**
- None

**Elements:**
- `<file>`: This instance of the `<file>` element must follow the required format defined in [description of the `<file>` element](#), but must also only reference an IEEE conformant metadata XML document.
38.2.  <item> element

This section defines the make up, attributes and elements, of the <item> element.

38.2.1.  <label> Element

Description:  The <label> element defines the name of the item.

Data Type:  String: Max length 255

Multiplicity:  This element must occur 1 and only 1 time within the <item> element.

Attributes:
- None

Elements:
- None

38.2.2.  <longdesc> Element

Description:  The <longdesc> element defines the general description for the item.

Data Type:  String: Max length 255

Multiplicity:  This element may occur 0 or 1 time within the <item> element.

Attributes:
- None

Elements:
- None

38.2.3.  <comments> Element

Description:  The <comments> element defines general development comments for the item.
Data Type: String: Max length 4000

Multiplicity: This element may occur 0 or 1 time within the <item> element.

Attributes:
- None

Elements:
- None

38.2.4. <keywords> Element
Description: The <keywords> element defines a collection of search keys for the item.

Data Type: This is a container element. It can only contain other elements.

Multiplicity: This element may occur 0 or 1 time within the <item> element.

Attributes:
- None

Elements:
- <keyword>

38.2.5. <children> Element
Description: The <children> element is a collection of subordinate elements defined within the item.

Data Type: This is a container element. It can only contain other elements.

Multiplicity: This element must occur 1 and only 1 time within the <item> element.

Attributes:
- None

Elements:
- <item>
- <assessment>
- <survey>
- <externalobject>
- <externallink>
- <itemref>
- <assessmentref>
Example:
38.3.  <assessment> element

This section defines the make up, attributes and elements, of the <assessment> element.

38.3.1.  <label> Element

Description:  The <label> element defines the name of the assessment.

Data Type:  String: Max length 255

Multiplicity:  This element must occur 1 and only 1 time within the <assessment> element.

Attributes:
  ▪  None

Elements:
  ▪  None

38.3.2.  <longdesc> Element

Description:  The <longdesc> element defines the general description for the assessment.

Data Type:  String: Max length 255

Multiplicity:  This element may occur 0 or 1 time within the <assessment> element.

Attributes:
  ▪  None

Elements:
  ▪  None

38.3.3.  <comments> Element

Description:  The <comments> element defines general development comments for the assessment.

Data Type:  String: Max length 4000

Multiplicity:  This element may occur 0 or 1 time within the <assessment> element.

Attributes:
  ▪  None

Elements:
  ▪  None
38.3.4. <keywords> Element

Description: The <keywords> element defines a collection of search keys for the assessment.

Data Type: This is a container element. It can only contain other elements.

Multiplicity: This element may occur 0 or 1 time within the <assessment> element.

Attributes:
- None

Elements:
- <keyword>

38.3.5. <duration> Element

Description: The <duration> element defines total time a user can access the assessment within a single instance.

Data Type: Non-negative integer: Default = 0 where 0 defines unlimited duration.

Multiplicity: This element may occur 0 or 1 time within the <assessment> element.

Attributes:
- None

Elements:
- None

38.3.6. <numtries> Element

Description: The <numtries> element defines total number of tries (instances) a user can access the assessment.

Data Type: Non-negative integer: Default = 0 where 0 defines unlimited number of tries.

Multiplicity: This element may occur 0 or 1 time within the <assessment> element.

Attributes:
- None

Elements:
- None
38.3.7.  <passingscore> Element

Description: The <passingscore> element defines the mastery score utilized when evaluating the successful satisfaction state of the assessment.

Data Type: Decimal: Default = 0.0

Multiplicity: This element may occur 0 or 1 time within the <assessment> element.

Attributes:
- None

Elements:
- None

38.3.8.  <shuffled> Element

Description: The <shuffled> element defines a collection of search keys for the assessment.

Data Type: Boolean: Default = false

Multiplicity: This element may occur 0 or 1 time within the <assessment> element.

Attributes:
- None

Elements:
- None

38.3.9.  <weight> Element

Description: The <weight> element defines the relative weight of an assessment when evaluated against multiple assessments.

Data Type: Non-negative integer: Default = 1

Multiplicity: This element may occur 0 or 1 time within the <assessment> element.

Attributes:
- None

Elements:
- None
38.3.10. <children> Element

Description: The <children> element is a collection of subordinate elements defined within the assessment.

Data Type: This is a container element. It can only contain other elements.

Multiplicity: This element must occur and only 1 time within the <assessment> element.

Attributes:
- None

Elements:
- <assessmentsection>
- <assessmentsectionref>

Example:

[source]
<xs:element name="children" minOccurs="0">
  <xs:complexType>
    <xs:choice minOccurs="0" maxOccurs="unbounded">
      <xs:element ref="assessmentsection"/>
      <xs:element ref="assessmentsectionref"/>
    </xs:choice>
  </xs:complexType>
</xs:element>

38.3.11. <metadata> Element

Description: The <metadata> element defines a collection of metadata assigned to the specific parent object in the manifest. The metadata container references a single XML file located within the package developed in strict adherence to the IEEE Learning Object Metadata Standards 1484.12.1 and 1484.12.3.

Data Type: This is a container element. It can only contain other elements.

Multiplicity: This element may occur 0 or 1 time within an element.

Attributes:
None

Elements:

- <file>: This instance of the <file> element must follow the required format defined in description of the <file> element, but must also only reference an IEEE conformant metadata XML document.

38.4. <survey> element

This section defines the make up, attributes and elements, of the <survey> element.

38.4.1. <label> Element

**Description:** The <label> element defines the name of the survey.

**Data Type:** String: Max length 255

**Multiplicity:** This element must occur 1 and only 1 time within the <survey> element.

**Attributes:**

- None

**Elements:**

- None

38.4.2. <longdesc> Element

**Description:** The <longdesc> element defines the general description for the survey.

**Data Type:** String: Max length 255

**Multiplicity:** This element may occur 0 or 1 time within the <survey> element.

**Attributes:**

- None

**Elements:**

- None

38.4.3. <comments> Element

**Description:** The <comments> element defines general development comments for the survey.

**Data Type:** String: Max length 4000

**Multiplicity:** This element may occur 0 or 1 time within the <survey> element.
Attributes:
  ▪ None

Elements:
  ▪ None

38.4.4. `<keywords>` Element
Description: The `<keywords>` element defines a collection of search keys for the survey.

Data Type: This is a container element. It can only contain other elements.

Multiplicity: This element may occur 0 or 1 time within the `<survey>` element.

Attributes:
  ▪ None

Elements:
  ▪ `<keyword>`

38.4.5. `<anonymous>` Element
Description: The `<anonymous>` element defines whether the user information will be stored with the survey submittal.

Data Type: Boolean: Default = false

Multiplicity: This element may occur 0 or 1 time within the `<survey>` element.

Attributes:
  ▪ None

Elements:
  ▪ None

38.4.6. `<completionmessage>` Element
Description: The `<completionmessage>` element defines the message displayed to a user upon completion of the survey in an interactive format.

Data Type: String: Max length 4000

Multiplicity: This element may occur 0 or 1 time within the `<assessment>` element.

Attributes:
  ▪ None

Elements:
38.4.7.  <expirationdate> Element
Description:  The <expirationdate> element defines the date that the survey will no longer be available to users for submittal.
Data Type:  Date/Time
Multiplicity:  This element may occur 0 or 1 time within the <survey> element.
Attributes:  
  ▪ None
Elements:  
  ▪ None

38.4.8.  <numtries> Element
Description:  The <numtries> element defines total number of tries (instances) a user can access the survey.
Data Type:  Non-negative integer: Default = 0 where 0 defines unlimited number of tries.
Multiplicity:  This element may occur 0 or 1 time within the <survey> element.
Attributes:  
  ▪ None
Elements:  
  ▪ None

38.4.9.  <children> Element
Description:  The <children> element is a collection of subordinate elements defined within the survey.
Data Type:  This is a container element. It can only contain other elements.
Multiplicity:  This element may occur 1 and only 1 time within the <survey> element.
Attributes:  
  ▪ None
Elements:  
  ▪ <surveysection>
  ▪ <surveysectionref>
Example:

\[
\text{\textbf{diagram}}
\]

\[
\text{\textbf{source}}
\]

\[
\begin{verbatim}
<xs:element name="children" minOccurs="0">
    <xs:complexType>
        <xs:choice maxOccurs="unbounded">
            <xs:element ref="surveysectionref"/>
            <xs:element ref="surveysection" maxOccurs="unbounded"/>
        </xs:choice>
    </xs:complexType>
</xs:element>
\end{verbatim}

\[
\text{\textbf{Output}}
\]

38.4.10. **<metadata> Element**

**Description:** The **<metadata>** element defines a collection of metadata assigned to the specific parent object in the manifest. The metadata container references a single XML file located within the package developed in strict adherence to the IEEE Learning Object Metadata Standards 1484.12.1 and 1484.12.3.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or 1 time within an element.

**Attributes:**
- None

**Elements:**
- **<file>:** This instance of the **<file>** element must follow the required format defined in description of the **<file> element**, but must also only reference an IEEE conformant metadata XML document.

38.5. **<externalobject> element**

This section defines the make up, attributes and elements, of the **<externalobject> element**.
38.5.1. <label> Element

Description: The <label> element defines the name of the external object.

Data Type: String: Max length 255

Multiplicity: This element must occur 1 and only 1 time within the <externalobject> element.

Attributes:
  - None

Elements:
  - None

38.5.2. <longdesc> Element

Description: The <longdesc> element defines the general description for the external object.

Data Type: String: Max length 255

Multiplicity: This element may occur 0 or 1 time within the <externalobject> element.

Attributes:
  - None

Elements:
  - None

38.5.3. <comments> Element

Description: The <comments> element defines general development comments for the external object.

Data Type: String: Max length 4000

Multiplicity: This element may occur 0 or 1 time within the <externalobject> element.

Attributes:
  - None

Elements:
  - None

38.5.4. <keywords> Element

Description: The <keywords> element defines a collection of search keys for the external object.
Data Type: This is a container element. It can only contain other elements.

Multiplicity: This element may occur 0 or 1 time within the <externalobject> element.

Attributes:
- None

Elements:
- <keyword>

38.5.5. <container> Element

Description: The <container> element defines a collection of one or more binary files that are managed as a single accessible object with an identified launch file.

Data Type: This is a container element. It can only contain other elements.

Multiplicity: This element may occur 0 or 1 time within the <survey> element. It is bound by the choice model for the <survey> element whereas 1 and only 1 element can be created for <container> and <containerref>.

Attributes:
- identifier (required): An identifier, provided by an author or authoring tool that is unique. Data type=ID. The identifier must be created as a globally unique value defined within the IETF RFC 2396 and IETF RFC 2141.
- startfile: The launch file for the container. Data type=any URI
- containertype: The format of the container . Data type=Vocabulary
  - Vocabulary List:
    - sco
    - aiccapi
    - aicchaclocal
    - other

Elements:
- <file>
- <dependences>
- <metadata>

38.5.6. <containerref> Element

Description: The <containerref> defines an ID reference to a container that is defined elsewhere within the same package.
**Data Type:** Base Reference Type

**Multiplicity:** This element may occur 0 or 1 time within the `<survey>` element. It is bound by the choice model for the `<survey>` element whereas 1 and only 1 element can be created for `<container>` and `<containerref>`.

**Attributes:**
- `identifierref` (required): An identifier, provided by an author or authoring tool that is globally unique and located within the package. Data type=IDREF

**Elements:**
- None

### 38.5.7. `<metadata>` Element

**Description:** The `<metadata>` element defines a collection of metadata assigned to the specific parent object in the manifest. The metadata container references a single XML file located within the package developed in strict adherence to the IEEE Learning Object Metadata Standards 1484.12.1 and 1484.12.3.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or 1 time within an element.

**Attributes:**
- None

**Elements:**
- `<file>`: This instance of the `<file>` element must follow the required format defined in [description of the `<file>` element](#), but must also only reference an IEEE conformant metadata XML document.

### 38.6. `<externallink>` Element

This section defines the make up, attributes and elements, of the `<externallink>` element.

#### 38.6.1. `<label>` Element

**Description:** The `<label>` element defines the name of the external URI.

**Data Type:** String: Max length 255

**Multiplicity:** This element must occur 1 and only 1 time within the `<externallink>` element.

**Attributes:**
None

Elements:
- None

38.6.2. **<longdesc> Element**  
**Description:** The `<longdesc>` element defines the general description for the external URI.

**Data Type:** String: Max length 255

**Multiplicity:** This element may occur 0 or 1 time within the `<externallink>` element.

**Attributes:**  
- None

Elements:
- None

38.6.3. **<comments> Element**  
**Description:** The `<comments>` element defines general development comments for the external URI.

**Data Type:** String: Max length 4000

**Multiplicity:** This element may occur 0 or 1 time within the `<externallink>` element.

**Attributes:**  
- None

Elements:
- None

38.6.4. **<keywords> Element**  
**Description:** The `<keywords>` element defines a collection of search keys for the external URI.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or 1 time within the `<externallink>` element.

**Attributes:**  
- None

Elements:
38.6.5.  <link> Element

Description: The <link> element defines the URI target and label for the external link.

Data Type: This is a container element. It can only contain other elements.

Multiplicity: This element must occur 1 and only 1 time within the <externallink> element.

Attributes:

- Linktype (optional): This defines the type of URI defined by the link.
  Default=url Data Type=Vocabulary
    - Vocabulary List
      - url
      - aicchacpremote

Elements:

- None

Example:

```xml
<xs:element name="link">
  <xs:complexType>
    <xs:sequence>
      <xs:element name="label" type="xs:string"/>
      <xs:element name="target" type="xs:anyURI"/>
    </xs:sequence>
    <xs:attribute name="linkType" use="optional" default="url">
      <xs:simpleType>
        <xs:restriction base="xs:string">
          <xs:enumeration value="url"/>
          <xs:enumeration value="aicchacp"/>
        </xs:restriction>
      </xs:simpleType>
    </xs:attribute>
  </xs:complexType>
</xs:element>
```

38.6.6.  <metadata> Element

Description: The <metadata> element defines a collection of metadata assigned to the specific parent object in the manifest. The metadata container references a single XML file located within the package developed in strict
adherence to the IEEE Learning Object Metadata Standards 1484.12.1 and 1484.12.3.

**Data Type**: This is a container element. It can only contain other elements.

**Multiplicity**: This element may occur 0 or 1 time within an element.

**Attributes**: None

**Elements**: None

---

### 38.7. **<keywords> Element**

This section defines the make up, attributes and elements, of the `<keywords>` element.

#### 38.7.1. **<keyword> Element**

**Description**: The `<keyword>` defines an individual search keyword within the `<keywords>` element.

**Data Type**: String: Max length 100

**Multiplicity**: This element must occur one or more times within the `<keywords>` element.

**Attributes**:

- None

**Elements**:

- None

---

### 38.8. **<children> Element**

This section defines the make up, attributes and elements, of the `<children>` element.

#### 38.8.1. **<itemref> Element**

**Description**: The `<itemref>` defines an ID reference to an item that is defined elsewhere within the same package.

**Data Type**: Base Reference Type
Multiplicity: This element may occur one or more times within the <children> element.

Attributes:
- identifierref: An identifier, provided by an author or authoring tool that is globally unique and located within the package. Data type=IDREF

Elements:
- None

38.8.2. <assessmentref> Element

Description: The <assessmentref> defines an ID reference to an assessment that is defined elsewhere within the same package.

Data Type: Base Reference Type

Multiplicity: This element may occur one or more times within the <children> element.

Attributes:
- identifierref: An identifier, provided by an author or authoring tool that is globally unique and located within the package. Data type=IDREF

Elements:
- None

38.8.3. <surveyref> Element

Description: The <surveyref> defines an ID reference to a survey that is defined elsewhere within the same package.

Data Type: Base Reference Type

Multiplicity: This element may occur one or more times within the <children> element.

Attributes:
- identifierref: An identifier, provided by an author or authoring tool that is globally unique and located within the package. Data type=IDREF

Elements:
- None

38.8.4. <externalobjectref> Element

Description: The <externalobjectref> defines an ID reference to an external object that is defined elsewhere within the same package.

Data Type: Base Reference Type
**Multiplicity:** This element may occur one or more times within the `<children>` element.

**Attributes:**
- `identifierref`: An identifier, provided by an author or authoring tool that is globally unique and located within the package. Data type=IDREF

**Elements:**
- None

### 38.8.5. `<externallinkref>` Element

**Description:** The `<externallinkref>` defines an ID reference to an external URI that is defined elsewhere within the same package.

**Data Type:** Base Reference Type

**Multiplicity:** This element may occur one or more times within the `<children>` element.

**Attributes:**
- `identifierref`: An identifier, provided by an author or authoring tool that is globally unique and located within the package. Data type=IDREF

**Elements:**
- None

### 38.8.6. `<assessmentsection>` Element

**Description:** The `<assessmentsection>` element defines a sub-container or section of questions for the top-level assessment. Sections are primarily used to organize pools of questions intended to satisfy the same objective, but can be used for any instructional means.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 1 or more times within the `<children>` element.

**Attributes:**
- `identifier` (required): An identifier, provided by an author or authoring tool that is unique. Data type=ID. The identifier must be created as a globally unique value defined within the IETF RFC 2396 and IETF RFC 2141.
- `display` (optional): The display type for the assessment. Data type=Vocabulary
  - Vocabulary List:
    - `Visible`

Elements:

- <label>
- <comment>
- <keywords>
- <numquestions>
- <shuffled>
- <weight>
- <mandatory>
- <random>
- <metadata>

Example:

38.8.7. <surveysection> Element

Description: The <surveysection> element defines a sub-container or section of questions for the top-level survey. Survey sections are primarily used to provide contextual grouping for questions within a Survey.

Data Type: This is a container element. It can only contain other elements.

Multiplicity: This element may occur 1 or more times within the <children> element.

Attributes:

- identifier (required): An identifier, provided by an author or authoring tool that is unique. Data type=ID. The identifier must be created as a globally unique value defined within the IETF RFC 2396 and IETF RFC 2141.

- display (optional): The display type for the assessment. Data type=Vocabulary
  - Vocabulary List:
    - Visible
    - Hidden

Elements:

- <label>
- <comment>
- <keywords>
- `<children>`
- `<metadata>`

**Example:**

### 38.8.8. `<assessmentsectionref>` Element

**Description:** The `<assessmentsectionref>` defines an ID reference to an assessment section that is defined elsewhere within the same package.

**Data Type:** Base Reference Type

**Multiplicity:** This element may occur 0 or more times within the `<children>` element.

**Attributes:**
- `identifierref`: An identifier, provided by an author or authoring tool that is globally unique and located within the package. Data type=IDREF

**Elements:** None

### 38.8.9. `<surveysectionref>` Element

**Description:** The `<surveysectionref>` defines an ID reference to a survey section that is defined elsewhere within the same package.

**Data Type:** Base Reference Type

**Multiplicity:** This element may occur 0 or more times within the `<children>` element.

**Attributes:**
- `identifierref`: An identifier, provided by an author or authoring tool that is globally unique and located within the package. Data type=IDREF

**Elements:** None

### 38.8.10. `<bibliography>` Element

**Description:** The `<bibliography>` element defines content that supports formatted textual entry specifically for the purpose of identifying bibliographic notation.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or more times within the `<children>` element.

**Attributes:**
- identifier (required): An identifier, provided by an author or authoring tool that is unique. Data type=ID. The identifier must be created as a globally unique value defined within the IETF RFC 2396 and IETF RFC 2141.

- display (optional): The display type for the assessment. Data type=Vocabulary
  
  o Vocabulary List:
    - Visible
    - Hidden

**Elements:**

- <label>
- <comment>
- <keywords>
- <content>
- <metadata>

**Example:**

```
<xs:element name="bibliography">
  <xs:annotation>
    <xs:documentation>The bibliography is a content element that provides formatted textual capabilities specifically for the purpose of defining bibliographic notation.</xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:complexContent>
      <xs:extension base="baseElementType">
        <xs:sequence>
          <xs:element name="content" minOccurs="0">
            <xs:complexType>
              <xs:group ref="group.titletext"/>
            </xs:complexType>
          </xs:element>
        </xs:sequence>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>
</xs:element>
```

**38.8.11. <description> Element**

**Description:** The <description> element defines content that supports basic textual entry capabilities.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or more times within the <children> element.
Attributes:

- **identifier (required):** An identifier, provided by an author or authoring tool that is unique. Data type=ID. The identifier must be created as a globally unique value defined within the IETF RFC 2396 and IETF RFC 2141.

- **display (optional):** The display type for the assessment. Data type=Vocabulary
  - Vocabulary List:
    - Visible
    - Hidden

Elements:

- `<label>`
- `<comment>`
- `<keywords>`
- `<content>`
- `<metadata>`

Example:

```xml
<xs:element name="description">
  <xs:annotation>
    <xs:documentation>The description is a content element that provides basic textual entry capabilities.</xs:documentation>
    <xs:documentation>The primary use for the description is to enter paragraph data.</xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:complexContent>
      <xs:extension base="baseElementType">
        <xs:sequence>
          <xs:element name="content" minOccurs="0">
            <xs:complexType>
              <xs:group ref="group.titletext"/>
            </xs:complexType>
          </xs:element>
        </xs:sequence>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>
</xs:element>
```
38.8.12. <note> Element

Description: The <note> element defines content that supports a visually distinct messagebox of information.

Data Type: This is a container element. It can only contain other elements.

Multiplicity: This element may occur 0 or more times within the <children> element.

Attributes:

- identifier (required): An identifier, provided by an author or authoring tool that is unique. Data type=ID. The identifier must be created as a globally unique value defined within the IETF RFC 2396 and IETF RFC 2141.

- display (optional): The display type for the assessment. Data type=Vocabulary
  - Vocabulary List:
    - Visible
    - Hidden

Elements:

- <label>
- <comment>
- <keywords>
- <content>
- <metadata>

Example:

38.8.13. <tip> Element

Description: The <tip> element defines content that supports a visually distinct messagebox of information.

