U.S. Department of
Homeland Security

**United States
Coast Guard**

The Coast Guard Integrated Logistics Support (ILS) Manual

COMDTINST M4105.14
March 2018

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U.S. Department of Homeland Security
United States Coast Guard

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COMMANDANT INSTRUCTION M4105.14

Subj: THE COAST GUARD INTEGRATED LOGISTICS SUPPORT (ILS) MANUAL

Ref:
(a) Information and Life Cycle Management Manual, COMDTINST M5212.12 (series)
(b) Major Systems Acquisition Manual (MSAM) Handbook (series)
(c) Coast Guard Configuration Management Manual, COMDTINST M4130.6 (series)
(d) Diminishing Manufacturing Sources and Material Shortages (DMSMS) Manual, COMDTINST M4105.12 (series)
(e) Supply Policy and Procedures Manual (SPPM), COMDTINST M4400.19 (series)
(f) Deputy Commandant for Mission Support (DCMS) Engineering Technical Authority (ETA) Policy, COMDTINST 5402.4 (series)
(g) Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series)
(h) Provisioning Allowance and Fitting Out Support (PAFOS) Policies and Procedures Manual, NAVSEA 9090-1500
(i) Civil Engineering Manual, COMDTINST M11000.11 (series)
(j) U.S. Coast Guard Real Property Management Manual, COMDTINST M11011.11 (series)

1. PURPOSE. This Manual establishes policy and procedures for the practice of the ILS process throughout the Coast Guard.

2. ACTION. All Coast Guard unit commanders, commanding officers, officers-in-charge, deputy/assistant commandants, and chiefs of headquarters staff elements must comply with the provisions of this Manual. Internet release is authorized.

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NON-STANDARD DISTRIBUTION:

3. DIRECTIVES AFFECTED. The following directives are cancelled:
   a. Coast Guard Engineering Logistics Concept of Operations (ECONOP), COMDTINST 4100.7 (series);
   b. Coast Guard Independent Logistics Assessment (ILA), COMDTINST 4081.19 (series);
   c. Coast Guard Logistics Readiness Review (LRR), COMDTINST 4081.3 (series);
   d. Provisioning Manual, COMDTINST M4423.5 (series);
   e. Equipment/System Integrated Logistics Support Plan (EILSP) and Equipment Support Sheet (ESS) Development and Maintenance Responsibilities, COMDTINST 4105.7 (series);
   f. Logistics Element Manager's (LEM) Desk Guide, COMDTINST M4105.11 (series);
   g. Long Range Planning of Logistics Support for Operational U.S. Coast Guard Cutters, COMDTINST 4105.4 (series);
   h. Maintenance Management Policy, COMDTINST 4790.3 (series);
   i. Standardized Bar Coding within the Coast Guard for Logistics Applications, COMDTINST 4000.4A;
   j. System Integrated Logistics Support (SILS) Policy Manual, COMDTINST M4105.8 (series); and
   k. U.S. Coast Guard Logistics Handbook, COMDTINST M4000.2 (series).

4. DISCUSSION. This Manual defines the process applied for developing Life Cycle Support Strategies for Coast Guard acquisitions and continuously maintaining these strategies to provide the greatest mission success possible from available resources.

5. DISCLAIMER. This guidance is not a substitute for applicable legal requirements, nor is it itself a rule. It is intended to provide guidance for Coast Guard personnel and is not intended to nor does it impose legally binding requirements on any party outside the Coast Guard.

6. MAJOR CHANGES. This Manual updates and consolidates Coast Guard ILS direction into a single directive using a systems engineering approach. It supports the Deputy Commandant for Mission Support (DCMS) business model. It specifies requirements for a single standard ILS plan applicable to all assets and provides more complete and emphasized guidance on ILS activities conducted during the Produce/Deploy/Support phase of the Department of Homeland Security (DHS) Acquisition Life Cycle Framework.

7. ENVIRONMENTAL ASPECT AND IMPACT CONSIDERATIONS.
   a. The development of this policy has been thoroughly reviewed by the originating office in conjunction with the Office of Environmental Management, and is categorically excluded (CE) under current United States Coast Guard (COAST GUARD) CE # 1 from further environmental analysis, in accordance with Section 2.B.2 and Figure 2-1 of the National Environmental Policy Act Implementing Procedures and Policy for Considering Environmental Impacts, COMDTINST M16475.1 (series). Because this Policy is a guidance document that implements, without substantive change, applicable Commandant Instructions and other Federal agency regulations, procedures, manuals and other guidance documents, Coast Guard categorical exclusion #33 is appropriate.

b. This directive will not have any of the following: significant cumulative impacts on the human environment; substantial controversy or substantial change to existing environmental conditions; or inconsistencies with any Federal, State, or local laws or administrative determinations relating to the environment. All future specific actions resulting from the general policies in this Manual must be individually evaluated for compliance with the National Environmental Policy Act (NEPA), Council on Environmental Policy NEPA regulations at 40 CFR Parts 1500-1508, DHS and Coast Guard NEPA policy, and compliance with all other environmental mandates.

8. DISTRIBUTION. No Paper Distribution will be made of this Manual. An electronic version will be located on the following Commandant (CG-612) web sites. Internet: https://www.uscg.mil/directives/ , and CGPortal: https://cgportal2.uscg.mil/library/directives/SitePages/Home.aspx.

9. RECORDS MANAGEMENT CONSIDERATIONS. This Manual has been thoroughly reviewed by the Coast Guard, and the undersigned have determined this action requires further scheduling requirements, in accordance with