Data Type: This is a container element. It can only contain other elements.

Multiplicity: This element may occur 0 or more times within the <children> element.

Attributes:
- identifier (required): An identifier, provided by an author or authoring tool that is unique. Data type=ID. The identifier must be created as a globally unique value defined within the IETF RFC 2396 and IETF RFC 2141.

- display (optional): The display type for the assessment. Data type=Vocabulary
  - Vocabulary List:
    - Visible
    - Hidden

**Elements:**

- `<label>`
- `<comment>`
- `<keywords>`
- `<content>`
- `<metadata>`

**Example:**

### 38.8.14. `<list>` Element

**Description:** The `<list>` element defines content that supports one or more levels of bulleted or numbered items.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or more times within the `<children>` element.

**Attributes:**

- identifier (required): An identifier, provided by an author or authoring tool that is unique. Data type=ID. The identifier must be created as a globally unique value defined within the IETF RFC 2396 and IETF RFC 2141.

- display (optional): The display type for the assessment. Data type=Vocabulary
  - Vocabulary List:
    - Visible
    - Hidden

**Elements:**
38.8.15. **<table> Element**

**Description:** The `<table>` element defines content that supports standard tables with simple row and column configurations.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or more times within the `<children>` element.

**Attributes:**

- `identifier` (required): An identifier, provided by an author or authoring tool that is unique. Data type=ID. The identifier must be created as a globally unique value defined within the IETF RFC 2396 and IETF RFC 2141.
- `display` (optional): The display type for the assessment. Data type=Vocabulary
  - Vocabulary List:
    - Visible
    - Hidden

**Elements:**

- `<label>`
- `<comment>`
- `<keywords>`
- `<content>`
- `<metadata>`

**Example:**
38.8.16. <reference> Element

**Description:** The `<reference>` element defines content that supports one or more hyperlinks to be created referencing target containers, items, assessments, surveys, elements, or external URIs.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or more times within the `<children>` element.

**Attributes:**

- **identifier (required):** An identifier, provided by an author or authoring tool that is unique. Data type=ID. The identifier must be created as a globally unique value defined within the IETF RFC 2396 and IETF RFC 2141.

- **display (optional):** The display type for the assessment. Data type=Vocabulary
  - Vocabulary List:
    - Visible
    - Hidden

**Elements:**

- `<label>`
- `<comment>`
- `<keywords>`
- `<content>`
- `<metadata>`

**Example:**

38.8.17. <image> Element

**Description:** The `<image>` element defines content that and any standard playable single-file media. Typically, it is utilized for non-multimedia formats.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or more times within the `<children>` element.

**Attributes:**

- **identifier (required):** An identifier, provided by an author or authoring tool that is unique. Data type=ID. The identifier must be created as a globally unique value defined within the IETF RFC 2396 and IETF RFC 2141.
display (optional): The display type for the assessment. Data type=Vocabulary
  o Vocabulary List:
    ▪ Visible
    ▪ Hidden

Elements:
  ▪ <label>
  ▪ <comment>
  ▪ <keywords>
  ▪ <content>
  ▪ <metadata>

Example:

38.8.18. <imagemap> Element
Description: The <imagemap> element defines content that supports a base image having one or more clickable map areas where of reference information. The information may reside in the form of references within the package or any URI.

Data Type: This is a container element. It can only contain other elements.

Multiplicity: This element may occur 0 or more times within the <children> element.

Attributes:
  ▪ identifier (required): An identifier, provided by an author or authoring tool that is unique. Data type=ID. The identifier must be created as a globally unique value defined within the IETF RFC 2396 and IETF RFC 2141.
  ▪ display (optional): The display type for the assessment. Data type=Vocabulary
    o Vocabulary List:
      ▪ Visible
      ▪ Hidden

Elements:
  ▪ <label>
  ▪ <comment>
  ▪ <keywords>
38.8.19. `<mouseover>` Element

**Description:** The `<mouseover>` element defines content that supports a base image with one or more mouseover or clickable map areas where of embedded text.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or more times within the `<children>` element.

**Attributes:**

- **identifier (required):** An identifier, provided by an author or authoring tool that is unique. Data type=ID. The identifier must be created as a globally unique value defined within the IETF RFC 2396 and IETF RFC 2141.
- **display (optional):** The display type for the assessment. Data type=Vocabulary
  - Vocabulary List:
    - Visible
    - Hidden

**Elements:**

- `<label>`
- `<comment>`
- `<keywords>`
- `<content>`
- `<metadata>`

**Example:**

38.8.20. `<slideshow>` Element

**Description:** The `<slideshow>` element defines content that supports an interactive sequence of image/text pairs defined as slides. The user can navigate back and forth between the slides to view the image/text for each.

**Data Type:** This is a container element. It can only contain other elements.
**Multiplicity:** This element may occur 0 or more times within the `<children>` element.

**Attributes:**

- **identifier (required):** An identifier, provided by an author or authoring tool that is unique. Data type=ID. The identifier must be created as a globally unique value defined within the IETF RFC 2396 and IETF RFC 2141.
- **display (optional):** The display type for the assessment. Data type=Vocabulary
  - Vocabulary List:
    - Visible
    - Hidden

**Elements:**

- `<label>`
- `<comment>`
- `<keywords>`
- `<content>`
- `<metadata>`

**Example:**

38.8.21. `<shockwave>` Element

**Description:** The `<shockwave>` element defines content that supports single-file Shockwave and Flash.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or more times within the `<children>` element.

**Attributes:**

- **identifier (required):** An identifier, provided by an author or authoring tool that is unique. Data type=ID. The identifier must be created as a globally unique value defined within the IETF RFC 2396 and IETF RFC 2141.
- **display (optional):** The display type for the assessment. Data type=Vocabulary
  - Vocabulary List:
    - Visible
Elements:

- <label>
- <comment>
- <keywords>
- <content>
- <metadata>

Example:

38.8.22. <audio> Element

**Description:** The `<audio>` element defines content that supports audio files.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or more times within the `<children>` element.

**Attributes:**

- identifier (required): An identifier, provided by an author or authoring tool that is unique. Data type=ID. The identifier must be created as a globally unique value defined within the IETF RFC 2396 and IETF RFC 2141.

- display (optional): The display type for the assessment. Data type=Vocabulary
  - Vocabulary List:
    - Visible
    - Hidden

Elements:

- <label>
- <comment>
- <keywords>
- <content>
- <metadata>

Example:
38.8.23. <video> Element

**Description:** The `<video>` element defines content that supports common single-file video/multimedia formats.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or more times within the `<children>` element.

**Attributes:**

- `identifier` (required): An identifier, provided by an author or authoring tool that is unique. Data type=ID. The identifier must be created as a globally unique value defined within the IETF RFC 2396 and IETF RFC 2141.

- `display` (optional): The display type for the assessment. Data type=Vocabulary
  - Vocabulary List:
    - Visible
    - Hidden

**Elements:**

- `<label>`
- `<comment>`
- `<keywords>`
- `<content>`
- `<metadata>`

**Example:**

---

38.8.24. <html> Element

**Description:** The `<html>` element defines content that supports JavaScript definition and utilization within rendered HTML page.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or more times within the `<children>` element.

**Attributes:**

- `identifier` (required): An identifier, provided by an author or authoring tool that is unique. Data type=ID. The identifier must be created as a globally unique value defined within the IETF RFC 2396 and IETF RFC 2141.
display (optional): The display type for the assessment. Data type=Vocabulary
  o Vocabulary List:
    ▪ Visible
    ▪ Hidden

Elements:
  ▪ <label>
  ▪ <comment>
  ▪ <keywords>
  ▪ <content>
  ▪ <metadata>

Example:

38.8.25. <truefalse> Element

Description: The <truefalse> element defines a question that evaluates a user ability select the appropriate choice from a binary answer list. Though it is typically identified as true/false, the element can support any two answers that require a choice.

Data Type: This is a container element. It can only contain other elements.

Multiplicity: This element may occur 0 or more times within the <children> element.

Attributes:
  ▪ identifier (required): An identifier, provided by an author or authoring tool that is unique. Data type=ID. The identifier must be created as a globally unique value defined within the IETF RFC 2396 and IETF RFC 2141.
  ▪ display (optional): The display type for the assessment. Data type=Vocabulary
    o Vocabulary List:
      ▪ Visible
      ▪ Hidden

Elements:
  ▪ <label>
  ▪ <comment>
38.8.26. <multiplechoice> Element

Description: The <multiplechoice> element defines a question that evaluates a user ability to select a single or multiple set of answer choices from a list of answers. The list can contain any number of answer choices, though 3 - 10 the recommended range.

Data Type: This is a container element. It can only contain other elements.

Multiplicity: This element may occur 0 or more times within the <children> element.

Attributes:

- identifier (required): An identifier, provided by an author or authoring tool that is unique. Data type=ID. The identifier must be created as a globally unique value defined within the IETF RFC 2396 and IETF RFC 2141.
- display (optional): The display type for the assessment. Data type=Vocabulary
  - Vocabulary List:
    - Visible
    - Hidden

Elements:

- <label>
- <comment>
- <keywords>
- <content>
- <metadata>

Example:

38.8.27. <fillintheblank> Element

Description: The <fillintheblank> element defines a question that evaluates a user ability to manually enter appropriate words or phrases to complete.
Data Type: This is a container element. It can only contain other elements.

Multiplicity: This element may occur 0 or more times within the <children> element.

Attributes:

- identifier (required): An identifier, provided by an author or authoring tool that is unique. Data type=ID. The identifier must be created as a globally unique value defined within the IETF RFC 2396 and IETF RFC 2141.

- display (optional): The display type for the assessment. Data type=Vocabulary
  - Vocabulary List:
    - Visible
    - Hidden

Elements:

- <label>
- <comment>
- <keywords>
- <content>
- <metadata>

Example:

38.8.28. <ordering> Element

Description: The <ordering> element defines a question that evaluates a user ability to input or select the the order of items within a list.

Data Type: This is a container element. It can only contain other elements.

Multiplicity: This element may occur 0 or more times within the <children> element.

Attributes:

- identifier (required): An identifier, provided by an author or authoring tool that is unique. Data type=ID. The identifier must be created as a globally unique value defined within the IETF RFC 2396 and IETF RFC 2141.

- display (optional): The display type for the assessment. Data type=Vocabulary
  - Vocabulary List:
Elements:

- Visible
- Hidden

Example:

38.8.29. <matching> Element

Description: The <matching> element defines a question that evaluates a user ability to pair or group together a series of choices that match.

Data Type: This is a container element. It can only contain other elements.

Multiplicity: This element may occur 0 or more times within the <children> element.

Attributes:

- identifier (required): An identifier, provided by an author or authoring tool that is unique. Data type=ID. The identifier must be created as a globally unique value defined within the IETF RFC 2396 and IETF RFC 2141.
- display (optional): The display type for the assessment. Data type=Vocabulary
  - Vocabulary List:
    - Visible
    - Hidden

Elements:

- <label>
- <comment>
- <keywords>
- <content>
- <metadata>

Example:
38.8.30. <hotspot> Element

**Description:** The `<hotspot>` element defines a question that evaluates a user's ability to select single or multiple points on a base image in a multiple choice fashion or based on an appropriate sequence.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or more times within the `<children>` element.

**Attributes:**

- **identifier** (required): An identifier, provided by an author or authoring tool that is unique. Data type=ID. The identifier must be created as a globally unique value defined within the IETF RFC 2396 and IETF RFC 2141.
- **display** (optional): The display type for the assessment. Data type=Vocabulary
  - Vocabulary List:
    - Visible
    - Hidden

**Elements:**

- `<label>`
- `<comment>`
- `<keywords>`
- `<content>`
- `<metadata>`

**Example:**

38.8.31. <dragdrop> Element

**Description:** The `<dragdrop>` element defines a question that evaluates a user's ability to place one or more drag items to correct points on a base image.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or more times within the `<children>` element.

**Attributes:**
- identifier (required): An identifier, provided by an author or authoring tool that is unique. Data type=ID. The identifier must be created as a globally unique value defined within the IETF RFC 2396 and IETF RFC 2141.
- display (optional): The display type for the assessment. Data type=Vocabulary
  - Vocabulary List:
    - Visible
    - Hidden

Elements:
- <label>
- <comment>
- <keywords>
- <content>
- <metadata>

Example:

38.8.32. <likert> Element
Description: The <likert> element defines content that supports a finite set of radio selection options used to specify a gradient or rating.

Data Type: This is a container element. It can only contain other elements.

Multiplicity: This element may occur 0 or more times within the <children> element.

Attributes:
- identifier (required): An identifier, provided by an author or authoring tool that is unique. Data type=ID. The identifier must be created as a globally unique value defined within the IETF RFC 2396 and IETF RFC 2141.
- display (optional): The display type for the assessment. Data type=Vocabulary
  - Vocabulary List:
    - Visible
    - Hidden

Elements:
- <label>
• <comment>
• <keywords>
• <content>
• <metadata>

Example:

38.8.33. <freeform> Element

Description: The <freeform> element defines content that supports an open response field.

Data Type: This is a container element. It can only contain other elements.

Multiplicity: This element may occur 0 or more times within the <children> element.

Attributes:

• identifier (required): An identifier, provided by an author or authoring tool that is unique. Data type=ID. The identifier must be created as a globally unique value defined within the IETF RFC 2396 and IETF RFC 2141.

• display (optional): The display type for the assessment. Data type=Vocabulary
  • Vocabulary List:
    • Visible
    • Hidden

Elements:

• <label>
• <comment>
• <keywords>
• <content>
• <metadata>

Example:

38.8.34. <elementref> Element

Description: The <elementref> defines an ID reference to an external object that is defined elsewhere within the same package.
Data Type: Base Reference Type

Multiplicity: This element may occur one or more times within the <children> element.

Attributes:
- identifierref: An identifier, provided by an author or authoring tool that is globally unique and located within the package. Data type=IDREF

Elements:
- None

38.9. <container> Element

This section defines the make up, attributes and elements, of the <container> element.

38.9.1. <label> Element

Description: The <label> element defines the name of the container.

Data Type: String: Max length 255

Multiplicity: This element must occur 1 and only 1 time within the <container> element.

Attributes:
- None

Elements:
- None

38.9.2. <comments> Element

Description: The <comments> element defines general development comments for the container.

Data Type: String: Max length 4000

Multiplicity: This element may occur 0 or 1 time within the <container> element.

Attributes:
- None

Elements:
- None
38.9.3.  **<keywords> Element**  
**Description:** The `<keywords>` element defines a collection of search keys for the container.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or 1 time within the `<container>` element.

**Attributes:**
- None

**Elements:**
- `<keyword>`

38.9.4.  **<file> Element**  
**Description:** The `<file>` defines the local relative path to a file on which the container is dependent.

**Data Type:** This is a container element.

**Multiplicity:** This element may occur one or more times within the `<container>` element.

**Attributes:**
- `href` (required). URI of the file. This implies that the file is locally stored within the package and referenced as a relative location. Data Type – String (smallest permitted maximum of 2000 characters).

**Elements:**
- None

38.9.5.  **<dependencies> Element**  
**Description:** The `<dependencies>` element defines additional external content to which the container is dependent. The dependency may be utilized to achieve required functionality of the source container, or it may be utilized to associate materials for development/management referencing.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or 1 time within the `<container>` element.

**Attributes:**
- None

**Elements:**
- `<container>`
38.9.6. <metadata> Element

**Description:** The `<metadata>` element defines a collection of metadata assigned to the specific parent object in the manifest. The metadata container references a single XML file located within the package developed in strict adherence to the IEEE Learning Object Metadata Standards 1484.12.1 and 1484.12.3.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or 1 time within an element.

**Attributes:**
- None

**Elements:**
- `<file>`: This instance of the `<file>` element must follow the required format defined in description of the `<file>` element, but must also only reference an IEEE conformant metadata XML document.

38.10. `<assessmentsection>` Element

This section defines the make up, attributes and elements, of the `<assessmentsection>` element.

38.10.1. `<label>` Element

**Description:** The `<label>` element defines the name of the assessment section.

**Data Type:** String: Max length 255

**Multiplicity:** This element must occur 1 and only 1 time within the `<assessmentsection>` element.

**Attributes:**
- None

**Elements:**
- None

38.10.2. `<comments>` Element

**Description:** The `<comments>` element defines general development comments for the assessment section.

**Data Type:** String: Max length 4000
Multiplicity: This element may occur 0 or 1 time within the <assessmentsection> element.

Attributes:
- None

Elements:
- None

38.10.3. <keywords> Element
Description: The <keywords> element defines a collection of search keys for the assessment section.

Data Type: This is a container element. It can only contain other elements.

Multiplicity: This element may occur 0 or 1 time within the <assessmentsection> element.

Attributes:
- None

Elements:
- <keyword>

38.10.4. <numquestions> Element
Description: The <numquestions> element defines number of questions that will be used in any given instance of an assessment section. The value of <numquestions> cannot

Data Type: Non-negative Integer

Multiplicity: This element may occur 1 and only 1 time within the <assessmentsection> element.

Attributes:
- None

Elements:
- None

38.10.5. <shuffled> Element
Description: The <shuffled> element defines whether or not the questions within the assessment section will be shuffled upon generation.

Data Type: Boolean (optional): Default = false

Multiplicity: This element may occur 0 or 1 time within the <assessmentsection> element.
38.10.6. <weight> Element

**Description:** The `<weight>` element defines the relative weight of an assessment section when evaluated against multiple sections in an assessment.

**Data Type:** Non-negative integer: Default = 1

**Multiplicity:** This element may occur 0 or 1 time within the `<assessmentsection>` element.

**Attributes:**
- None

**Elements:**
- None

38.10.7. <mandatory> Element

**Description:** The `<mandatory>` element defines a collection of all assessment questions that are required for the assessment section and will always be utilized within it.

**Data Type:** This is a container element. It can only contain other elements

**Multiplicity:** This element must occur 1 and only 1 time within the `<assessmentsection>` element.

**Attributes:**
- None

**Elements:**
- `<truefalse>`
- `<multiplechoice>`
- `<fillintheblank>`
- `<ordering>`
- `<matching>`
- `<hotspot>`
- `<dragdrop>`
38.10.8. <random> Element

Description: The <random> element defines a collection of all assessment questions that are not mandatory and will be chosen at random based upon the <numquestions> value and total number of questions within the <mandatory> element. For example, if the <numquestions> value is 10, <mandatory> contains 5 questions, and <random> contains 10 questions, 5 questions will be selected randomly from the pool in <random> to be displayed with the mandatory questions.

Data Type: This is a container element. It can only contain other elements.

Multiplicity: This element may occur 0 or 1 time within the <assessmentsection> element.

Attributes:
- None

Elements:
- <truefalse>
- <multiplechoice>
- <fillintheblank>
- <ordering>
- <matching>
- <hotspot>
- <dragdrop>
- <elementref>

38.10.9. <metadata> Element

Description: The <metadata> element defines a collection of metadata assigned to the specific parent object in the manifest. The metadata container references a single XML file located within the package developed in strict adherence to the IEEE Learning Object Metadata Standards 1484.12.1 and 1484.12.3.

Data Type: This is a container element. It can only contain other elements.

Multiplicity: This element may occur 0 or 1 time within an element.

Attributes:
- None

Elements:
<file>: This instance of the <file> element must follow the required format defined in description of the <file> element, but must also only reference an IEEE conformant metadata XML document.

38.11. <surveysection> Element

This section defines the make up, attributes and elements, of the <surveysection> element.

38.11.1. <label> Element

**Description:** The <label> element defines the name of the survey section.

**Data Type:** String: Max length 255

**Multiplicity:** This element must occur 1 and only 1 time within the <surveysection> element.

**Attributes:**
- None

**Elements:**
- None

38.11.2. <comments> Element

**Description:** The <comments> element defines general development comments for the survey section.

**Data Type:** String: Max length 4000

**Multiplicity:** This element may occur 0 or 1 time within the <surveysection> element.

**Attributes:**
- None

**Elements:**
- None

38.11.3. <keywords> Element

**Description:** The <keywords> element defines a collection of search keys for the survey section.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or 1 time within the <surveysection> element.

**Attributes:**
None

Elements:

- <keyword>

### 38.11.4. <children> Element

**Description:** The <children> element defines a list of all content elements that can be included within the survey section.

**Data Type:** This is a container element. It can only contain other elements

**Multiplicity:** This element must occur 1 or more times within the <surveysection> element.

**Attributes:**

- None

**Elements:**

- <likert>
- <freeform>
- <description>
- <note>
- <tip>
- <list>
- <table>
- <reference>
- <image>
- <imagemap>
- <mouseover>
- <slideshow>
- <shockwave>
- <audio>
- <video>
- <truefalse>
- <multiplechoice>
- <fillintheblank>
- <ordering>
- <matching>
- <hotspot>
- <dragdrop>
- <elementref>

Elements:
- None

38.11.5. <metadata> Element

Description: The <metadata> element defines a collection of metadata assigned to the specific parent object in the manifest. The metadata container references a single XML file located within the package developed in strict adherence to the IEEE Learning Object Metadata Standards 1484.12.1 and 1484.12.3.

Data Type: This is a container element. It can only contain other elements.

Multiplicity: This element may occur 0 or 1 time within an element.

Attributes:
- None

Elements:
- <file>: This instance of the <file> element must follow the required format defined in description of the <file> element, but must also only reference an IEEE conformant metadata XML document.

38.12. <bibliography> Element

This section defines the make up, attributes and elements, of the <bibliography> element.

38.12.1. <label> Element

Description: The <label> element defines the name of the Bibliography content element.

Data Type: String: Max length 255

Multiplicity: This element must occur 1 and only 1 time within the <bibliography> element.

Attributes:
- None
Elements:

- None

38.12.2. <comments> Element

**Description:** The `<comments>` element defines general development comments for the Bibliography content element.

**Data Type:** String: Max length 4000

**Multiplicity:** This element may occur 0 or 1 time within the `<bibliography>` element.

**Attributes:**

- None

**Elements:**

- None

38.12.3. <keywords> Element

**Description:** The `<keywords>` element defines a collection of search keys for the Bibliography content element.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or 1 time within the `<bibliography>` element.

**Attributes:**

- None

**Elements:**

- `<keyword>`

38.12.4. <content> Element

**Description:** The `<content>` element defines the actual content components of a Bibliography element that an end user will view.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element must occur 1 and only 1 time within the `<bibliography>` element.

**Attributes:**

- None

**Elements:**

- `<author>`
38.12.5. <metadata> Element

Description: The <metadata> element defines a collection of metadata assigned to the specific parent object in the manifest. The metadata container references a single XML file located within the package developed in strict adherence to the IEEE Learning Object Metadata Standards 1484.12.1 and 1484.12.3.

Data Type: This is a container element. It can only contain other elements.

Multiplicity: This element may occur 0 or 1 time within an element.

Attributes:
- None

Elements:
- <file>: This instance of the <file> element must follow the required format defined in description of the <file> element, but must also only reference an IEEE conformant metadata XML document.

38.13. <description> Element

This section defines the make up, attributes and elements, of the <description> element.

38.13.1. <label> Element

Description: The <label> element defines the name of the Description content element.

Data Type: String: Max length 255

Multiplicity: This element must occur 1 and only 1 time within the <description> element.

Attributes:
38.13.2. <comments> Element

**Description:** The `<comments>` element defines general development comments for the Description content element.

**Data Type:** String: Max length 4000

**Multiplicity:** This element may occur 0 or 1 time within the `<description>` element.

**Attributes:**
- None

**Elements:**
- None

38.13.3. <keywords> Element

**Description:** The `<keywords>` element defines a collection of search keys for the Description content element.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or 1 time within the `<description>` element.

**Attributes:**
- None

**Elements:**
- `<keyword>`

38.13.4. <content> Element

**Description:** The `<content>` element defines the actual content components of a Description element that an end user will view.

**Data Type:** This is a container element. It can only contain other elements

**Multiplicity:** This element must occur 1 and only 1 time within the `<description>` element.

**Attributes:**
- None

**Elements:**
Examples:

38.13.5. <metadata> Element
Description: The <metadata> element defines a collection of metadata assigned to the specific parent object in the manifest. The metadata container references a single XML file located within the package developed in strict adherence to the IEEE Learning Object Metadata Standards 1484.12.1 and 1484.12.3.

Data Type: This is a container element. It can only contain other elements.

Multiplicity: This element may occur 0 or 1 time within an element.

Attributes:
- None

Elements:
- <file>: This instance of the <file> element must follow the required format defined in description of the <file> element, but must also only reference an IEEE conformant metadata XML document.

38.14. <note> Element
This section defines the make up, attributes and elements, of the <note> element.

38.14.1. <label> Element
Description: The <label> element defines the name of the Note content element.

Data Type: String: Max length 255

Multiplicity: This element must occur 1 and only 1 time within the <note> element.

Attributes:
- None

Elements:
- None

38.14.2. <comments> Element
Description: The <comments> element defines general development comments for the Note content element.
Data Type: String: Max length 4000

Multiplicity: This element may occur 0 or 1 time within the <note> element.

Attributes:
- None

Elements:
- None

38.14.3. <keywords> Element

Description: The <keywords> element defines a collection of search keys for the Note content element.

Data Type: This is a container element. It can only contain other elements.

Multiplicity: This element may occur 0 or 1 time within the <note> element.

Attributes:
- None

Elements:
- <keyword>

38.14.4. <content> Element

Description: The <content> element defines the actual content components of a Note element that an end user will view.

Data Type: This is a container element. It can only contain other elements

Multiplicity: This element must occur 1 and only 1 time within the <note> element.

Attributes:
- None

Elements:
- <title>
- <text>

Examples:

38.14.5. <metadata> Element

Description: The <metadata> element defines a collection of metadata assigned to the specific parent object in the manifest. The metadata container references a single XML file located within the package developed in strict
adherence to the IEEE Learning Object Metadata Standards 1484.12.1 and 1484.12.3.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or 1 time within an element.

**Attributes:**
- None

**Elements:**
- `<file>`: This instance of the `<file>` element must follow the required format defined in description of the `<file>` element, but must also only reference an IEEE conformant metadata XML document.

### 38.15. `<tip>` Element

This section defines the make up, attributes and elements, of the `<tip>` element.

#### 38.15.1. `<label>` Element

**Description:** The `<label>` element defines the name of the Tip content element.

**Data Type:** String: Max length 255

**Multiplicity:** This element must occur 1 and only 1 time within the `<tip>` element.

**Attributes:**
- None

**Elements:**
- None

#### 38.15.2. `<comments>` Element

**Description:** The `<comments>` element defines general development comments for the Tip content element.

**Data Type:** String: Max length 4000

**Multiplicity:** This element may occur 0 or 1 time within the `<tip>` element.

**Attributes:**
- None

**Elements:**
- None
38.15.3. `<keywords>` Element

**Description:** The `<keywords>` element defines a collection of search keys for the Tip content element.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or 1 time within the `<tip>` element.

**Attributes:**
- None

**Elements:**
- `<keyword>`

38.15.4. `<content>` Element

**Description:** The `<content>` element defines the actual content components of a Tip element that an end user will view.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element must occur 1 and only 1 time within the `<tip>` element.

**Attributes:**
- None

**Elements:**
- `<title>`
- `<text>`

**Examples:**

38.15.5. `<metadata>` Element

**Description:** The `<metadata>` element defines a collection of metadata assigned to the specific parent object in the manifest. The metadata container references a single XML file located within the package developed in strict adherence to the IEEE Learning Object Metadata Standards 1484.12.1 and 1484.12.3.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or 1 time within an element.

**Attributes:**
- None

**Elements:**
- `<file>`: This instance of the `<file>` element must follow the required format defined in description of the `<file>` element, but must also only reference an IEEE conformant metadata XML document.

38.16. `<list>` Element

This section defines the make up, attributes and elements, of the `<list>` element.

38.16.1. `<label>` Element

**Description:** The `<label>` element defines the name of the List content element.

**Data Type:** String: Max length 255

**Multiplicity:** This element must occur 1 and only 1 time within the `<list>` element.

**Attributes:**
- None

**Elements:**
- None

38.16.2. `<comments>` Element

**Description:** The `<comments>` element defines general development comments for the List content element.

**Data Type:** String: Max length 4000

**Multiplicity:** This element may occur 0 or 1 time within the `<list>` element.

**Attributes:**
- None

**Elements:**
- None

38.16.3. `<keywords>` Element

**Description:** The `<keywords>` element defines a collection of search keys for the List content element.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or 1 time within the `<list>` element.

**Attributes:**
- None

**Elements:**
- `<keyword>`
38.16.4. <content> Element  
**Description:** The <content> element defines the actual content components of a List element that an end user will view.

**Data Type:** This is a container element. It can only contain other elements

**Multiplicity:** This element must occur 1 and only 1 time within the <list> element.

**Attributes:**
- None

**Elements:**
- <title>
- <text>
- <listitems>
- <bottomtext>

**Examples:**

38.16.5. <metadata> Element  
**Description:** The <metadata> element defines a collection of metadata assigned to the specific parent object in the manifest. The metadata container references a single XML file located within the package developed in strict adherence to the IEEE Learning Object Metadata Standards 1484.12.1 and 1484.12.3.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or 1 time within an element.

**Attributes:**
- None

**Elements:**
- <file>: This instance of the <file> element must follow the required format defined in description of the <file> element, but must also only reference an IEEE conformant metadata XML document.

38.17. <table> Element  
This section defines the make up, attributes and elements, of the <table> element.

38.17.1. <label> Element  
**Description:** The <label> element defines the name of the Table content element.
Data Type: String: Max length 255

Multiplicity: This element must occur 1 and only 1 time within the <table> element.

Attributes:
  - None

Elements:
  - None

38.17.2. <comments> Element
Description: The <comments> element defines general development comments for the Table content element.

Data Type: String: Max length 4000

Multiplicity: This element may occur 0 or 1 time within the <table> element.

Attributes:
  - None

Elements:
  - None

38.17.3. <keywords> Element
Description: The <keywords> element defines a collection of search keys for the Table content element.

Data Type: This is a container element. It can only contain other elements.

Multiplicity: This element may occur 0 or 1 time within the <table> element.

Attributes:
  - None

Elements:
  - <keyword>

38.17.4. <content> Element
Description: The <content> element defines the actual content components of a Table element that an end user will view.

Data Type: This is a container element. It can only contain other elements

Multiplicity: This element must occur 1 and only 1 time within the <table> element.
Attributes:
- None

Elements:
- <title>
- <text>
- <table>
- <bottomtext>

Examples:

38.17.5. <metadata> Element
Description: The <metadata> element defines a collection of metadata assigned to the specific parent object in the manifest. The metadata container references a single XML file located within the package developed in strict adherence to the IEEE Learning Object Metadata Standards 1484.12.1 and 1484.12.3.

Data Type: This is a container element. It can only contain other elements.

Multiplicity: This element may occur 0 or 1 time within an element.

Attributes:
- None

Elements:
- <file>: This instance of the <file> element must follow the required format defined in description of the <file> element, but must also only reference an IEEE conformant metadata XML document.

38.18. <reference> Element

This section defines the make up, attributes and elements, of the <reference> element.

38.18.1. <label> Element
Description: The <label> element defines the name of the Reference content element.

Data Type: String: Max length 255

Multiplicity: This element must occur 1 and only 1 time within the <reference> element.

Attributes:
38.18.2. <comments> Element
Description: The <comments> element defines general development comments for the Reference content element.
Data Type: String: Max length 4000
Multiplicity: This element may occur 0 or 1 time within the <reference> element.
Attributes:
  - None
Elements:
  - None

38.18.3. <keywords> Element
Description: The <keywords> element defines a collection of search keys for the Reference content element.
Data Type: This is a container element. It can only contain other elements.
Multiplicity: This element may occur 0 or 1 time within the <reference> element.
Attributes:
  - None
Elements:
  - <keyword>

38.18.4. <content> Element
Description: The <content> element defines the actual content components of a Reference element that an end user will view.
Data Type: This is a container element. It can only contain other elements
Multiplicity: This element must occur 1 and only 1 time within the <reference> element.
Attributes:
  - None
Elements:
  - <title>
38.18.5. <metadata> Element

Description: The <metadata> element defines a collection of metadata assigned to the specific parent object in the manifest. The metadata container references a single XML file located within the package developed in strict adherence to the IEEE Learning Object Metadata Standards 1484.12.1 and 1484.12.3.

Data Type: This is a container element. It can only contain other elements.

Multiplicity: This element may occur 0 or 1 time within an element.

Attributes:
- None

Elements:
- <file>: This instance of the <file> element must follow the required format defined in description of the <file> element, but must also only reference an IEEE conformant metadata XML document.

38.19. <image> Element

This section defines the make up, attributes and elements, of the <image> element.

38.19.1. <label> Element

Description: The <label> element defines the name of the Image content element.

Data Type: String: Max length 255

Multiplicity: This element must occur 1 and only 1 time within the <image> element.

Attributes:
- None

Elements:
38.19.2. <comments> Element
Description: The <comments> element defines general development comments for the Image content element.
Data Type: String: Max length 4000
Multiplicity: This element may occur 0 or 1 time within the <image> element.
Attributes:
- None
Elements:
- None

38.19.3. <keywords> Element
Description: The <keywords> element defines a collection of search keys for the Image content element.
Data Type: This is a container element. It can only contain other elements.
Multiplicity: This element may occur 0 or 1 time within the <image> element.
Attributes:
- None
Elements:
- <keyword>

38.19.4. <content> Element
Description: The <content> element defines the actual content components of a Image element that an end user will view.
Data Type: This is a container element. It can only contain other elements
Multiplicity: This element must occur 1 and only 1 time within the <image> element.
Attributes:
- None
Elements:
- <title>
- <media>
- <mediaref>
Examples:

38.19.5. <metadata> Element

Description: The <metadata> element defines a collection of metadata assigned to the specific parent object in the manifest. The metadata container references a single XML file located within the package developed in strict adherence to the IEEE Learning Object Metadata Standards 1484.12.1 and 1484.12.3.

Data Type: This is a container element. It can only contain other elements.

Multiplicity: This element may occur 0 or 1 time within an element.

Attributes:
- None

Elements:
- <file>: This instance of the <file> element must follow the required format defined in description of the <file> element, but must also only reference an IEEE conformant metadata XML document.

38.20. <imagemap> Element

This section defines the make up, attributes and elements, of the <imagemap> element.

38.20.1. <label> Element

Description: The <label> element defines the name of the Image Map content element.

Data Type: String: Max length 255

Multiplicity: This element must occur 1 and only 1 time within the <imagemap> element.

Attributes:
- None

Elements:
- None
38.20.2. <comments> Element
**Description:** The <comments> element defines general development comments for the Image Map content element.

**Data Type:** String: Max length 4000

**Multiplicity:** This element may occur 0 or 1 time within the <imagemap> element.

**Attributes:**
- None

**Elements:**
- None

38.20.3. <keywords> Element
**Description:** The <keywords> element defines a collection of search keys for the Image Map content element.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or 1 time within the <imagemap> element.

**Attributes:**
- None

**Elements:**
- <keyword>

38.20.4. <content> Element
**Description:** The <content> element defines the actual content components of a Image Map element that an end user will view.

**Data Type:** This is a container element. It can only contain other elements

**Multiplicity:** This element must occur 1 and only 1 time within the <imagemap> element.

**Attributes:**
- None

**Elements:**
- <title>
- <media>
- <mediaref>
Examples:

38.20.5. **<metadata> Element**

**Description:** The **<metadata>** element defines a collection of metadata assigned to the specific parent object in the manifest. The metadata container references a single XML file located within the package developed in strict adherence to the IEEE Learning Object Metadata Standards 1484.12.1 and 1484.12.3.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or 1 time within an element.

**Attributes:**
- None

**Elements:**
- **<file>:** This instance of the **<file>** element must follow the required format defined in description of the **<file> element**, but must also only reference an IEEE conformant metadata XML document.

38.21. **<mouseover> Element**

This section defines the make up, attributes and elements, of the **<mouseover>** element.

38.21.1. **<label> Element**

**Description:** The **<label>** element defines the name of the Mouseover content element.

**Data Type:** String: Max length 255

**Multiplicity:** This element must occur 1 and only 1 time within the **<mouseover>** element.

**Attributes:**
- None

**Elements:**
- None
38.21.2. <comments> Element
Description: The <comments> element defines general development comments for the mouseover content element.

Data Type: String: Max length 4000

Multiplicity: This element may occur 0 or 1 time within the <mouseover> element.

Attributes:
- None

Elements:
- None

38.21.3. <keywords> Element
Description: The <keywords> element defines a collection of search keys for the Mouseover content element.

Data Type: This is a container element. It can only contain other elements.

Multiplicity: This element may occur 0 or 1 time within the <mouseover> element.

Attributes:
- None

Elements:
- <keyword>

38.21.4. <content> Element
Description: The <content> element defines the actual content components of a Mouseover element that an end user will view.

Data Type: This is a container element. It can only contain other elements.

Multiplicity: This element must occur 1 and only 1 time within the <mouseover> element.

Attributes:
- None

Elements:
- <title>
- <text>
- <media>
Examples:

38.21.5. *<metadata>* Element

**Description:** The `<metadata>` element defines a collection of metadata assigned to the specific parent object in the manifest. The metadata container references a single XML file located within the package developed in strict adherence to the IEEE Learning Object Metadata Standards 1484.12.1 and 1484.12.3.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or 1 time within an element.

**Attributes:**
- None

**Elements:**
- `<file>`: This instance of the `<file>` element must follow the required format defined in description of the `<file>` element, but must also only reference an IEEE conformant metadata XML document.

38.22. *<slideshow>* Element

This section defines the make up, attributes and elements, of the `<slideshow>` element.

38.22.1. *<label>* Element

**Description:** The `<label>` element defines the name of the Slideshow content element.

**Data Type:** String: Max length 255

**Multiplicity:** This element must occur 1 and only 1 time within the `<slideshow>` element.

**Attributes:**
- None

**Elements:**
- None

38.22.2. *<comments>* Element

**Description:** The `<comments>` element defines general development comments for the Slideshow content element.
**Data Type:** String: Max length 4000

**Multiplicity:** This element may occur 0 or 1 time within the `<slideshow>` element.

**Attributes:**
- None

**Elements:**
- None

38.22.3. **<keywords> Element**

**Description:** The `<keywords>` element defines a collection of search keys for the Slideshow content element.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or 1 time within the `<slideshow>` element.

**Attributes:**
- None

**Elements:**
- `<keyword>`

38.22.4. **<content> Element**

**Description:** The `<content>` element defines the actual content components of a Slideshow element that an end user will view.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element must occur 1 and only 1 time within the `<slideshow>` element.

**Attributes:**
- None

**Elements:**
- `<title>`
- `<text>`
- `<mediastage>`
- `<textstage>`
- `<autoplay>`
- `<transparency>`
- `<slides>`
Examples:

38.22.5. <metadata> Element
Description: The <metadata> element defines a collection of metadata assigned to the specific parent object in the manifest. The metadata container references a single XML file located within the package developed in strict adherence to the IEEE Learning Object Metadata Standards 1484.12.1 and 1484.12.3.

Data Type: This is a container element. It can only contain other elements.

Multiplicity: This element may occur 0 or 1 time within an element.

Attributes:
- None

Elements:
- <file>: This instance of the <file> element must follow the required format defined in description of the <file> element, but must also only reference an IEEE conformant metadata XML document.

38.23. <shockwave> Element
This section defines the make up, attributes and elements, of the <shockwave> element.

38.23.1. <label> Element
Description: The <label> element defines the name of the Shockwave content element.

Data Type: String: Max length 255

Multiplicity: This element must occur 1 and only 1 time within the <shockwave> element.

Attributes:
- None

Elements:
- None

38.23.2. <comments> Element
Description: The <comments> element defines general development comments for the Shockwave content element.

Data Type: String: Max length 4000
**Multiplicity:** This element may occur 0 or 1 time within the `<shockwave>` element.

**Attributes:**
- None

**Elements:**
- None

### 38.23.3. `<keywords>` Element

**Description:** The `<keywords>` element defines a collection of search keys for the Shockwave content element.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or 1 time within the `<shockwave>` element.

**Attributes:**
- None

**Elements:**
- `<keyword>`

### 38.23.4. `<content>` Element

**Description:** The `<content>` element defines the actual content components of a Shockwave element that an end user will view.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element must occur 1 and only 1 time within the `<shockwave>` element.

**Attributes:**
- None

**Elements:**
- `<title>`
- `<text>`
- `<media>`
- `<mediaref>`
- `<thumbnail>`
- `<parameters>`
Examples:

38.23.5. <metadata> Element

**Description:** The `<metadata>` element defines a collection of metadata assigned to the specific parent object in the manifest. The metadata container references a single XML file located within the package developed in strict adherence to the IEEE Learning Object Metadata Standards 1484.12.1 and 1484.12.3.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or 1 time within an element.

**Attributes:**
- None

**Elements:**
- `<file>`: This instance of the `<file>` element must follow the required format defined in [description of the `<file>` element](#), but must also only reference an IEEE conformant metadata XML document.

38.24. <audio> Element

This section defines the make up, attributes and elements, of the `<audio>` element.

38.24.1. <label> Element

**Description:** The `<label>` element defines the name of the Audio content element.

**Data Type:** String: Max length 255

**Multiplicity:** This element must occur 1 and only 1 time within the `<audio>` element.

**Attributes:**
- None

**Elements:**
- None

38.24.2. <comments> Element

**Description:** The `<comments>` element defines general development comments for the Audio content element.

**Data Type:** String: Max length 4000

**Multiplicity:** This element may occur 0 or 1 time within the `<audio>` element.
Attributes:
- None

Elements:
- None

38.24.3. <keywords> Element

Description: The <keywords> element defines a collection of search keys for the Audio content element.

Data Type: This is a container element. It can only contain other elements.

Multiplicity: This element may occur 0 or 1 time within the <audio> element.

Attributes:
- None

Elements:
- <keyword>

38.24.4. <content> Element

Description: The <content> element defines the actual content components of a Audio element that an end user will view.

Data Type: This is a container element. It can only contain other elements

Multiplicity: This element must occur 1 and only 1 time within the <audio> element.

Attributes:
- None

Elements:
- <title>
- <text>
- <media>
- <mediaref>
- <thumbnail>
- <parameters>

Examples:
38.24.5. <metadata> Element

**Description:** The <metadata> element defines a collection of metadata assigned to the specific parent object in the manifest. The metadata container references a single XML file located within the package developed in strict adherence to the IEEE Learning Object Metadata Standards 1484.12.1 and 1484.12.3.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or 1 time within an element.

**Attributes:**
- None

**Elements:**
- <file>: This instance of the <file> element must follow the required format defined in description of the <file> element, but must also only reference an IEEE conformant metadata XML document.

38.25. <video> Element

This section defines the make up, attributes and elements, of the <video> element.

38.25.1. <label> Element

**Description:** The <label> element defines the name of the Video content element.

**Data Type:** String: Max length 255

**Multiplicity:** This element must occur 1 and only 1 time within the <video> element.

**Attributes:**
- None

**Elements:**
- None

38.25.2. <comments> Element

**Description:** The <comments> element defines general development comments for the Video content element.

**Data Type:** String: Max length 4000

**Multiplicity:** This element may occur 0 or 1 time within the <video> element.

**Attributes:**
38.25.3. **<keywords> Element**

**Description:** The `<keywords>` element defines a collection of search keys for the Video content element.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or 1 time within the `<video>` element.

**Attributes:**

- None

**Elements:**

- `<keyword>`

38.25.4. **<content> Element**

**Description:** The `<content>` element defines the actual content components of a Video element that an end user will view.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element must occur 1 and only 1 time within the `<video>` element.

**Attributes:**

- None

**Elements:**

- `<title>`
- `<text>`
- `<media>`
- `<mediaref>`
- `<thumbnail>`
- `<parameters>`

**Examples:**

38.25.5. **<metadata> Element**

**Description:** The `<metadata>` element defines a collection of metadata assigned to the specific parent object in the manifest. The metadata container
references a single XML file located within the package developed in strict adherence to the IEEE Learning Object Metadata Standards 1484.12.1 and 1484.12.3.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or 1 time within an element.

**Attributes:**
- None

**Elements:**
- `<file>`: This instance of the `<file>` element must follow the required format defined in description of the `<file>` element, but must also only reference an IEEE conformant metadata XML document.

### 38.26. `<html>` Element

This section defines the make up, attributes and elements, of the `<html>` element.

#### 38.26.1. `<label>` Element

**Description:** The `<label>` element defines the name of the HTML content element.

**Data Type:** String: Max length 255

**Multiplicity:** This element must occur 1 and only 1 time within the `<html>` element.

**Attributes:**
- None

**Elements:**
- None

#### 38.26.2. `<comments>` Element

**Description:** The `<comments>` element defines general development comments for the HTML content element.

**Data Type:** String: Max length 4000

**Multiplicity:** This element may occur 0 or 1 time within the `<html>` element.

**Attributes:**
- None

**Elements:**
38.26.3. <keywords> Element
Description: The <keywords> element defines a collection of search keys for the HTML content element.

Data Type: This is a container element. It can only contain other elements.

Multiplicity: This element may occur 0 or 1 time within the <html> element.

Attributes: None

Elements:
- <keyword>

38.26.4. <content> Element
Description: The <content> element defines the actual content components of a HTML content element that an end user will view.

Data Type: This is a container element. It can only contain other elements

Multiplicity: This element must occur 1 and only 1 time within the <html> element.

Attributes: None

Elements:
- <title>
- <head>
- <onload>
- <body>

Examples:

38.26.5. <metadata> Element
Description: The <metadata> element defines a collection of metadata assigned to the specific parent object in the manifest. The metadata container references a single XML file located within the package developed in strict adherence to the IEEE Learning Object Metadata Standards 1484.12.1 and 1484.12.3.

Data Type: This is a container element. It can only contain other elements.

Multiplicity: This element may occur 0 or 1 time within an element.
Attributes:
- None

Elements:
- <file>: This instance of the <file> element must follow the required format defined in description of the <file> element, but must also only reference an IEEE conformant metadata XML document.

38.27. <truefalse> Element

This section defines the make up, attributes and elements, of the <truefalse> element.

38.27.1. <label> Element
Description: The <label> element defines the name of the True/False question.
Data Type: String: Max length 255
Multiplicity: This element must occur 1 and only 1 time within the <truefalse> element.
Attributes:
- None
Elements:
- None

38.27.2. <comments> Element
Description: The <comments> element defines general development comments for the True/False question.
Data Type: String: Max length 4000
Multiplicity: This element may occur 0 or 1 time within the <truefalse> element.
Attributes:
- None
Elements:
- None

38.27.3. <keywords> Element
Description: The <keywords> element defines a collection of search keys for the True/False question.
Data Type: This is a container element. It can only contain other elements.
**Multiplicity:** This element may occur 0 or 1 time within the `<truefalse>` element.

**Attributes:**
- None

**Elements:**
- `<keyword>`

### 38.27.4. `<content>` Element

**Description:** The `<content>` element defines the actual content components of a True/False question that an end user will view.

**Data Type:** This is a container element. It can only contain other elements

**Multiplicity:** This element must occur 1 and only 1 time within the `<truefalse>` element.

**Attributes:**
- None

**Elements:**
- `<title>`
- `<stem>`
- `<media>`
- `<mediaref>`
- `<hints>`
- `<remediation>`
- `<answers>`

**Examples:**

### 38.27.5. `<metadata>` Element

**Description:** The `<metadata>` element defines a collection of metadata assigned to the specific parent object in the manifest. The metadata container references a single XML file located within the package developed in strict adherence to the IEEE Learning Object Metadata Standards 1484.12.1 and 1484.12.3.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or 1 time within an element.

**Attributes:**
- None
Elements:

- `<file>`: This instance of the `<file>` element must follow the required format defined in description of the `<file>` element, but must also only reference an IEEE conformant metadata XML document.

38.28. `<multiplechoice>` Element

This section defines the make up, attributes and elements, of the `<multiplechoice>` element.

38.28.1. `<label>` Element

Description: The `<label>` element defines the name of the Multiple-choice question.

Data Type: String: Max length 255

Multiplicity: This element must occur 1 and only 1 time within the `<multiplechoice>` element.

Attributes:

- None

Elements:

- None

38.28.2. `<comments>` Element

Description: The `<comments>` element defines general development comments for the Multiple-choice question.

Data Type: String: Max length 4000

Multiplicity: This element may occur 0 or 1 time within the `<multiplechoice>` element.

Attributes:

- None

Elements:

- None

38.28.3. `<keywords>` Element

Description: The `<keywords>` element defines a collection of search keys for the Multiple-choice question.

Data Type: This is a container element. It can only contain other elements.
**Multiplicity:** This element may occur 0 or 1 time within the `<multiplechoice>` element.

**Attributes:**
- None

**Elements:**
- `<keyword>`

### 38.28.4. `<content>` Element

**Description:** The `<content>` element defines the actual content components of a Multiple-choice question that an end user will view.

**Data Type:** This is a container element. It can only contain other elements

**Multiplicity:** This element must occur 1 and only 1 time within the `<multiplechoice>` element.

**Attributes:**
- None

**Elements:**
- `<title>`
- `<stem>`
- `<media>`
- `<mediaref>`
- `<hints>`
- `<remediation>`
- `<numtries>`
- `<shuffled>`
- `<answers>`

**Examples:**

### 38.28.5. `<metadata>` Element

**Description:** The `<metadata>` element defines a collection of metadata assigned to the specific parent object in the manifest. The metadata container references a single XML file located within the package developed in strict adherence to the IEEE Learning Object Metadata Standards 1484.12.1 and 1484.12.3.

**Data Type:** This is a container element. It can only contain other elements.
**Multiplicity:** This element may occur 0 or 1 time within an element.

**Attributes:**
- None

**Elements:**
- `<file>`: This instance of the `<file>` element must follow the required format defined in [description of the `<file>` element](#), but must also only reference an IEEE conformant metadata XML document.

### 38.29. `<fillintheblank>` Element

This section defines the make up, attributes and elements, of the `<fillintheblank>` element.

#### 38.29.1. `<label>` Element

**Description:** The `<label>` element defines the name of the Fill-in-the-blank question.

**Data Type:** String: Max length 255

**Multiplicity:** This element must occur 1 and only 1 time within the `<fillintheblank>` element.

**Attributes:**
- None

**Elements:**
- None

#### 38.29.2. `<comments>` Element

**Description:** The `<comments>` element defines general development comments for the Fill-in-the-blank question.

**Data Type:** String: Max length 4000

**Multiplicity:** This element may occur 0 or 1 time within the `<fillintheblank>` element.

**Attributes:**
- None

**Elements:**
- None
38.29.3. `<keywords>` Element

**Description:** The `<keywords>` element defines a collection of search keys for the Fill-in-the-blank question.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or 1 time within the `<fillintheblank>` element.

**Attributes:**
- None

**Elements:**
- `<keyword>`

38.29.4. `<content>` Element

**Description:** The `<content>` element defines the actual content components of a Fill-in-the-blank question that an end user will view.

**Data Type:** This is a container element. It can only contain other elements

**Multiplicity:** This element must occur 1 and only 1 time within the `<fillintheblank>` element.

**Attributes:**
- None

**Elements:**
- `<title>`
- `<stem>`
- `<media>`
- `<mediaref>`
- `<hints>`
- `<remediation>`
- `<numtries>`
- `<ordered>`
- `<answers>`

**Examples:**

38.29.5. `<metadata>` Element

**Description:** The `<metadata>` element defines a collection of metadata assigned to the specific parent object in the manifest. The metadata container
references a single XML file located within the package developed in strict adherence to the IEEE Learning Object Metadata Standards 1484.12.1 and 1484.12.3.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or 1 time within an element.

**Attributes:**
- None

**Elements:**
- `<file>`: This instance of the `<file>` element must follow the required format defined in description of the `<file>` element, but must also only reference an IEEE conformant metadata XML document.

### 38.30. `<ordering>` Element

This section defines the make up, attributes and elements, of the `<ordering>` element.

#### 38.30.1. `<label>` Element

**Description:** The `<label>` element defines the name of the Ordering question.

**Data Type:** String: Max length 255

**Multiplicity:** This element must occur 1 and only 1 time within the `<ordering>` element.

**Attributes:**
- None

**Elements:**
- None

#### 38.30.2. `<comments>` Element

**Description:** The `<comments>` element defines general development comments for the Ordering question.

**Data Type:** String: Max length 4000

**Multiplicity:** This element may occur 0 or 1 time within the `<ordering>` element.

**Attributes:**
- None

**Elements:**
- None
38.30.3. **<keywords> Element**

**Description:** The `<keywords>` element defines a collection of search keys for the Ordering question.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or 1 time within the `<ordering>` element.

**Attributes:**
- None

**Elements:**
- `<keyword>`

38.30.4. **<content> Element**

**Description:** The `<content>` element defines the actual content components of a Ordering question that an end user will view.

**Data Type:** This is a container element. It can only contain other elements

**Multiplicity:** This element must occur 1 and only 1 time within the `<ordering>` element.

**Attributes:**
- None

**Elements:**
- `<title>`
- `<stem>`
- `<media>`
- `<mediaref>`
- `<hints>`
- `<remediation>`
- `<numtries>`
- `<shuffled>`
- `<answers>`

**Examples:**

38.30.5. **<metadata> Element**

**Description:** The `<metadata>` element defines a collection of metadata assigned to the specific parent object in the manifest. The metadata container references a single XML file located within the package developed in strict
adherence to the IEEE Learning Object Metadata Standards 1484.12.1 and 1484.12.3.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or 1 time within an element.

**Attributes:**
- None

**Elements:**
- `<file>`: This instance of the `<file>` element must follow the required format defined in description of the `<file>` element, but must also only reference an IEEE conformant metadata XML document.

38.31. **<matching> Element**

This section defines the make up, attributes and elements, of the `<matching>` element.

38.31.1. **<label> Element**

**Description:** The `<label>` element defines the name of the Matching question.

**Data Type:** String: Max length 255

**Multiplicity:** This element must occur 1 and only 1 time within the `<matching>` element.

**Attributes:**
- None

**Elements:**
- None

38.31.2. **<comments> Element**

**Description:** The `<comments>` element defines general development comments for the Matching question.

**Data Type:** String: Max length 4000

**Multiplicity:** This element may occur 0 or 1 time within the `<matching>` element.

**Attributes:**
- None

**Elements:**
- None
38.31.3. <keywords> Element

**Description:** The <keywords> element defines a collection of search keys for the Matching question.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or 1 time within the <matching> element.

**Attributes:**
- None

**Elements:**
- <keyword>

38.31.4. <content> Element

**Description:** The <content> element defines the actual content components of a Matching question that an end user will view.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element must occur 1 and only 1 time within the <matching> element.

**Attributes:**
- None

**Elements:**
- <title>
- <stem>
- <media>
- <mediaref>
- <hints>
- <remediation>
- <numtries>
- <shuffled>
- <matchitems>
- <answers>
- <matches>

**Examples:**
38.31.5. <metadata> Element

**Description:** The <metadata> element defines a collection of metadata assigned to the specific parent object in the manifest. The metadata container references a single XML file located within the package developed in strict adherence to the IEEE Learning Object Metadata Standards 1484.12.1 and 1484.12.3.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or 1 time within an element.

**Attributes:**
- None

**Elements:**
- <file>: This instance of the <file> element must follow the required format defined in description of the <file> element, but must also only reference an IEEE conformant metadata XML document.

38.32. <hotspot> Element

This section defines the make up, attributes and elements, of the <hotspot> element.

38.32.1. <label> Element

**Description:** The <label> element defines the name of the Hotspot question.

**Data Type:** String: Max length 255

**Multiplicity:** This element must occur 1 and only 1 time within the <hostpot> element.

**Attributes:**
- None

**Elements:**
- None

38.32.2. <comments> Element

**Description:** The <comments> element defines general development comments for the Hotspot question.

**Data Type:** String: Max length 4000

**Multiplicity:** This element may occur 0 or 1 time within the <hotspot> element.

**Attributes:**
- None
Elements:
  - None

38.32.3. <keywords> Element
Description: The <keywords> element defines a collection of search keys for the Hotspot question.

Data Type: This is a container element. It can only contain other elements.

Multiplicity: This element may occur 0 or 1 time within the <hotspot> element.

Attributes:
  - None

Elements:
  - <keyword>

38.32.4. <content> Element
Description: The <content> element defines the actual content components of a Hotspot question that an end user will view.

Data Type: This is a container element. It can only contain other elements.

Multiplicity: This element must occur 1 and only 1 time within the <hotspot> element.

Attributes:
  - None

Elements:
  - <title>
  - <stem>
  - <media>
  - <mediaref>
  - <hints>
  - <remediation>
  - <numtries>
  - <ordered>
  - <hotzones>

Examples:
38.32.5. <metadata> Element

**Description:** The <metadata> element defines a collection of metadata assigned to the specific parent object in the manifest. The metadata container references a single XML file located within the package developed in strict adherence to the IEEE Learning Object Metadata Standards 1484.12.1 and 1484.12.3.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or 1 time within an element.

**Attributes:**
- None

**Elements:**
- <file>: This instance of the <file> element must follow the required format defined in [description of the <file> element](#), but must also only reference an IEEE conformant metadata XML document.

38.33. <dragdrop> Element

This section defines the make up, attributes and elements, of the <dragdrop> element.

38.33.1. <label> Element

**Description:** The <label> element defines the name of the DragDrop question.

**Data Type:** String: Max length 255

**Multiplicity:** This element must occur 1 and only 1 time within the <dragdrop> element.

**Attributes:**
- None

**Elements:**
- None

38.33.2. <comments> Element

**Description:** The <comments> element defines general development comments for the DragDrop question.

**Data Type:** String: Max length 4000

**Multiplicity:** This element may occur 0 or 1 time within the <dragdrop> element.

**Attributes:**
- None
Elements:

- None

38.33.3. <keywords> Element

Description: The <keywords> element defines a collection of search keys for the DragDrop question.

Data Type: This is a container element. It can only contain other elements.

Multiplicity: This element may occur 0 or 1 time within the <dragdrop> element.

Attributes:

- None

Elements:

- <keyword>

38.33.4. <content> Element

Description: The <content> element defines the actual content components of a DragDrop question that an end user will view.

Data Type: This is a container element. It can only contain other elements

Multiplicity: This element must occur 1 and only 1 time within the <dragdrop> element.

Attributes:

- None

Elements:

- <title>
- <stem>
- <media>
- <mediaref>
- <hints>
- <remediation>
- <numtries>
- <shuffled>
- <showdragborder>
- <dropareas>
- <dragimages>
38.33.5. <metadata> Element

**Description:** The `<metadata>` element defines a collection of metadata assigned to the specific parent object in the manifest. The metadata container references a single XML file located within the package developed in strict adherence to the IEEE Learning Object Metadata Standards 1484.12.1 and 1484.12.3.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or 1 time within an element.

**Attributes:**
- None

**Elements:**
- `<file>`: This instance of the `<file>` element must follow the required format defined in [description of the `<file>` element](#), but must also only reference an IEEE conformant metadata XML document.

38.34. <likert> Element

This section defines the make up, attributes and elements, of the `<likert>` element.

38.34.1. <label> Element

**Description:** The `<label>` element defines the name of the Likert question.

**Data Type:** String: Max length 255

**Multiplicity:** This element must occur 1 and only 1 time within the `<likert>` element.

**Attributes:**
- None

**Elements:**
- None

38.34.2. <comments> Element

**Description:** The `<comments>` element defines general development comments for the Likert question.

**Data Type:** String: Max length 4000
Multiplicity: This element may occur 0 or 1 time within the <likert> element.

Attributes:
- None

Elements:
- None

38.34.3. <keywords> Element

Description: The <keywords> element defines a collection of search keys for the Likert question.

Data Type: This is a container element. It can only contain other elements.

Multiplicity: This element may occur 0 or 1 time within the <likert> element.

Attributes:
- None

Elements:
- <keyword>

38.34.4. <content> Element

Description: The <content> element defines the actual content components of a Likert question that an end user will view.

Data Type: This is a container element. It can only contain other elements

Multiplicity: This element must occur 1 and only 1 time within the <likert> element.

Attributes:
- None

Elements:
- <title>
- <text>
- <numchoices>
- <labels>

Examples:

38.34.5. <metadata> Element

Description: The <metadata> element defines a collection of metadata assigned to the specific parent object in the manifest. The metadata container
references a single XML file located within the package developed in strict adherence to the IEEE Learning Object Metadata Standards 1484.12.1 and 1484.12.3.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or 1 time within an element.

**Attributes:**
- None

**Elements:**
- `<file>`: This instance of the `<file>` element must follow the required format defined in [description of the `<file>` element](#), but must also only reference an IEEE conformant metadata XML document.

### 38.35. `<freeform>` Element

This section defines the make up, attributes and elements, of the `<freeform>` element.

#### 38.35.1. `<label>` Element

**Description:** The `<label>` element defines the name of the Freeform question.

**Data Type:** String: Max length 255

**Multiplicity:** This element must occur 1 and only 1 time within the `<freeform>` element.

**Attributes:**
- None

**Elements:**
- None

#### 38.35.2. `<comments>` Element

**Description:** The `<comments>` element defines general development comments for the Freeform question.

**Data Type:** String: Max length 4000

**Multiplicity:** This element may occur 0 or 1 time within the `<freeform>` element.

**Attributes:**
- None

**Elements:**
- None
38.35.3. `<keywords>` Element

**Description:** The `<keywords>` element defines a collection of search keys for the Freeform question.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or 1 time within the `<freeform>` element.

**Attributes:**
- None

**Elements:**
- `<keyword>`

38.35.4. `<content>` Element

**Description:** The `<content>` element defines the actual content components of a Freeform question that an end user will view.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element must occur 1 and only 1 time within the `<freeform>` element.

**Attributes:**
- None

**Elements:**
- `<title>`
- `<text>`
- `<length>`

**Examples:**

38.35.5. `<metadata>` Element

**Description:** The `<metadata>` element defines a collection of metadata assigned to the specific parent object in the manifest. The metadata container references a single XML file located within the package developed in strict adherence to the IEEE Learning Object Metadata Standards 1484.12.1 and 1484.12.3.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 0 or 1 time within an element.

**Attributes:**
- None
Elements:
- `<file>`: This instance of the `<file>` element must follow the required format defined in [description of the `<file>` element](#), but must also only reference an IEEE conformant metadata XML document.

38.36. `<content>` Element
This section defines the make up, attributes and elements, of the `<content>` element.

38.36.1. `<title>` Element
**Description:** The `<title>` element defines the visible title of the content element or question.

**Data Type:** String: Max length 255

**Multiplicity:** This element may occur 0 or 1 time within the `<content>` element.

**Attributes:**
- None

**Elements:**
- None

38.36.2. `<text>` Element
**Description:** The `<text>` element defines a paragraph form text area.

**Data Type:** This element is a complex container. It can support direct content as String: Max length 4000. It can also support other elements as defined below.

**Multiplicity:** This element may occur 0 or 1 time within the `<content>` element.

**Attributes:**
- None

**Elements:**
- `<link>`
- `<media>`
- `<mediaref>`
- {any inline XHML for formatting}

38.36.3. `<author>` Element
**Description:** The `<author>` element defines a single line entry for a name.

**Data Type:** String: Max length 255
**Multiplicity:** This element may occur 0 or 1 time within the `<content>` element.

**Attributes:**
- None

**Elements:**
- None

### 38.36.4. `<articletitle>` Element

**Description:** The `<articletitle>` element defines a single line entry for an article title of a publication.

**Data Type:** String; Max length 255

**Multiplicity:** This element may occur 0 or 1 time within the `<content>` element.

**Attributes:**
- None

**Elements:**
- None

### 38.36.5. `<sourcetitle>` Element

**Description:** The `<sourcetitle>` element defines a single line entry for a source publication.

**Data Type:** String; Max length 255

**Multiplicity:** This element may occur 0 or 1 time within the `<content>` element.

**Attributes:**
- None

**Elements:**
- None

### 38.36.6. `<sourcetype>` Element

**Description:** The `<sourcetype>` element defines a paragraph form text area.

**Data Type:** Vocabulary; Default=Book

- Vocabulary List
  - Book
  - Journal Article
  - Magazine Article
o Newspaper Article
o Web Address
o Other

Multiplicity: This element may occur 0 or 1 time within the <content> element.

Attributes:
  ▪ None

Elements:
  ▪ None

38.36.7. <publisher> Element
Description: The <publisher> element defines a single line entry for a publishing company.

Data Type: String: Max length 255

Multiplicity: This element may occur 0 or 1 time within the <content> element.

Attributes:
  ▪ None

Elements:
  ▪ None

38.36.8. <location> Element
Description: The <location> element defines a single line entry for the publishing company location.

Data Type: String: Max length 255

Multiplicity: This element may occur 0 or 1 time within the <content> element.

Attributes:
  ▪ None

Elements:
  ▪ None

38.36.9. <date> Element
Description: The <date> element defines a single line entry for the date the article was published.

Data Type: String: Max length 255

Multiplicity: This element may occur 0 or 1 time within the <content> element.
Attributes:
- None

Elements:
- None

38.36.10. `<listitems>` Element
Description: The `<listitems>` element defines a collection of list items.

Data Type: This is a container element. It can only contain other elements.

Multiplicity: This element must occur 1 or more times within the `<content>` element when child of a `<list>` element.

Attributes:
- Type (optional): Determines the rendering style of the list as ordered or unordered. Data type=Vocabulary; Default=Blank
  - Vocabulary List
    - Blank
    - Letters
    - Bulleted
    - Numbers
- startnumber (optional): Determines the start number of a list. Data type: Positive Integer; Default=1

Elements:
- `<listitem>`

38.36.11. `<bottomtext>` Element
Description: The `<bottomtext>` element defines the visible title of the content element or question.

Data Type: This element is a complex container. It can support direct content as String: Max length 4000. It can also support other elements as defined below.

Multiplicity: This element may occur 0 or 1 time within the `<content>` element.

Attributes:
- None

Elements:
- `<link>`
38.36.12. **<table> Element**

**Description:** The `<table>` element defines a standard table collection of rows and columns.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element must occur 1 and only 1 time within the `<content>` element when child of a `<table>` element.

**Attributes:**
- `width` (optional): The width of the table when displayed. Data type=Non-negative Integer
- `border` (optional): Determines whether the table border will show. Data type=Boolean; Default=false
- `numbercolumns` (optional): Determines whether the first column displayed will be a numbered column. Data type=Boolean; Default=false
- `numbercolumnslabel` (optional): Value of the number column header when displayed. This value is only utilized if numbercolumns set to true. Data type=String Max length 25
- `shadeheading` (optional): Determines whether the table header will have a system controlled shaded value. Data type=Boolean; Default=false

**Elements:**
- `<thead>`
- `<tbody>`
- `<tr>`

38.36.13. **<thumbnail> Element**

**Description:** The `<thumbnail>` element defines a graphical thumbnail that will display with a content element.

**Data Type:** This element is a container. It can only contain other elements.

**Multiplicity:** This element may occur 0 or 1 time within the `<content>` element.

**Attributes:**
- None
Elements:
- <media>
- <mediaref>
- <alignment>

38.36.14. <alignment> Element
Description: The <alignment> element defines the relative latitudinal location of a supported data component.
Data Type: Vocabulary; Default=Left
  - Vocabulary List
    - Left
    - Right
Multiplicity: This element may occur 0 or 1 time within the <content> element.
Attributes:
- None
Elements:
- None

38.36.15. <position> Element
Description: The <position> element defines the relative longitudinal location of a supported data component.
Data Type: Vocabulary; Default=Top
  - Vocabulary List
    - Top
    - Bottom
Multiplicity: This element may occur 0 or 1 time within the <content> element.
Attributes:
- None
Elements:
- None
38.36.16.  <links> Element

Description:  The <links> element defines a collection of content hyperlinks.

Data Type:  This is a container element. It can only contain other elements.

Multiplicity:  This element must occur 1 and only 1 time within the <content> element when utilized by a <reference> or <remediation> element.

Attributes:
  - None

Elements:
  - <link>

38.36.17.  <media> Element

Description:  The <media> element defines one or media file equivalencies.

Data Type:  This is a container element. It can only contain other elements.

Multiplicity:  This element may occur 0 or 1 time within the <content> element depending upon its usage. Some elements require the usage of media.

Attributes:
  - identifier (required): An identifier, provided by an author or authoring tool that is unique. Data type=ID. The identifier must be created as a globally unique value defined within the IETF RFC 2396 and IETF RFC 2141.

Elements:
  - <label>
  - <comments>
  - <keywords>
  - <mediafiles>
  - <alttext>
  - <metadata>

38.36.18.

38.36.19.  <mediaref> Element

Description:  The <mediaref> element defines a reference to an existing media element located within the same package.

Data Type:  This is a container element.
Multiplicity: This element may occur 0 or 1 time within the <content> element depending upon its usage. Some elements require the usage of media.

Attributes:
- identifierref: An identifier, provided by an author or authoring tool that is globally unique and located within the package. Data type=IDREF

Elements:
- None

38.36.20. <caption> Element
Description: The <caption> element defines a caption to be displayed with associated media when available to a user.

Data Type: String: Max length 100

Multiplicity: This element may occur 0 or 1 time within the <content> element.

Attributes:
- None

Elements:
- None

38.36.21.

38.36.22. <textareas> Element
Description: The <textareas> element defines a collection of individual text entries that can be utilized together.

Data Type: This is a container element. It can only contain other elements.

Multiplicity: This element may occur 0 or 1 time within the <content> element.

Attributes:
- None

Elements:
- <textarea>

38.36.23. <mapareas> Element
Description: The <mapareas> element defines a collection of individual maparea coordinates utilized with an associated media.
**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element may occur 1 and only 1 time within the `<content>` element for appropriate content elements utilizing the values.

**Attributes:**
- None

**Elements:**
- `<maparea>`

---

### 38.36.24. `<mediastage>` Element

**Description:** The `<mediastage>` element defines the dimensions of the slide media stage for a Slideshow element.

**Data Type:** This is a container element.

**Multiplicity:** This element may occur 0 or 1 time within the `<content>` element when utilized by a `<slideshow>` element.

**Attributes:**
- Width (optional): The width of the entire stage where media will display for an individual slide. Data type=Positive Integer; Default=400
- Height (optional): The height of the entire stage where media will display for an individual slide. Data type=Positive Integer; Default=300

**Elements:**
- None

---

### 38.36.25. `<textstage>` Element

**Description:** The `<textstage>` element defines the dimensions of the slide text stage for a Slideshow element.

**Data Type:** This is a container element.

**Multiplicity:** This element may occur 0 or 1 time within the `<content>` element when utilized by a `<slideshow>` element.

**Attributes:**
- Width (optional): The width of the entire stage where text will display for an individual slide. Data type=Positive Integer; Default=400
- Height (optional): The height of the entire stage where text will display for an individual slide. Data type=Positive Integer; Default=300
Elements:

- None

38.36.26.  <autoplay> Element

**Description:** The `<autoplay>` element defines the ability to automatically progress each slide of a slideshow without requiring user interaction.

**Data Type:** This is a container element.

**Multiplicity:** This element may occur 0 or 1 time within the `<content>` element when utilized by a `<slideshow>` element.

**Attributes:**

- `enabled` (optional): Determines if the slideshow will automatically transition between slides. Data type=Boolean; Default=false
- `delay` (optional): The time delay in seconds between each slide transition. Data type=Positive Integer; Default=5

Elements:

- None

38.36.27.  <transparency> Element

**Description:** The `<transparency>` element defines the ability to overlap each slide of a slideshow where the previous slide media is visible in the background of the current slide media. This element requires the media of the slideshow to be developed with appropriate transparent background to utilize the capability effectively.

**Data Type:** Boolean (optional). Default=false

**Multiplicity:** This element may occur 0 or 1 time within the `<content>` element when utilized by a `<slideshow>` element.

**Attributes:**

- None

Elements:

- None
38.36.28.

38.36.29.  <slides> Element
Description: The <slides> element defines a collection of slides within the Slideshow content element.

Data Type: This is a container element.

Multiplicity: This element must occur 1 and only 1 time within the <content> element when utilized by a <slideshow> element.

Attributes:
- None

Elements:
- <slide>

38.36.30.  <parameters> Element
Description: The <parameters> element defines one or more parameters that can be used to determine the way a media item will be presented to a user when loaded in a browser page.

Data Type: This is a container element.

Multiplicity: This element may occur 0 or 1 time within the <content> element when utilized by appropriate media elements.

Attributes:

Elements:
- <param>

38.36.31.  <head> Element
Description: The <head> element defines a set of script or other data definition that can be used to determine custom capabilities of a rendered web page.

Data Type: This element is a complex container. It can support direct content as String: Max length 4000. It can also support other elements as defined below.

Multiplicity: This element may occur 0 or 1 time within the <content> element when utilized by a <html> element.

Attributes:
- None
Elements:
- <link>
- <media>
- <mediaref>
- {any XHML}

38.36.32. <onload> Element
Description: The <onload> element defines one or more functions that will be evaluated when the page loads in a browser.
Data Type: String: Max length 255.
Multiplicity: This element may occur 0 or 1 time within the <content> element when utilized by a <html> element.
Attributes:
- None
Elements:
- None

38.36.33. <body> Element
Description: The <body> element defines a field for any data to be entered for complex page rendering capabilities.
Data Type: This element is a complex container. It can support direct content as String: Max length 4000. It can also support other elements as defined below.
Multiplicity: This element may occur 0 or 1 time within the <content> element.
Attributes:
- None
Elements:
- <link>
- <media>
- <mediaref>
- {any XHML}
38.36.34.  <stem> Element

Description:  The <stem> element defines a paragraph form text area for the foundation of any question.

Data Type:  This element is a complex container. It can support direct content as String: Max length 255. It can also support other elements as defined below.

Multiplicity:  This element may occur 0 or 1 time within the <content> element when utilized by a question element.

Attributes:
- None

Elements:
- <link>
- <media>
- <mediaref>
- {any inline XHML for formatting}

38.36.35.  <hints> Element

Description:  The <hints> element defines a collection of one or more hint items that can be used to assist a user when answering a question.

Data Type:  This is a container element. It can only contain other elements.

Multiplicity:  This element may occur 0 or 1 time within the <content> element.

Attributes:
- None

Elements:
- <hint>

38.36.36.  <remediation> Element

Description:  The <remediation> element defines a collection responses that will display for a user depending upon the final results for a question.

Data Type:  This is a container element. It can only contain other elements.

Multiplicity:  This element may occur 0 or 1 time within the <content> element.

Attributes:
- None
Elements:
- <correctfeedback>
- <incorrectfeedback>
- <links>

38.36.37.  <answers> Element
Description: The <answers> element defines a collection of one or more answers that can be used in a question.

Data Type: This is a container element. It can only contain other elements.

Multiplicity: This element may occur 0 or 1 time within the <content> element when utilized by a question element.

Attributes:
- None

Elements:
- <answer>

38.36.38.  <ordered> Element
Description: The <ordered> element defines whether a series of answers for a question are required to be entered or selected in a particular order.

Data Type: Boolean; Default=false

Multiplicity: This element may occur 0 or 1 time within the <content> element when utilized by an appropriate question.

Attributes:
- None

Elements:
- None

38.36.39.  <matchitems> Element
Description: The <matchitems> element defines a collection of matching items that may be paired with one or more answers in a Matching question.

Data Type: This is a container element. It can only contain other elements
**Multiplicity:** This element must occur 1 and only 1 time within the `<content>` element when utilized by a `<matching>` element.

**Attributes:**
- None

**Elements:**
- `<matchitem>`

### 38.36.40. `<matches>` Element

**Description:** The `<matches>` element defines a paired set of IDs defined between a match item and answer in the Matching question.

**Data Type:** This is a container element. It can only contain other elements

**Multiplicity:** This element must occur 1 and only time within the `<content>` element when utilized by a `<matching>` or `<dragdrop>` element.

**Attributes:**
- None

**Elements:**
- `<match>`

### 38.36.41. `<hotzones>` Element

**Description:** The `<hotzones>` element defines a collection of one or more mapped areas that are used on a base image of a Hotspot question.

**Data Type:** This is a container element. It can only contain other elements

**Multiplicity:** This element must occur 1 and only 1 time within the `<content>` element when utilized by a `<hotspot>` element.

**Attributes:**
- None

**Elements:**
- `<hotzone>`

### 38.36.42. `<showdragborder>` Element

**Description:** The `<showdragborder>` element defines whether or not a boundary border will display around the "safe zone" of a DragDrop question to visually
identify where Drag images can be returned to avoid being counted during an attempt at the question.

**Data Type:** Boolean; Default=false

**Multiplicity:** This element may occur 0 or 1 time within the `<content>` element.

**Attributes:**
- None

**Elements:**
- None

### 38.36.43. `<dropareas>` Element

**Description:** The `<dropareas>` element defines a collection of one or more mapped areas that can be used as a target for drag images to be placed in a DragDrop element.

**Data Type:** This is a container element. It can only contain other elements

**Multiplicity:** This element must occur 1 and only time within the `<content>` element when utilized by a `<dragdrop>` element.

**Attributes:**
- None

**Elements:**
- `<droparea>`

### 38.36.44. `<numchoices>` Element

**Description:** The `<numchoices>` element defines the number of scale points that will be associated with a Likert question.

**Data Type:** Positive Integer; Default=3

**Multiplicity:** This element may occur 0 or 1 time within the `<content>` element when utilized by a `<likert>` element.

**Attributes:**
- None

**Elements:**
- None
38.36.45.  <labels> Element

Description:  The <labels> element defines up to three positioned labels to appear above the scale points of a Likert question.

Data Type:  This is a container element. It can only contain other elements

Multiplicity:  This element may occur 0 or 1 time within the <content> element.

Attributes:

- display (optional): Determines whether the labels will be displayed to the end user or retained behind the scenes for data analysis. Data type=Boolean; Default=false

Elements:

- <left>
- <center>
- <right>

38.36.46.  <length> Element

Description:  The <length> element defines the character length supported for a response in a Freeform question.

Data Type:  Positive Integer; Default=800

Multiplicity:  This element may occur 0 or 1 time within the <content> element when utilized by the <freeform> element.

Attributes:

- None

Elements:

- None

38.36.47.  <listitem> Element

Description:  The <listitem> element defines an individual list item used within a List element.

Data Type:  This element is a complex container. It can support direct content as String: Max length 255. It can also support other elements as defined below.

Multiplicity:  This element may occur 0 or 1 time within the <listitems> element.

Attributes:
Elements:

- None

Description: The `<link>` element defines the visible title of the content element or question.

Data Type: This element is a complex container. It can support direct content as String: Max length 4000. It can also support other elements as defined below.

Multiplicity: This element may occur 0 or 1 time within the `<links>`, `<text>`, or `<body>` elements.

Attributes:
- newwindow (optional): Determines whether the link target will launch in existing browser window or a separate window. Data type=Boolean; Default=false

Elements:
- `<label>`
- `<identifierref>`
- `<target>`

38.36.49. `<thead>` Element

Description: The `<thead>` element defines the first row of a table to be used as a header row.

Data Type: This is a container element. It can only contain other elements.

Multiplicity: This element may occur 0 or 1 time within the `<table>` element.

Attributes:
- None

Elements:
- `<tr>`
38.36.50.  <th> Element

Description: The <th> element defines a header column cell within a table header row.

Data Type: This element is a complex container. It can support direct content as String: Max length 255. It can also support other elements as defined below.

Multiplicity: This element may occur 0 or 1 time within the <tr> element when utilized by a <thead> element.

Attributes:

- width (optional): This determines the width of the column in relation to the entire table width. Data type=String max length 10; If % used, value will be evaluated as a percentage of the entire width. If no %, then value will be fixed. Only the first value will be used to set the column width. All other <th> or <td> width values will be ignored.
- align (optional): defines the textual formatting alignment within the column. Data type=Vocabulary; Default=left
  - Vocabulary List
    - Left
    - Center
    - Right

Elements:

- <link>
- <media>
- <mediaref>
- {any inline XHML for formatting}

38.36.51.  <tbody> Element

Description: The <tbody> element defines a collection of body rows within a Table.

Data Type: This is a container element. It can only contain other elements.

Multiplicity: This element must occur 1 and only 1 time within the <table> element.

Attributes:
38.36.52.  **<tr> Element**

**Description:** The `<tr>` element defines the table row.

**Data Type:** This element is a container. It can only contain other elements.

**Multiplicity:** This element may occur 0 or many times within the `<thead>`, `<tbody>`, or `<table>` element.

**Attributes:**
- None

**Elements:**
- `<th>`

38.36.53.  **<td> Element**

**Description:** The `<td>` element defines a standard column cell within a table row.

**Data Type:** This element is a complex container. It can support direct content as String: Max length 255. It can also support other elements as defined below.

**Multiplicity:** This element may occur 0 or 1 time within the `<tr>` element when utilized within the `<table>` or `<tbody>` element.

**Attributes:**
- width (optional): This determines the width of the column in relation to the entire table width. Data type=String max length 10; If % used, value will be evaluated as a percentage of the entire width. If no %, then value will be fixed. Only the first value will be used to set the column width. All other `<th>` or `<td>` width values will be ignored.
- align (optional): defines the textual formatting alignment within the column. Data type=Vocabulary; Default=left
  - Vocabulary List
    - Left
    - Center
    - Right
Elements:
- <link>
- <media>
- <mediaref>
- {any inline XHML for formatting}

38.36.54. <mediafiles> Element
**Description:** The `<mediafiles>` element defines a collection of equivalent media files used within a media element.

**Data Type:** This element is a container. It can only contain other elements.

**Multiplicity:** This element may occur 1 and only 1 time within the `<media>` element.

**Attributes:**
- None

**Elements:**
- `<mediafile>`

38.36.55. <mediafile> Element
**Description:** The `<mediafile>` element defines an individual media file used within a package.

**Data Type:** This element is a container. It can only contain other elements.

**Multiplicity:** This element may occur 1 or more times within the `<mediafiles>` element.

**Attributes:**
- None

**Elements:**
- `<file>`
- `<dpi>`
- `<width>`
- `<height>`
- `<mediatype>`
38.36.56.  <dpi> Element

Description:  The <dpi> element defines the dots-per-inch value of a media file. This value is only utilized if the media file is generated to a print format or other medium that utilizes the DPI property.

Data Type:  Positive Integer (optional); Default=72

Multiplicity:  This element may occur 1 and only 1 time within the <mediafile> element.

Attributes:
  - None

Elements:
  - None

38.36.57.  <width> Element

Description:  The <width> element defines the width of the media file to be used when rendering the file in a medium not utilizing DPI.

Data Type:  Positive Integer (optional); Default=400

Multiplicity:  This element may occur 0 or 1 time within the <mediafile> element.

Attributes:
  - None

Elements:
  - None

38.36.58.  <height> Element

Description:  The <height> element defines the height of the media file to be used when rendering the file in a medium not utilizing DPI.

Data Type:  Positive Integer (optional); Default=300

Multiplicity:  This element may occur 0 or 1 time within the <mediafile> element.

Attributes:
  - None

Elements:
  - None
38.36.59.  <mediatype> Element

Description: The <mediatype> element defines the appropriate output or medium that the individual media file is associated with.

Data Type: Vocabulary; Default=web

- Web
- CD
- Thumbnail
- Print
- Source
- PDA

Multiplicity: This element may occur 1 and only 1 time within the <mediafile> element.

Attributes:
- None

Elements:
- None

38.36.60.  <maparea> Element

Description: The <maparea> element defines the coordinates of an individual mapped area on a base image.

Data Type: This element is a container.

Multiplicity: This element may occur 0 or many times within the <mapareas> element.

Attributes:
- x: Identifies the X-axis coordinate of the top left corner for the map area relative to the media file boundary. Data type=Non-negative Integer
- y: Identifies the Y-axis coordinate of the top left corner for the map area relative to the media file boundary. Data type=Non-negative Integer
- Width: Identifies the width of the map area. Data type=Positive Integer
- Height: Identifies the height of the map area. Data type=Positive Integer

**Elements:**
- `<text>`

---

**38.36.61. `<slide>` Element**

**Description:** The `<slide>` element defines a media text pair used in a sequenced slideshow.

**Data Type:** This element is a container.

**Multiplicity:** This element may occur 0 or many times within the `<mapareas>` element.

**Attributes:**
- None

**Elements:**
- `<text>`
- `<media>`
- `<mediaref>`

---

**38.37. `<remediation>` Element**

This section defines the make up, attributes and elements, of the `<remediation>` element.

---

**38.37.1. `<correctfeedback>` Element**

**Description:** The `<correctfeedback>` element defines the correct feedback response based on the user successful completion of a question.

**Data Type:** String: Max Length 255.

**Multiplicity:** This element may occur 0 or 1 time within the `<remediation>` element.

**Attributes:**
- None

**Elements:**
- None
38.37.2. <incorrectfeedback> Element

Description: The <incorrectfeedback> element defines the incorrect feedback response based on the user unsuccessful completion of a question.

Data Type: String: Max Length 255.

Multiplicity: This element may occur 0 or 1 time within the <remediation> element.

Attributes:
- None

Elements:
- None

38.38. <hints> Element

This section defines the make up, attributes and elements, of the <matchitems> element.

38.38.1. <hint> Element

Description: The <hint> element defines an individual hint option that can be utilized within by a student in the practice mode of any question.

Data Type: String: Max length 255

Multiplicity: This element must occur 1 or more times within the <hints> element if utilized for a question.

Attributes:
- None

Elements:
- <link>
- <media>
- <mediaref>
- {any inline XHML for formatting}
38.39. **<matchitems> Element**

This section defines the make up, attributes and elements, of the <matchitems> element.

38.39.1. **<matchitem> Element**

**Description:** The <matchitem> element defines an individual match option that can be utilized within a match pair of a Matching question.

**Data Type:** This element is a complex container. It can support direct content as String: Max length 255. It can also support other elements as defined below.

**Multiplicity:** This element must occur 1 or more times within the <matchitems> element.

**Attributes:**
- None

**Elements:**
- <link>
- <media>
- <mediaref>
  - {any inline XHML for formatting}

38.40. **<matches> Element**

This section defines the make up, attributes and elements, of the <matches> element.

38.40.1. **<match> Element**

**Description:** The <match> element defines matched pair of match item and answer within a Matching element.

**Data Type:** This element is a container. It can only contain other elements.

**Multiplicity:** This element must occur 1 or more times within the <matches> element.

**Attributes:**
- None

**Elements:**
- <itemindex>
- <answerindex>
- <feedback>
38.41.  <match> Element
This section defines the make up, attributes and elements, of the <match> element.

38.41.1.  <itemindex> Element
Description: The <itemindex> element defines an index order number for an item. This number will be used to pair an answer in a Matching or DragDrop element.

The index number is the order number of one of the following:

- The order that a <matchitem> appears within a <matchitems> element of a Matching element
- The order that a <dragimage> appears within a <dragimages> element of a DragDrop element

Data Type: Positive Integer

Multiplicity: This element must occur 1 or more times within the <match> element.

Attributes:
- None

Elements:
- None

38.41.2.  <answerindex> Element
Description: The <answerindex> element defines an index order number for an answer. This number will be used to pair an item in a Matching or DragDrop element.

The index number is the order number of one of the following:

- The order that a <answer> appears within a <answers> element of a Matching element
- The order that a <droparea> appears within a <dropareas> element of a DragDrop element

Data Type: Positive Integer

Multiplicity: This element must occur 1 or more times within the <match> element.
Attributes:
  - None

Elements:
  - None

38.42. **<hotzones> Element**

This section defines the make up, attributes and elements, of the `<hotzones>` element.

38.42.1. **<hotzone> Element**

**Description:** The `<hotzone>` element defines an individual mapped area for the HotSpot element.

**Data Type:** This element is a container. It can only contain other elements.

**Multiplicity:** This element must occur 1 or more times within the `<hotzones>` element.

**Attributes:**
  - x: Identifies the X-axis coordinate of the top left corner for the map area relative to the media file boundary. Data type=Non-negative Integer
  - y: Identifies the Y-axis coordinate of the top left corner for the map area relative to the media file boundary. Data type=Non-negative Integer
  - Width: Identifies the width of the map area. Data type=Positive Integer
  - Height: Identifies the height of the map area. Data type=Positive Integer

**Elements:**
  - `<feedback>`
  - `<weight>`
  - `<correct>`

38.43. **<answers> Element**

This section defines the make up, attributes and elements, of the `<answers>` element.
38.43.1. <answer> Element

**Description:** The <answer> element defines a textual answer choice for a question.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element must occur 1 or more times within the <answers> element.

**Attributes:**
- None

**Elements:**
- <text>
- <feedback>
- <weight>
- <correct>

38.44. <answer> Element

This section defines the make up, attributes and elements, of the <answer> element.

38.44.1. <feedback> Element

**Description:** The <feedback> element defines a feedback for an individual answer or match within a question. If a user selects the answer or match, the feedback will appear in a response after the attempt.

**Data Type:** String: Max Length 255

**Multiplicity:** This element must occur 1 or more times within the <answer> or <match> element.

**Attributes:**
- None

**Elements:**
- None

38.44.2. <weight> Element

**Description:** The <weight> element defines a relative weight of the answer choice or match in a question to other answer choices or matches.

**Data Type:** Non-negative Integer; Default=1
**Multiplicity:** This element may occur 0 or 1 time within the `<answer>` or `<match>` element.

**Attributes:**
- None

**Elements:**
- None

### 38.44.3. `<correct>` Element

**Description:** The `<correct>` element defines whether an answer choice is correct when selected by a user.

**Data Type:** Boolean; Default=false

**Multiplicity:** This element must occur 1 and only 1 time within the `<answer>` element.

**Attributes:**
- None

**Elements:**
- None

### 38.44.4. `<options>` Element

**Description:** The `<options>` element defines a textual equivalent in an answer for a Fill in the Blank question.

**Data Type:** This is a container element. It can only contain other elements.

**Multiplicity:** This element must occur 1 or more times within the `<answer>` element when utilized by a `<fillintheblank>` element.

**Attributes:**
- None

**Elements:**
- `<option>`

### 38.44.5. `<casesensitive>` Element

**Description:** The `<casesensitive>` element defines whether the text entered by a student must match the case of the answer options available for a Fill in the Blank question.

**Data Type:** Boolean (optional); Default=false

**Multiplicity:** This element must occur 0 or 1 time within the `<answer>` element utilized by a `<fillintheblank>` question.
Attributes:
- None

Elements:
- None

38.44.6. <format> Element

**Description:** The <format> element defines how the formatting of a response entered by a user coincides with the answer options in a Fill in the Blank question.

**Data Type:** Vocabulary (optional); Default=exactly
- Vocabulary List
  - Exactly
  - Begins with
  - Ends with
  - Contains

**Multiplicity:** This element must occur 0 or 1 time within the <answer> element when utilized by a <fillintheblank> element.

Attributes:
- None

Elements:
- None

39.0 CONTENT PACKAGING

Evolution XML data transport package will contain the following components:

1. Manifest describing the entire data structure, content and physical file references as defined by the Evolution XML Specifications. This manifest must be titled evsmanifest.xml. The evsmanifest.xml must be located at the top level of the package.

2. Physical files – All physical files referenced within the manifest must be contained within the package in the same relative path that is defined within that XML file.
The package must be bound in a PKZIP format. ZIP is a Package Interchange File (PIF) that is a representation of the content packaging components within an archive format.

40.0 ADDITIONAL SUPPORT REQUIREMENTS

40.1. Transport Routine
The Transport Routine is the final step in ensuring complete transportability between content developed in disparate authoring tools and the content repository where it will ultimately reside. This routine will provide a mechanism for any content package that validates against the Evolution XML schema to be imported and disassembled into fully structured and editable* components within the content repository.

40.1.1. Storage of Data Elements
The routine will also ensure that all data elements within the content package are stored and available for reorganization, editing*, versioning, tracking, and reporting from within the content repository as well as the delivery system. These data elements include the following:

- Aggregation objects
- Content data
- Physical Files

40.1.2. True Transport Capabilities
The transport routine will provide a two-way mechanism for moving content in and out of the repository through the specifications. By allowing this level of integration, imported content residing within the repository can be checked out (generating the content package) and potentially edited within any authoring tool supporting the schema.

*Only content in the form of raw data can be edited. Media and rich media items can only be modified within appropriate media creation tools.

41.0 APPENDIX A – XML CONTENT SAMPLE
This section is not currently available.

42.0 REFERENCES
   Includes: Universal Resource Locator, Universal Resource Identifier, 
   Extensible Markup Language Version 1.0, Document Object Model (DOM) 
   Specification.

   Syntax. Available at: http://www.ietf.org/

   Syntax. Available at: http://www.ietf.org/

   http://www.ieee.org/

   IEEE 1484.12.3 Draft Standard for Extensible Markup
   Language (XML) Binding for Learning Object Metadata Data 
   Model
STATEMENT OF WORK

FOR ANALYSIS, DESIGN, AND DEVELOPMENT
OF

ASYNCHRONOUS SELF-PACED
LEARNING CONTENT

PREPARING ACTIVITY’S NAME

PREPARING ACTIVITY’S ADDRESS

PREPARED BY: [Authorizing Signature]__ DATE:
Author’s Name
Author’s Title
Author’s Office Code

APPROVED BY: [Authorizing Signature]__ DATE:
Approver’s Name
Approver’s Title
Approver’s Office Code
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Appendix E

Statement of Work
for
Asynchronous Self-Paced Learning Content

43.0 SCOPE
This Statement of Work (SOW) provides the minimum performance specifications, information, and guidance for the analysis, design, development, and evaluation of the ______ Asynchronous Self-Paced Learning Content. Additionally, this SOW outlines the minimum requirements to develop (new/revise/enhance) existing _____ content for self-paced delivery and to revise/enhance reference materials for the following areas:

- (Course/Center/School/Competency/Continuum)
- (Platform/System/Equipment)
- (Use cases, i.e., civilian, military, shore, afloat, performance aid)

43.1 Background

43.1.1 The Integrated Learning Environment
In December of 2002, NETC established the Integrated Learning Environment (ILE) as a mechanism for transforming legacy systems and business processes into a “system of systems” that would enable the changes needed to accomplish RiT (Revolution in Training) goals and provide the functions required to realize Sea Warrior. The stated ILE vision is, “Improve and support job performance and mission readiness by providing high quality learning and performance support available anytime and anywhere. Provide an environment to analyze, define, develop, document, and implement human performance and learning alternatives, acquire products, and provide life cycle support per the vision, goals, and objectives of the “Revolution in Training.”

There is a range of key functional participants that will be operating in the Navy’s Integrated Learning Environment:

- Navy “Users” – people and organizations responsible for providing learning (e.g., educators, trainers, managers, personnelists, and operators) and receiving learning to improve readiness and performance;
- Acquisition Interests – those responsible for learning acquisition considerations, including government and private-sector interests having both managerial and technical responsibilities; and
- Content and Tool Providers – government and private-sector interests responsible for designing and developing learning content and tools (e.g., SCORM-conformant content, Learning Management Systems, Learning Content Management Systems, information technology architectures, etc.).

The Integrated Learning Environment, therefore, must have well-defined interfaces that allow people to interact, organizationally and technically, within the Navy, as well as with other audiences in the Department of Defense, Federal government, and the private sector. This will be especially important as technology-enabled, sharable, reusable
content and tools become more ubiquitous, and as technology-enabled interactions between the learning, personnel, and operational communities become more commonplace.

The ILE is people, processes, and technologies. While the most obvious attributes are technologies, the ILE is conceived as a means to enable individual excellence through highly personalized interfaces to essential decision support and learning activities with supporting business rules. The ILE combines support tools for developing and distributing electronic course materials, and managing student and curriculum records, with standards for classifying content, formatting files, and interoperability among other systems. It provides five primary services to its users:

- Design, develop, and display of individual learning plans derived from Sea Warrior validated organizational requirements
- Learning and performance support content design, development, display, and event data capture
- Learning consumption, ashore and afloat
- Performance assessments
- Business analytics for managing investments

The ILE will support a range of pedagogical and andragogical learning approaches to meet the diverse requirements of the Navy’s workforce. Learning and performance support materials will be provided in the most cost-effective manner to include a larger body of foundational simple serial learning media to a growing body of highly adaptive learner-sensitive content. The ILE will avoid lowest common denominator solution paths including geographically constrained, instructor-centric training as these will by definition address a limited subset of the required population. The Navy’s primary investment will be learner-centric, highly deployable content.

43.1.2. SkillObjects™

In 2002, the Chief of Naval Operations (CNO) funded the Navy’s Workforce (INWF) project, an aggressive effort to develop a data rich, occupational analysis that would update the Navy Occupational Standards. The initial requirement was to capture and characterize the occupational work (jobs) for Navy enlisted personnel and develop a new occupational classification system. The SkillsNET Corporation process, suite of technology, and information rich data model was selected by Navy Leadership to underpin the occupational analysis effort. SkillsNET’s data model, the trade marked SkillObject™, brings a fidelity and structure to an otherwise incomplete and unstructured human resource data modeling.

The Navy has proven the utility of the SkillsNET approach and data model with its integrated data clusters of knowledge, skills, abilities, tasks and tools (KSATT) components of the SkillObject™. SkillObjects are used to develop a set of normative data ready for multiple uses in all types of other applications and other processes. The SkillsNET organizational structure of occupational data affords Naval Leadership a
strategic view of work and adds a new dimension of currency to work descriptors. Refer to Appendix J for SkillsNET Taxonomies; Knowledge, Resources, and Skills and Abilities.

Subsequent CNO funding supported the effort to classify SkillObjects into skill standards that are used for numerous Navy functions, including manpower, recruiting, distribution, and training. More recently, CNO initiated the Sea Warrior Project that builds from the work-based standards to capture and provide Sailors with an environment whereby they can make decisions about career choices, follow-on duty assignments, and training.

43.1.2.1. Level-1 Occupational Job Task Analysis
The Level I process generates two kinds of SkillObjects which relate to work being accomplished. These are Occupational and Organizational SkillObjects. Occupational SkillObjects are defined as work accomplished that is primary to a Navy occupation. The training for this work is usually accomplished through formal training as in schools or center classes.

Organizational SkillObjects are defined as work accomplished through “other duties as assigned” or collateral duties, work that is not considered official Navy occupation, these include watches.

43.1.2.2. Level-2 Training and Requirements Analysis
The Level II process is a method which gathers information for training and the Integrated Learning Environment. The content data elements offer more granular/discrete descriptors of work requirements and performance statements. Level II data elements are anchored by subtasks, steps, specialty skills, special abilities, specific tools, specific knowledge, specific resources and performance standards.

43.1.3. Learning Objective Statements
Learning objective statements act as the triggers or catalysts for the assembly and aggregation of content assets to form Terminal and Enabling Learning Objects. These objects may then be logically connected to enterprise competencies structured from SkillObjects™ work elements are aggregates of required unique knowledges, skills, tools, abilities and resources.

Instructional designers use learning objectives statements as the cornerstone to designing content or curriculum. Traditionally, learning objective statements are used to:

- Offer a means to designers to select and organize activities and resources associated with the learning process;
- Provide a means by which assessment can measure a learner’s performance or evaluate a program’s worth;
- Identify the skills and knowledge that must be mastered in the learning event (Morrison, Ross, & Kemp, 2004).
Serve as anchor points in sustaining proper alignment between competency gaps, TO/EO selection, content assembly, sequencing, delivery methodology and medium, student assessment, and program evaluation.

With the advent of learning content management systems and the SCORM specifications, designers now have the opportunity to search repositories and reuse learning objectives and content. Carefully crafted learning objectives comprised of discrete and precise components aligned to SkillObjects™ and related work elements are critical to content or curriculum design and development in the future for reasons as follows:

- Reduce costs associated with development and maintenance efforts
- Ensure the building of relevant content in the present systems
- Serve as the cornerstone in prescriptive learning events in future systems
- Identify measurable attributes for successful performance
- Align content to mission-specific requirements

43.1.4. Overview

This statement of work details development of asynchronous self-paced training materials for use in the ILE. (If applicable, describe existing content and deficiencies) The ___Center and School have identified a requirement to provide a revised/enhanced, scenario-based curriculum in a self-paced interactive delivery format for the _______ course to enhance cognitive skill development for _____ personnel assigned to _______. This effort seeks to enhance the course through reduction of the instructor-led classroom-based portion by delivering initial instruction and refresher training via self-paced IMI. Existing content deficiencies could include:

- Technically inaccurate content,
- ILE Style Guide deviations,
- Inadequate or inappropriate level of learning/interactivity,
- Content not delivered.

If applicable, provide details of existing content to include:

- Content/courseware type
- Number of lessons
- Hours of instruction

43.2. Approval Authority (Tailor to meet your specific requirements)

Overall coordination, final approval and authority for this project are the responsibility of the (Name of Project Manager, Center, School, etc). The Program Manager will be the administrative point of contact at ____________ for all official correspondence and information concerning this contract. Final acceptability or unacceptability of all deliverables and tasks performed by the contractor is the responsibility of the ____________ Contracting Officer. A Contracting Officer’s Representative (COR) will be assigned to be the ISD and technical representative lead supporting the Contracting Officer. The Program Manager will make performance, cost, and schedule decisions based on technical input from the COR. The COR will be assisted with
review and administration of this contract by one Technical Point of Contact (TPOC). The TPOC will coordinate the Government review process and provide one set of Discrepancy Reports (DRs) for each training product. Deliverables are not considered accepted or rejected until the contractor receives written notification from the Contracting Officer. The TPOC will recommend acceptance of the deliverable products to the COR, but only after concurrence from Government on-site Subject Matter Experts (SMEs) that the deliverables are complete and correct. The TPOC will then inform the COR of acceptance/unacceptable products.

43.3. Government Furnished Information
The Government will provide the contractor access to all existing course materials and any supporting documents, publications, and technical manuals required to support this effort, no later than 15 working days after identification, at any time during the curriculum development effort. Contractor requirements concerning GFI are specified in 45.1.4.

43.4. Subject Matter Experts (Tailor to meet your requirements)
The Government will provide SMEs and course instructors from the ___________ as technical experts. The SMEs will be available at ______________. Their availability will be made on a not-to-interfere basis for contractor consultation. The Government’s SMEs supporting this contract will have sufficient background and experience to verify the technical information requirements. The Government will make SMEs available by telephone and for interview and discussions at course sites as described.

44.0 APPLICABLE DOCUMENTS
The following documents form a part of this SOW to the extent specified herein. In the event of conflict between the documents referenced herein and the contents of this SOW, the contents of this SOW shall be considered a superseding requirement. Nothing in this SOW, however, supersedes applicable laws and regulations, unless a specific exemption has been obtained.

44.1. Government Documents
Department of Defense (DoD) Specifications
MIL-PRF-29612B - Training Data Products
DoD Handbooks
MIL-HDBK-29612-2A - Instructional Systems Development/Systems Approach To Training And Education (Part 2 of 5 Parts)
MIL-HDBK-29612-3A - Development of Interactive Multimedia Instruction
MIL-HDBK-29612-5 - Advanced Distributed Learning (ADL) Products and Systems (Part 5 of 5)

NOTE: Copies of the above DoD specifications and handbooks can be obtained online from the Defense Training Standards Working Group (DTSWG) website at http://www.dtswg.org/. Copies are also available from the DoD Single Stock Point or from the Acquisition Streamlining and Standardization Information System (ASSIST) Web Site. Electronic copies can be downloaded from the ASSIST Web Site located at: http://assist2.daps.dla.mil/quicksearch/.
Department of the Navy (DON) documents

Navy - Integrated Learning Environment (ILE) - Content Design, Development, and Deployment (CD3) for the Navy Integrated Learning Environment, Version 1.6, 27 July 2005

Navy-Integrated Learning Environment - Online ILE Content Host Agreement Forms

Government Regulations

29 U.S.C. 794d - Section 508 of the Rehabilitation Act – Title 29 – Labor, Chapter 16 – Vocational Rehabilitation And Other Rehabilitation Services, Section 794d – Electronic and Information Technology

44.2. Non-Government Documents

Standards - ADL Co-Laboratories

SCORM 2004 (V1.3) - Sharable Content Object Reference Model (SCORM)

45.0 REQUIREMENTS

45.1. General requirements

45.1.1. Management Requirements

The contractor shall organize, coordinate, and control all program activities to ensure compliance with the contract requirements and the timely delivery of the required product and services specified herein. The contractor shall provide the necessary system engineering, design engineering, hardware, software, personnel, supervision, management, materials, services, equipment, facilities, testing, technical, logistics, and clerical support necessary to perform the tasks specified described in this SOW.

45.1.1.1. Program Planning and Scheduling

The contractor shall perform a program-planning effort that will result in a documented Integrated Master Plan (IMP) and an Integrated Master Schedule (IMS). As a part of the
planning effort, the contractor shall determine and document how work will be accomplished; how the proposed approach will be structured to minimize and control risk, to accomplish up-front summary planning and commitment, to provide a basis for subsequent detailed planning, to instill a balanced design principle, to measure process of life-cycle requirements, and provide management with in-process verification of requirements in order to make informed milestone decisions. The contractor shall produce and document an event-based plan that measures program maturity by capturing the initiation/Conclusion of the tasks, key events, significant accomplishments, and accomplishment criteria as well as the processes necessary to implement the program. The contractor shall produce a Work Breakdown Structure (WBS), excluding level of effort activities. The contractor shall prepare the Management Plan (Integrated Master Plan (IMP)) and the Integrated Master Schedule (IMS) in accordance with (IAW) the Contract Data Requirements List (CDRL) A002 and A003.

45.1.1.2. Risk Management
The contractor shall maintain a risk management process to identify and mitigate all program risks. Identification of risk items and associated risk mitigation or avoidance shall require a constant vigilance and active participation at every level of the project (by both contractor and Government personnel). The contractor shall identify risks early and shall have the overall responsibility and accountability for risk management, to include both programmatic and technical risks. The contractor shall implement a process to collect and analyze metrics that quantitatively measure the development of risk in key areas and to identify problems in the project development life cycle as early as possible. The IPT members shall also have the responsibility to conduct risk management activities. Risk identification may come from other sources, requirements/design impacts, lessons learned, earlier corrective actions, and action items. Once identified and approved as an item that requires further attention, risks shall be captured and managed by the contractor and assigned a rating based on the Probability of Occurrence (Po) and the Severity of Outcome (So). The Po is an assessment of the likelihood that a risk will surface. The So is an assessment of the overall impact of the risk should risk occur. Severity can be assessed as either overall to the program or by subject area (e.g., technical, schedule and cost). Risk items shall remain visible until resolved or mitigated to a sufficiently low level. Risk schedules shall be integrated in the IMP and tracking shall be performed during the regular In-Progress Reviews (IPRs).

45.1.1.3. Program Progress and Status Monitoring
The contractor shall monitor and report contract cost and schedule performance information such as original and current contract values, the management estimate at completion, performance data consisting of cost and schedule performance information by summary level WBS elements, and significant cost and schedule variances and other problems of contract interest. The progress of all work performed under this contract and shall collect, track, and report the contract status, progress, cost, and schedule performance information. The contractor shall prepare Contractor’s Progress, Status, and Management Reports IAW the CDRL B001.

45.1.1.4. Integrated Product Team
A Learning Content IPT shall be established for this project. The IPT shall consist of Government and contractor personnel. The purpose of the IPT is to review and discuss all content information (including product documentation) and content related issues. The IPT shall identify and resolve potential problem areas related to the learning content.
45.1.1.5. Configuration Management System

The contractor shall establish and implement an online Configuration Management System (CMS) throughout the duration of the contract. The CMS shall provide data storage and management of unclassified information collected during the design, development, and evaluation of all project related products during the contracted period of performance. This online site shall provide access to unclassified information to the Program Manager, the COR, TPOC, and other team members concerning the status of the contractual effort. This shall include posting and keeping current the program IMP and IMS. The online CMS shall provide a daily report of the status of each required product, for each lesson. The detailed design for the CMS and tracking tools will be determined at the Contract Kickoff and Design Meeting. The CMS shall be online and shall meet the DoD website requirements specified below in 3.1.1.5.2.

Online Review and Comment Capability

Online Review and Comment of the Instructional Media Design Package (IMDP)

Online review and comment of the Instructional Media Design Package provides the government the ability to expeditiously complete the verification process required by MIL-PRF-29612B. The online review and comment capability allows reviewers at dispersed locations to coordinate verification comments without face-to-face meetings or the extra time to consolidate comments. The online review and comment capabilities shall include the:

a. Ability for the government to view and comment on the following data through a standard Internet connection
   - Courseware design strategy
   - Course title and description
   - Estimated time to complete
   - References
   - Test design strategy
   - Course overview
   - Lesson strategy
   - Organization and format
   - Learning objectives
   - Lesson design strategy
   - Test items
   - Prototype lesson
   - Instruction media resource requirements

b. Ability for the contractor to reply to all comments online.

c. Ability to provide online review and comment capability for initial verification

d. Ability to provide online review and comment capability for intermediate verification

e. Ability to provide online review and comment capability for final verification.

f. Ability to provide historical record of all verification comments.
Online Review and Comment of the Instructional Media Package (IMP)

Online review and comment of the Instructional Media Package provides the government the ability to expeditiously complete the verification process required by MIL-PRF-29612B. The online review and comment capability allows reviewers at disbursed locations to coordinate verification comments without face-to-face meetings or the extra time to consolidate comments. The online review and comment capabilities shall include the:

a. Ability for the government to view and comment on the following data through a standard Internet connection
   - IMI storyboard of each instructional screen
   - Asset level SCORM metadata
   - Full function instructional screens
   - Full function instructional navigation
b. Ability for the contractor to reply to all comments online.
c. Ability to provide online review and comment capability for initial verification
d. Ability to provide online review and comment capability for intermediate verification
e. Ability to provide online review and comment capability for final verification.
f. Ability to provide historical record of all verification comments.

Online Review and Comment of the Test Package

Online review and comment of the Test Package provides the government the ability to expeditiously complete the verification process required by MIL-PRF-29612B. The online review and comment capability allows reviewers at disbursed locations to coordinate verification comments without face-to-face meetings or the extra time to consolidate comments. The online review and comment capabilities shall include the:

a. Ability for the government to view and comment on the following data through a standard Internet connection
   - Pre-test items
   - Pre-test interoperability
   - Pre-test course sequencing
   - Post test items
   - Post-test interoperability
   - Post-test remediation
b. Ability for the contractor to reply to all comments online.
c. Ability to provide online review and comment capability for initial verification
d. Ability to provide online review and comment capability for intermediate verification
e. Ability to provide online review and comment capability for final verification.
f. Ability to provide historical record of all verification comments.

Website

The contractor shall develop and provide access to a secure website to be used for the CMS specified above in 45.1.1.5. The website shall be certified IAW DoD policy and regulations,
which can be found at: http://www.defenselink.mil/webmasters/policy/dod_web_policy_12071998_with_amendments_and_corrections.html. The website does not need to be registered with the Government Information Locator System (GILS). The contractor shall provide a Vendor Integrity Statement for the website IAW the security requirements specified below in 45.1.2. The Government shall have access to the website, via the Internet, using a standard web browser (e.g. Microsoft Internet Explorer). The contractor shall notify the Government team via email when changes or upgrades have been posted on the website. Only unclassified data shall be available on the website. The website shall provide the following:

a. A home page and site map
b. Password protected access - The password protection shall meet the following requirements:
   (1) Passwords shall be required to be at least eight (8) characters long.
   (2) Passwords shall be required to contain characters from all four (4) of the following classes:
      (a) English upper case letters: A, B, C, ... Z
      (b) English lower case letters: a, b, c, ...z
      (c) Westernized Arabic numerals: 0, 1, 2, 3, ...9
      (d) Special characters: !, @, #, $, %, &
   (3) Passwords shall not be allowed to contain user account name.
   (4) Passwords shall not be allowed to include full name.
   c. Intrusion detection to automatically shutdown the site if tampering is suspected
d. Access and download of deliverable data
e. Indication of new items or additions
f. The means for all parties to securely post (upload) data
g. A current directory of Integrated Product Team (IPT) members including name, job title, telephone number, and e-mail address
h. Action Item Listing and Status
i. Current Schedule and baselines
j. Access to a current list of program related risk assessment items
k. Access to CDRL items in process

45.1.2. Security
This program has a security classification of _____(Classification/Unclassified). If classified - The contractor shall safeguard all classified information and meet all security and information assurance requirements identified in the DD Form 254, DoD Security Classification Specification, and the Operations Security (OPSEC) Plan. The contractor shall enforce these safeguards throughout the life of the contract including the transport and delivery phases. If UNCLAS - When on-site, the contractor shall also adhere to all local security procedures required by the end-user, as well as the security procedures dictated in the DD Form 254. The contractor shall prepare the OPSEC Plan IAW the CDRL.
45.1.2.1. Courseware Integrity (If Classified)

The contractor shall ensure that the delivered training software functions as designed in a properly secured operating system environment and is free of elements that might be detrimental to the secure operation of the resource operating system, including those elements listed below. All Information Assurance (IA) and IA-enabled products incorporated into DoD information systems shall be configured in accordance with DoD-approved security configuration guidelines. Guidelines are available at http://iase.disa.mil and http://www.nsa.gov. The contractor shall provide Vendor Integrity Statements for the training software. Commercial software does not require a Vendor Integrity Statement. The contractor shall prepare the Scientific and Technical Reports (Vendor Integrity Statements) IAW the CDRL A00F.

- Malicious code
- Trojans, worms, logic bombs, and other computer viruses
- Backdoors
- Ad-ware, Spy-ware, or web bugs that have the ability to track user behavior
- Code that permits functions that are beyond the actual publicized intent of the courseware
- Software that will not function properly with the operating system configured securely

45.1.3. Conferences and In-Progress Reviews (IPRs)

The contractor shall conduct and participate in conferences and reviews to be held at both the contractor and Government facilities. The specific location, dates, and duration of the conferences shall be as specified in the contract. Conferences and reviews will be co-chaired by a Government and contractor representative. The contractor shall be prepared to explain the reasoning, assumption, and methodologies in arriving at particular conclusions, recommendations, or alternatives in the accomplishment of the tasks required by the contract. The contractor shall prepare drawings and other data, as required, to aid in the presentations. The contractor shall have key personnel and support available to carry out the conference. The contractor shall make available facilities for Government only meetings during all conferences and reviews. Changes to the schedule will be bi-laterally agreed upon and documented in a revised IMS. Except where noted herein, conferences and reviews shall be considered fulfilled when all of the following items are completed:

- A formal meeting has been conducted and the conference and reviews are presented to the Government.
- All action items requiring contractor response have been resolved.
- The Government has accepted the conference minutes.

45.1.3.1. Post Award Conference (PAC)

The contractor shall participate in a PAC within seven (7) working days after contract award. The PAC will be one (1) day in length. This conference will be used to communicate the roles and responsibilities of team members, present the planned approach to all members, and fine-tune the design approach. The contractor shall orally present its proposed approach, IMP, and IMS. The contractor shall be prepared to discuss its proposed approach with the entire Government team. Except where noted this conference shall be considered fulfilled when all of the following items are completed and accepted:

- All GFI and GFE will be presented and provided.
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- Initial IMP and IMS.
- Navy ILE Content Announcement Form.

45.1.3.2. Navy Learning Objective Statements (NLOS) Conference (If traceability matrix to include the LOS is GFI this paragraph will not be required.)

The contractor shall participate in a Navy Learning Objective Statements (NLOS) Conference that will be conducted following the PAC. NLOS specification and Traceability Matrix requirements are provided in the Navy ILE Content Design, Development, and Deployment Guide v1.6 and referenced in CDRL and represent the Governments requirement for learning content design and development. Except where noted this conference shall be considered fulfilled when all of the following items are completed and accepted:

- NLOS are developed in accordance with NLOS specification and adequate in meeting the training gap identified in the Traceability Matrix.
- NLOS Traceability Matrix developed in accordance with NLOS specification ensuring alignment and traceability to applicable SkillObject™.
- Updated IMP and IMS.
- Decision to enter Content Design.

Learning Content Design/Production Decision Conference

The contractor shall participate in a Learning Content Design Conference that will be conducted following the NLOS Conference. The primary focus will be the acceptance of the Instructional Media Design Package deliverables and following decision to enter into the content production phase. The Learning Content Design Conference will be a working group to define technical requirements, establish acceptable courseware design strategies, discuss module/lesson content, and further establish the plan for management, development, production, and implementation of the product. The contractor shall document this information in the IMP and IMS. Except where noted this conference shall be considered fulfilled when all of the following items are completed and accepted:

- Any and/or all waivers to Navy ILE technical requirements, specifications, standards, and style.
- Navy ILE Content Re-use and Repurpose Assessment and Plan.
- Content Design Strategy (flow diagrams and sequencing) and Assessment are learner-centric, performance or performance-based, adequately supports required content use-cases, target audience and traceable to NLOS requirements.
- Content Development Tools, Schemas, and Taxonomies.
- Risk Assessment.
- Updated IMP and IMS.
- Navy ILE Content Host Submission Form.
- Decision to enter Content Production.
Content Deployment Readiness Review

Upon completion of all product reviews, discrepancy reports, validation, and verification activities the content is accepted and submitted to the ILE production site. Except where noted this conference shall be considered fulfilled when all of the following items are completed and accepted:

- Government Acceptance Testing (GAT)
- 508 Compliance Verification
- Metadata Tagging Conformance Verification
- If applicable, update Navy ILE Content Host Submission Form
- Assessment Readiness
- Effectiveness Evaluation Plan
- Decision to Deploy Content

45.1.3.3. In-Progress Reviews (IPRs) (Choose from below depending on level of effort required.)

The contractor shall schedule periodic reviews for the purpose of discussing project status and deliverables, identifying and solving problems, reviewing the design documents, and reviewing each unit of instruction. These IPRs will be conducted and documented in the accepted IMS. All IPRs will be held at Government facilities (____________(Center), or __________) and shall be coordinated through the ________ TPOC. The contractor shall use Video Teleconferences (VTC) when and where it is practicable for time efficiency and for cost saving measures. The contractor shall attend and participate in all of the meetings. The contractor shall prepare the Conference Agenda and Conference Minutes for all IPRs IAW the CDRL B002 and B003. The Government may use independent validation and verification (IV&V) for the specified IPRs, inspections, and verifications. As a minimum, the meetings listed below are anticipated in the conduct of this contract.

- a. Design Strategy IPR – The purpose of the Design Strategy IPR is to review in detail the instructional design strategies for the training products. Participants shall include the contractor, _____________(Center and or School), and _____________(Contracting Office).
- b. Script Storyboard IPR – The purpose of the Script Storyboard IPR is to review in detail the Script Storyboard deliverable. Participants shall include the contractor, ______Center or School, and _______Contracting Office.
- c. On-Screen Lesson Reviews – The purpose of the On-Screen Lesson Reviews is to review in detail the on-screen training and performance support product deliverables. Participants shall include the contractor, ______Center or School, and ______Contracting Office. On-Screen Lesson Reviews will be conducted and documented in the approved IMS. Changes to the schedule will be bi-laterally agreed upon and documented in a revised IMS. During the On-Screen Lesson Reviews, the courseware/IMI modules shall be reviewed for correct operation (i.e., branching, navigation buttons, student interactivity, and the like) and technical accuracy. Each screen shall be checked for accuracy against the final Government-accepted script storyboards and the instructional design strategy document. During the conduct of the On-Screen Lesson Reviews, the contractor shall make available all Government-accepted design
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information. There shall be no known coding errors or abnormal conditions of any kind, including warnings, in either the source or resultant executable code or the authored courseware/IMI prior to the start of each On-Screen Lesson Review. All branches of the modules shall be tested. Deficiency reporting and correction during the On-Screen Lesson Reviews, shall be in accordance with the following requirements:

(1) Deficiencies identified during the On-Screen Lesson Review shall be documented in a report, with each discrepancy on a separate contractor-prepared Government-authorized DR form. The contractor shall prepare the Training Evaluation Document (Deficiency Report) IAW the CDRL A001.

(2) The contractor shall correct all deficiencies documented during the On-Screen Lesson Review prior to the beginning of any subsequent On-Screen Lesson Review. Any subsequent On-Screen Lesson Review shall verify that all deficiencies identified during the previous review have been corrected.

45.1.4. GFI requirements

GFI is described in 43.3. The contractor shall acknowledge receipt of all GFI in writing to the assigned government contracting office within 30 working days after receipt. The contractor shall coordinate all requests for additional technical and contractual information with the assigned government contracting officer. The contractor shall return all GFI to the Government when the effort is completed, or destroy it using applicable procedures (subject to Government authorization).

45.1.5. Period of Performance

The period of performance shall be as specified in the contract.

45.2. Detailed Requirements

The contractor shall perform the analyses, design, and development of the courseware/IMI specified below. The contractor shall produce the courseware/IMI based on the Government provided curriculum outline, Job/Task Analysis, and adjunctive materials. All support documentation and associated training materials that are developed by the contractor shall comply with the Navy ILE Content Design, Development, and Deployment Guidelines V1.6 and MIL-PRF-29612B. The contractor may use MIL-HDBK-29612-5 for guidance in accomplishing this task. The contractor may use MIL-HDBK-29612-2A Section 7.12 (Design Lessons) and MIL-HDBK-29612-3A, Section 6.1.1.1 (Interactive Courseware (ICW – see A.1.4) Design) through 6.1.1.6.1 (ICW Events of Instruction), and Section 6.5.1 (Electronic Performance Support System) as applicable for guidance in accomplishing this task. See Appendix A for definitions of specific terms. If applicable, the contractor shall ensure that the content complies with Section 508 of the Rehabilitation Act (29 U.S.C. 794d).

45.2.1. Instructional Performance Requirements Package

The ADDIE model (Analysis, Design, Development, Implementation and Evaluation) is a linear systematic logically fed process that operates on the assumption you cannot provide an adequate training solution until you know what the problem is. The “problem” is the defined result of the independent analysis phase.
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The Navy’s ILE demands a different methodological approach to Instructional Systems Design (ISD), especially Analysis. A new systematic non-linear information mapping process that enables the creation of learning objects and not courses or courseware has been popularized recently. This new process is provided in the Navy’s ILE ISD-ID and NLOS sections of the Navy ILE Content Design, Development, and Deployment Guidelines v1.6.

The Navy will conduct analyses, which involves occupational and human performance analyses to identify the tasks, knowledge, skills, abilities, tools, subtasks, conditions, equipment, and performance standards related to a specific job. In addition, the analysis data will include other essential information for the Instructional Designer (ID) to fully understand the performance requirements of the learner. This new process is provided in the Navy’s ILE ISD-ID and NLOS sections of the Navy ILE Content Design, Development, and Deployment Guidelines v1.6.

45.2.1.1. Learning Objective Statements

Using the _________Center-approved JTA as a basis, the contractor shall conduct and document a curriculum/content and learner analysis and provide a validated list of performance-oriented learning objectives suitable for: a) scenario-based learning (for the courseware/IMI) and b) refresher training/performance support (for the performance support tool). The contractor shall develop the courseware/IMI specification by determining the level of interactivity, learning levels, and hierarchy of learning, then sequencing the learning objectives, selecting the appropriate category of ICW presentation (see A.1.2) and levels of interactivity (see A.1.8), and matching the interactivity levels (levels of ICW – see A.1.7), and associated learning levels (per MIL-HDBK-29612-3A). The contractor shall identify and document the desired performance metrics of the previously identified tasks and shall prepare the analysis report. The contractor shall ensure that the learning objectives align with the 5-Vector Model for (___________). The contractor shall prepare the Instructional Performance Requirements Package (Learning Objectives Analysis) IAW the CDRL A004.

45.2.2. Content Design Requirements

45.2.2.1. Shareable Content Object Reference Model (SCORM)

The contractor shall implement SCORM 2004 v1.3, as required by Government and as defined in the approved Navy ILE Content Design, Development, and Deployment Guidelines v1.6. The application of SCORM shall provide code to allow for the creation of a course structure, the content of a course element and the course, and content metadata so that content can be identified and found in repositories, delivered over the Web, and managed by a LMS. The contractor shall produce the required metadata tags for all training products in order to identify reusable learning objects. The contractor shall use the Government-furnished content object repository as the data repository for course, lesson, segment, topic, block, SCO, Learning Objective, and raw media element. Each of these shall be tagged with SCORM required metadata. Metadata shall be stored in a separate database linked to the content object repository.

**Shareable Content Object (SCO)**

A Sharable Content Object (SCO) is the basic building block for SCORM conformant courseware. A SCO is a collection of assets developed to provide the instructional requirements
of a Learning Objective (TLOs and ELOs). An asset is the smallest, meaningful learning content object used to develop web-based IMI training to include the media (separate and distinct instructional text, audio, video, graphic, animation, etc.) used to create a SCO. The Navy has mapped a SCO to the Enabling Learning Objective, and in its absence, the Terminal Learning Objective. SCO’s shall not be developed at a level higher than an ILO (or, in the absence of ELOs, the TLO level).

A SCO is a launchable object that includes the Computer Managed Instruction (CMI) tracking for launch and completion. An ELO shall be represented by a SCO.

45.2.3. Instructional Media Design Package (IMDP)

The contractor shall provide in accordance with the CDRL an Instructional Media Design Package, including Content Instructional Design Strategy, Lesson Strategy Data (with a Prototype Lesson), and Content Logic Flow Diagrams demonstrating adequate alignment and traceability to approved NLOSs.

45.2.3.1. Development of Content Instructional Design Strategy

The contractor shall develop and deliver an electronic Content Instructional Design Strategy using an automated tool. The tool shall meet all specifications required in SCORM 2004 (V1.3) and shall reduce time to produce as well as automate the tagging process. The tool shall be linked to other production tools, to include Script/Storyboard, assessment development, and on-Screen development. The contractor shall develop the Content Instructional Design Strategy in accordance with the Style Guide section of the Navy ILE Content Design, Development, and Deployment Guidelines v1.6 to include screen navigation procedures, instructional strategies, screen designs, templates, and the implementation of SCORM 2004 v1.3. The implementation of SCORM and the Content Instructional Design Strategy shall ensure maximum reusability, interoperability, durability, and affordability of all learning objects. The contractor shall identify and document common design features among courseware and performance support tools, and existing differences. The contractor shall prepare the Instructional Media Design Package (IMI Instructional Design Strategy IAW the CDRL A005. The contractor shall use the Government-accepted Content Instructional Design Strategy and Style Guide to produce all training products. The contractor shall identify and document, at a minimum:

- Lesson Title
- Length of Lesson
- Learning Objectives
- Level of Interactivity (LOI)
- Delivery Method (Group or Self-paced)
- Instructional strategies (Drill and Practice, Tutorial and Inquiry, Simulation, Gaming, Problem Analysis, Collaboration, etc)
- Media to be used (2-D/3-D still, 2-D/3-D animation, video, audio, text, digital photos or a combination of types)
- Length of lesson
- Content outline
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- Testing Strategy with sample test questions
- Reference Documentation

45.2.4. Courseware Development Requirements

45.2.4.1. Learning Management System (LMS) Functionality

The contractor shall make the content compatible with the Application Programmer’s Interface (API) to the Navy enterprise LMS (see A.1.6), by making the content conform to the Navy - Integrated Learning Environment (ILE) and Navy E-Learning Content Technical Specifications as stated in the Navy ILE Content Design, Development, and Deployment Guidelines v1.6.

45.2.4.2. Navy ILE Content Metadata Requirements

To meet the Navy's short and long term plans and strategy for the ILE, the metadata approach is structured around an information-centric methodology. A major component of this architecture is the definition of metadata for many aspects of the system and content, as well as the physical and logical components to store metadata and execute software actions using metadata.

A complete description of the metadata registry and schema architecture and standards is described in full in the Navy ILE Content Metadata Guide for Development and Delivery section of the Navy ILE Content Design, Development and Deployment v1.6.

45.2.5. Instructional Media Package (IMP) and Test Package

The contractor shall develop learning content products IAW approved IMDP and CDRLs.

45.2.5.1. Development of Script/Storyboards

The contractor shall develop and deliver electronic Script/Storyboards that describe each specific training screen within a lesson. The Script/Storyboard, at a minimum, must contain a visual representation of all objects on each screen, written descriptions of all media (graphics, animations, photographs, video and audio), programming instructions, lists of source materials and references. Upon final delivery to the Government, and at the completion of the contract, Script/Storyboards must contain all file names (source model, object and final image displaying all objects), audio files, video files, any programming code used, and metatagging information. The contractor shall use a Script/Storyboard development tool to reduce production time and automate the tagging process. It is preferred that the Script/Storyboard tool will produce an electronic product that, with implementation of Government DRs, will produce the on-screen lesson, thereby reducing production time. The Script/Storyboard tool shall reuse data in the Content Instructional Design Strategy. The contractor shall prepare the Instructional Media Package (Script/Storyboards) IAW the CDRL A006.

45.2.5.2. Development of On-Screen Lessons

The contractor shall develop On-Screen Lessons based on the Government-accepted Script/Storyboards. The contractor shall provide the On-Screen Lessons incrementally. The contractor shall provide the On-Screen lessons with the implementation of the Script/Storyboard DRs. Minimal effort shall be required to produce the On-Screen Lessons with the use of the required production tools. The contractor shall prepare the Instructional Media Package (On-Screen Lessons) IAW the CDRL A007.
45.2.5.3. Development of a Learner Assessment Package
The contractor shall produce a learner assessment bank (pool of test questions) for each ELO and TLO (but not for the refresher training/performance support tool), as detailed in the Government-accepted Content Instructional Design Strategy. The contractor shall prepare the Test Package (Learner Assessment Package) IAW the CDRL A008.

45.2.5.4. Development Software
The contractor shall develop the content using web-based tools having an Hypertext Markup Language (HTML)/Extensible Markup Language (XML) output consistent with the Navy ILE Technical Requirements section of the Navy ILE Content Design, Development, and Deployment Guidelines v1.6. A list of allowable browser plug-ins is contained in the Navy ILE Content Design, Development, and Deployment v 1.6. If the content is designed to require additional and/or different plug-ins, the contractor shall submit a request no later than submission of the Instructional Media Design Package and obtain Navy ILE approval to use the required plug-in(s). Waiver procedures are contained in the Navy ILE Content Design, Development, and Deployment v 1.6. All software shall be subject to Government final approval prior content production decision.

45.2.5.5. Development of Training System Support Procedures
The contractor shall develop and document procedures for the operation of the courseware/IMI to aid schoolhouse personnel in full and effective use of the courseware/IMI. The contractor shall develop and document procedures for utilization of all software utility programs, support software file generation, and verification of system performance characteristics for the purpose of life cycle management. The contractor shall prepare the Training System Support Document IAW the CDRL A00A.

45.2.6. Developmental Source Materials and Training System Support Product Requirements
The contractor shall deliver all logic source files, transportability and maintainability data, portability commands, courseware data files, instructional media generation programs and files, and developmental source materials. The contractor shall prepare the Instructional Media Package (Developmental Source Materials/Master Data Files) IAW the CDRL A00B.

45.2.6.1. Navy ILE Content XML Specification for Content Development
The contractor has the option to use a Navy provided ILE Content Development Environment for Content Authoring. If the contractor decides to use a different web-enabled content authoring tool (that meets the minimum requirements as stated in the Navy ILE Content Design, Development, and Deployment Guidelines v1.6) the contractor shall deliver all source files in the format specified in the Navy ILE Content XML Specification in accordance with the CDRL. This is to ensure maximum re-use, repurpose, revision and maintenance of content objects regardless of content authoring environment.

45.2.7. Final Inspection
A courseware/IMI Final Inspection will be conducted at ____ in accordance with the Government-accepted Software Test Plan. The contractor shall provide the necessary resources
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and personnel to support the tests. The Government may use IV&V for the courseware/IMI Final Inspection. Deficiencies identified during the Courseware/IMI Final Inspection shall be documented in a report, with each discrepancy on a separate contractor-prepared Government-authorized DR form. Deficiencies found during this Final Inspection shall be corrected by the contractor and verified by the Government prior to Government acceptance of the courseware/IMI. The Government reserves the right to perform such additional tests as deemed necessary to ensure compliance with the specified requirements. The contractor shall prepare the and the Training Evaluation Document (Deficiency Report) IAW the CDRL A00C

45.2.8. Government Data Rights

The Government will not pay royalties, recurring license or run-time fees, user fees, or similar additional payments for the contract developed courseware or associated multimedia production/authoring/presentation software packages necessary to produce, modify, or view/execute the courseware. The contractor shall ensure that all deliverables are in a non-proprietary format and all source code is provided to the Government. All text-based materials with digital copies shall be organized in a manner to facilitate revision.

Note: Licensing fees required for database software is the only exception to this statement. The contractor shall strive to keep licensing fees to a minimum. Functionality and lifecycle cost shall always be a consideration.

45.2.8.1. Licensing/Ownership Rights

All data, including at a minimum, source files, two-dimensional (2-D) and three-dimensional (3-D) imagery, 3-D models and wire-frames, video, audio, animations, design documentation, other support documentation and courseware, developed by the contractor are the property of the Government and are not to be used for resale to any Government agency, organization, or Command.

45.2.8.2. Delivery

The contractor shall deliver the web-based version of the content and test content packages IAW this SOW and Navy ILE Content Design, Development, and Deployment Guidelines v1.6 as Package Interchange Files (PIFs) on CD-ROM or provided electronically to Government provided FTP site. Only the content files, meta-data files imsmanifest.xml file and the schema files shall be included in the PIFs. Other files or contract deliverables shall not be included within the PIFs. The NLOS and Traceability Matrix files shall be a separate file external to the PIFs but maybe included on the same CD-ROM as the content PIFs.

At project completion, that contractor shall archive and deliver all authoring tool files, content, and supporting products with full authoring and scripting access, i.e., without password or other restrictive protection.
Appendix A

A.1 SOW Terms and Definitions

Below are key terms and definitions reflected in this SOW. Refer to MIL-HDBK-29612 Parts 1 through 5 for additional definitions.

A.1.1 Attitudes

One of three separate learning types (i.e., knowledge, skills, and attitudes, or KSAs) under which are learning levels (e.g., fact learning, mechanism, competence, etc.). Acquiring particular attitudes may require prior learning of intellectual skills or particular sets of information. For example, if a positive attitude toward safety is to be acquired, the student should have intellectual skills (concepts and procedures) associated with safety, and a variety of verbal information about the advantages of following safety procedures or the consequences of not following them. Attitudes are learned by observing others and viewing the consequences of their behavior. External conditions for learning attitudes include a human model. Experiences play a major role in the formulation of attitudes.

A.1.2 Categories of ICW Presentation

Categories of ICW presentation (not to be confused with Levels of Interactivity) address the way the material is packaged and presented. Categories of ICW presentation are initially derived from the level of interactivity related to the Learning Objective (LO). This drives the complexity of the computer programming. ICW presentation categories range from linear formatted (page turner) to real-time simulation presentations. In determining the most appropriate presentation category to support an LO, the following process will be helpful:

a. Match the level of interactivity with the learning level (e.g., fact learning, rule learning, etc.) associated with the LO.

b. Identify the sensory stimulus requirements.

c. Select the instructional delivery mode (e.g., exportable ICW, ICW supporting training, network, etc.) based on the required level of interactivity.

d. Match the required level of interactivity, sensory stimulus requirements, and delivery mode with the appropriate category of ICW presentation.

A.1.3 Commercial Item

Per the Federal Acquisition Regulations, Part 2.101, ‘Commercial Item’ means:

a. Any item, other than real property, that is of a type customarily used for non-governmental purposes and that--

   (1) Has been sold, leased, or licensed to the general public; or,

   (2) Has been offered for sale, lease, or license to the general public;

b. Any item that evolved from an item described in paragraph a. of this definition through advances in technology or performance and that is not yet available in the commercial marketplace, but will be available in the commercial marketplace in time to satisfy the delivery requirements under a Government solicitation;

c. Any item that would satisfy a criterion expressed in paragraphs a. or b. of this definition, but for--
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(1) Modifications of a type customarily available in the commercial marketplace; or

(2) Minor modifications of a type not customarily available in the commercial marketplace made to meet Federal Government requirements. Minor modifications means modifications that do not significantly alter the nongovernmental function or essential physical characteristics of an item or component, or change the purpose of a process. Factors to be considered in determining whether a modification is minor include the value and size of the modification and the comparative value and size of the final product. Dollar values and percentages may be used as guideposts, but are not conclusive evidence that a modification is minor;

d. Any combination of items meeting the requirements of paragraphs a., b., c., or e. of this definition that are of a type customarily combined and sold in combination to the general public;

e. Installation services, maintenance services, repair services, training services, and other services if such services are procured for support of an item referred to in paragraphs a., b., c., or d. of this definition, and if the source of such services--

(1) Offers such services to the general public and the Federal Government contemporaneously and under similar terms and conditions; and

(2) Offers to use the same work force for providing the Federal Government with such services as the source uses for providing such services to the general public;

f. Services of a type offered and sold competitively in substantial quantities in the commercial marketplace based on established catalog or market prices for specific tasks performed under standard commercial terms and conditions. This does not include services that are sold based on hourly rates without an established catalog or market price for a specific service performed;

g. Any item, combination of items, or service referred to in paragraphs a. through f., notwithstanding the fact that the item, combination of items, or service is transferred between or among separate divisions, subsidiaries, or affiliates of a contractor; or

h. A Non-Developmental Items (NDI - see A.1.9), if the procuring agency determines the item was developed exclusively at private expense and sold in substantial quantities, on a competitive basis, to multiple State and local governments.

A.1.4 Interactive Courseware

ICW is computer controlled courseware that relies on trainee input to determine the pace, sequence, and content of training delivery using more than one type medium to convey the content of instruction. Interactive courseware can link a combination of media, to include but not be limited to; programmed instruction, video, text, graphics, audio, animation, and simulation to enhance the learning process.

A.1.5 Interactive Multimedia Instruction

IMI is a term applied to a group of predominantly interactive, electronically delivered training and training support products. IMI products include instructional software and software management tools used in support of instructional programs. IMI products are teaching tools and may be used in combination or individually. IMI products include:

a. ICW

b. Electronic publications
Appendix F

(1) Electronic guides
(2) Interactive Electronic Technical Manuals (IETMs)
(3) Electronic Technical Manuals (ETMs)

c. Electronic testing
d. Simulation
e. Electronic management systems including:
   (1) Electronic Performance Support System (EPSS)
   (2) Computer Aided Instruction (CAI)
   (3) LMSs
   (4) Computer Managed Instruction (CMI)
   (5) Course Management System
   (6) Electronic job aids (e.g., templates, macros, etc.)

f. Other materials (digital or printed) including:
   (1) Workbooks
   (2) Study guides
   (3) Job aids
   (4) Training manuals
   (5) Programmed instruction booklets
   (6) Technical orders

g. Trainers - This data shall include descriptions of the trainer requirements, mission statement and objective, and an explanation of the sortie/exercise elements to be trained using the following trainers:
   (1) Simulator trainers
   (2) Platform and component trainers
   (3) Combination platform and component and simulator (hybrid trainers)

h. ADL products including:
   (1) On-line (e.g., Internet, intranet, extranet) courses including:
       (a) Web-ready (e.g., HTML, XML, synchronous, etc.)
       (b) Web-deliverable (i.e., executable files launched via a browser)
       (c) Web-based (i.e., asynchronous and synchronous instruction)
       (d) Web-downloadable (i.e., content for off-line instruction)
   (2) Compact Disk-Read Only Memory (CD-ROM), Digital Versatile Disk (DVD), and other digital storage devices
   (3) Broadcast television (including cable and satellite)
   (4) Video conferencing
   (5) Audio conferencing

A.1.6 Learning Management System
An LMS is a software program developed to manage student/teacher administration functions. An LMS is a sophisticated program that assists administrators in performing the functions of
Appendix F

tracking of student registration, scheduling, gathering, and processing student performance data. It may control the entire instructional system, including the traditional classroom. An LMS provides students an integrated view of their entire active courseware, assignments, and progression in a syllabus that spans multiple courses. The purpose of an LMS is to manage and deliver content. Core features include:

a. An open architecture.
b. SCOs that are modularly stored
c. Content storage provided via an Enterprise-class Standard Query Language (SQL) database
d. Records management individually and by group of tests
e. Ability for students to view assignments in integrated syllabus across multiple courses
f. Integration with other products
g. Highly flexible content presentation
h. Synchronous tools built-in, but can integrate to other delivery systems
i. Support various content authoring and reporting tools
j. Importable and exportable grading and reporting capabilities

LMSs establish a common blueprint and set of data for managing instructional content and student performance data, thereby increasing opportunities to share instructional resources across isolated instructional systems. LMSs utilize web-server technology that allows administration over the Web. LMSs also allow an instructor to manage a student in a virtual classroom setting.

A.1.7 Levels of ICW

Levels of ICW is a generic term evolved from combining Categories of ICW Presentation with Levels of Interactivity (NOTE: Levels of ICW is not found in MIL-PRF-29612B or any part of MIL-HDBK-29612). This combination typically results in the following generally accepted Levels of ICW:

a. Level I - Basic Interactivity. This is the lowest level of development. Level I lessons are linear (one idea after another), and are used primarily for introducing an idea or concept. There is little ‘interaction’ other than the student touching the screen or using a keystroke or mouse click to continue. Branching is not a feature other than in the use of a menu system. Testing is provided with immediate feedback. Level I employs a IMI system. The media used are primarily text and graphics (not complex), but may also include audio and video.

b. Level II - Medium Interactivity. Level II involves all levels of learning from recall of information to performing skills. Level II allows the user to have increased control over lesson presentation; that is, there is more interaction. Multiple objects may appear on the screen and may move independently, or may be controlled by the user. Level II will combine audio, video, text, graphics, and animation. Level II uses branching (1 to 2 levels), testing, and immediate feedback. IMI features are used in Level II lessons to track and analyze student performance. Level II lessons include designs for recall of facts, rules and concepts, but also support other
Appendix F

instructional strategies at the low end, such as Tutorials, Drill/Practice, Collaborative Learning, and Discovery Learning.

c. Level III - High Interactivity. This level involves aspects of both Level I and Level II while using the full abilities of technology. Level III lessons supports high end or complex forms of training using instructional strategies such as Gaming, Simulation, and the Socratic method. Level III may present on-screen interaction similar to that used in an aircraft simulator. This level provides a high degree of interactivity, extensive branching capability (3 or more levels), maximum remediation opportunity (supports multiple levels of errors), real-time event simulation with minor equipment limitations, capability to interface with other output devices, and thorough IMI capability.

d. Level IV – Very High Interactivity using Simulation. Level IV involves the greatest in-depth recall of a larger amount of information (compared to Levels 1, 2, and 3) and allows the user a high degree of control over the lesson. Every possible subtask is analyzed and presented with full on-screen interaction, similar to the approach used in aircraft simulator technology. The lesson material is extremely complex and involves more frequent use of peripherals to affect the transfer of learning. This type of lesson most often uses combinations of scenarios, simulation, gaming, and drill-practice as the chosen instructional strategy. This category normally supports certification or qualification requirements. Complicated operation and maintenance procedures are normally practiced with Level IV and involves all of the elements of Levels 1, 2, and 3 presentations plus the following:

1. High degree of interactivity.
2. Extensive branching (four or more levels).
3. Levels of sophistication - short of artificial intelligence.

A.1.8 Levels of Interactivity

Interactivity is the degree of student involvement in the instructional activity. Levels of interactivity (not to be confused with the Categories of ICW Presentation) addresses the way the program is designed for user interaction (i.e., two-way communication between the courseware and a user). There are four levels of interactivity:

a. Level 1 - Passive. The student acts solely as a receiver of information.

b. Level 2 - Limited participation. The student makes simple responses to instructional cues.

c. Level 3 - Complex participation. The student makes a variety of responses using varied techniques in response to instructional cues.

d. Level 4 - Real-time participation. The student is directly involved in a life-like set of complex cues and responses.

A.1.9 Non-Developmental Items

Per the Federal Acquisition Regulations, Part 2.101, NDI means:

a. Any previously developed item of supply used exclusively for governmental purposes by a Federal agency, a State or local government, or a foreign government with which the United States has a mutual defense cooperation agreement;
Appendix F

b. Any item described in paragraph a. of this definition that requires only minor modification or modifications of a type customarily available in the commercial marketplace in order to meet the requirements of the procuring department or agency; or
c. Any item of supply being produced that does not meet the requirements of paragraph a. or b., solely because the item is not yet in use.

A.1.10 Simulation
A simulation is the representation or simulation of the salient features, operation, or environment of a system or subsystem through the use of technology that permits students to acquire skills and learn tasks through interaction in the same manner as would occur in a reality situation.
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### A. CONTRACT LINE ITEM NO.  | B. EXHIBIT  | C. CATEGORY:  F  TDP  TM  OTHER TRAINING DATA
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### D. SYSTEM/ITEM  | E. CONTRACT/PR NO.  | F. CONTRACTOR

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### A. CONTRACT LINE ITEM NO.

### B. EXHIBIT

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### C. CATEGORY:

TDP ______ TM ______ OTHER TRAINING DATA

### D. SYSTEM/ITEM

WEB-BASED LEARNING CONTENT

### E. CONTRACT/PR NO.

### F. CONTRACTOR

### G. PREPARED BY

DD Form 1423-1, JUN 90 Previous editions are obsolete Page of Pages

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### I. APPROVED BY

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| A003 | F | F | TDP | TM | OTHER TRAINING DATA |

#### 1. DATA ITEM NO.  2. TITLE OF DATA ITEM  3. SUBTITLE

| A003 | INTEGRATED MASTER SCHEDULE (IMS) | |

#### 4. AUTHORITY (Data Acquisition Document No.)  5. CONTRACT REFERENCE  6. REQUIRING OFFICE

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1. BLK 12/13: FIRST SUBMISSION SHALL BE DELIVERED WITH THE PROPOSAL. SUBSEQUENT SUBMISSIONS SHALL BE AS REQUIRED CONTINUING THROUGH THE END OF THE CONTRACT.
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### REMARKS

1. BLK 12: SUBMISSION SHALL BE DUE IAW THE GOVERNMENT-APPROVED IMS.
2. THE GOVERNMENT SHALL HAVE 30 WORKING DAYS FOR REVIEW AND ACCEPTANCE/REJECTION OF SUBMISSION. WHEN COMMENTS REQUIRE INCORPORATION OR CORRECTION, CHANGES ARE DUE 10 WORKING DAYS FOLLOWING RECEIPT OF COMMENTS. THE GOVERNMENT SHALL HAVE 30 WORKING DAYS FOR REVIEW AND ACCEPTANCE/REJECTION OF REVISED SUBMISSIONS.
3. BLK 14: SUBMISSIONS SHALL BE POSTED TO A PROJECT WEB PORTAL OR TRANSMITTED ELECTRONICALLY VIA E-MAIL AND BE IN MICROSOFT OFFICE 2000 FORMAT. NO CLASSIFIED INFORMATION SHALL BE POSTED WEB PORTAL.

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DD Form 1423-1, JUN 90 Previous editions are obsolete Page of Pages

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### Appendix L

**CONTRACT DATA REQUIREMENTS LIST (CDRL)**

Public reporting burden for this collection of information is estimated to average 110 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington DC 20503. Please DO NOT RETURN your form to either of these addresses. Send completed form to the government Issuing Contracting Officer for the Contract/PR No. in Block E.

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### BLK 4:

- DELETE THE FOLLOWING SUB-PARAGRAPHS: 2.2.G, H AND J THRU K, 2.3.6.E AND F, 2.3.10, 2.3.11.F THRU H, AND 2.4.8 A THRU D.
- UNDER SUB-PARAGRAPH 2.3, THE FOLLOWING INFORMATION SHALL BE PROVIDED:
  1. Level of interactivity
  2. The number and category of instructional units to be developed.
  3. Methodologies employed in production.
  4. Basic screen design and layout
  5. Font, size, and color
  6. Media/Graphic design
  7. Screen navigation
  8. Screen display resolution
  9. Screen refresh rates
  10. Performance support strategies
  11. Performance support tool design

### BLK 12/13:

THE DELIVERY SCHEDULE FOR THE INSTRUCTIONAL DESIGN STRATEGY SHALL BE DUE FOLLOWING GOVERNMENT ACCEPTANCE OF THE INSTRUCTIONAL PERFORMANCE REQUIREMENTS PACKAGE.

THE GOVERNMENT SHALL HAVE 30 DAYS FOR REVIEW AND ACCEPTANCE/REJECTION OF EACH SUBMISSION. WHEN COMMENTS REQUIRE INCORPORATION OR CORRECTION, CHANGES ARE DUE 14 DAYS FOLLOWING RECEIPT OF COMMENTS. THE GOVERNMENT SHALL HAVE 30 DAYS FOR REVIEW AND ACCEPTANCE/REJECTION OF REVISED SUBMISSIONS.

SUBMISSION SHALL BE POSTED TO A PROJECT WEB PORTAL OR TRANSMITTED ELECTRONICALLY VIA E-MAIL AND BE IN MICROSOFT OFFICE 2000 FORMAT. NO CLASSIFIED INFORMATION SHALL BE POSTED TO THE WEB PORTAL.

15. TOTAL - - - - - - - -> 4
### CONTRACT DATA REQUIREMENTS LIST (CDRL)

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### REMARKS

1. BLK 4: ONLY PARAGRAPHS 3.1 AND 3.3.3 APPLY.
2. BLK 12/13: THE DELIVERY SCHEDULE FOR SCRIPT STORYBOARDS SHALL BE DUE FOLLOWING GOVERNMENT ACCEPTANCE OF THE INSTRUCTIONAL DESIGN STRATEGY.
3. THE GOVERNMENT SHALL HAVE 60 WORKING DAYS FOR REVIEW AND ACCEPTANCE/REJECTION OF EACH SUBMISSION. WHEN COMMENTS REQUIRE INCORPORATION OR CORRECTION, CHANGES ARE DUE 10 WORKING DAYS FOLLOWING RECEIPT OF COMMENTS. THE GOVERNMENT SHALL HAVE 30 WORKING DAYS FOR REVIEW AND ACCEPTANCE/REJECTION OF REVISED SUBMISSIONS.
4. BLK 14: SUBMISSION SHALL BE DELIVERED ON A CD-ROM IN A FORMAT MUTUALLY AGREED UPON BETWEEN THE GOVERNMENT AND CONTRACTOR DURING THE DESIGN STRATEGY IPR. NO PAPER COPIES OF SCRIPT STORYBOARDS WILL BE ACCEPTED.
CONTRACT DATA REQUIREMENTS LIST (CDRL)

Public reporting burden for this collection of information is estimated to average 110 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington DC 20503. Please DO NOT RETURN your form to either of these addresses. Send completed form to the government Issuing Contracting Officer for the Contract/PR No. in Block E.

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<td>1. BLK 4: ONLY SUB-PARAGRAPHS 3.1, 3.3.10, 3.6.2, 3.6.3, and 3.6.5A APPLY.</td>
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<td>2. BLK 12/13: THE DELIVERY SCHEDULE FOR ON-SCREEN LESSONS SHALL BE DUE FOLLOWING GOVERNMENT ACCEPTANCE OF THE SCRIPT STORYBOARDS.</td>
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<td>3. BLK 12: SUBMISSION SHALL BE DUE 30 WORKING DAYS AFTER COMPLETION OF FINAL INSTALLATION, VERIFICATION, AND ACCEPTANCE OF COURSEWARE.</td>
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<td>4. THE GOVERNMENT SHALL HAVE 6 MONTHS FOR REVIEW AND ACCEPTANCE/REJECTION OF SUBMISSION. WHEN COMMENTS REQUIRE INCORPORATION OR CORRECTION, CHANGES ARE DUE 90 DAYS FOLLOWING RECEIPT OF COMMENTS. THE GOVERNMENT SHALL HAVE 60 WORKING DAYS FOR REVIEW AND ACCEPTANCE/REJECTION OF REVISED SUBMISSIONS.</td>
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<td>5. BLK 14: SUBMISSION SHALL BE IN DELIVERED ON CD-ROM IN A FORMAT MUTUALLY AGREED UPON BETWEEN THE GOVERNMENT AND CONTRACTOR DURING THE DESIGN STRATEGY IPR.</td>
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1. BLK 4: DELETE THE FOLLOWING SUBPARAGRAPHS: 2.3A THRU C, F, AND G, 2.4.1 E AND G, 2.4.2, 2.4.3, 2.4.4, AND 2.5B.
2. BLK 12/13: THE DELIVERY SCHEDULE FOR THE LEARNER ASSESSMENT PACKAGE SHALL BE DUE WITH THE SCRIPT STORYBOARDS FOLLOWING GOVERNMENT ACCEPTANCE OF THE INSTRUCTIONAL DESIGN STRATEGY.
3. THE GOVERNMENT SHALL HAVE 30 WORKING DAYS FOR REVIEW AND ACCEPTANCE/REJECTION OF SUBMISSION. WHEN COMMENTS REQUIRE INCORPORATION OR CORRECTION, CHANGES ARE DUE IN 10 WORKING DAYS FOLLOWING RECEIPT OF COMMENTS. THE GOVERNMENT SHALL HAVE 30 WORKING DAYS FOR REVIEW AND ACCEPTANCE/REJECTION OF REVISED SUBMISSION.
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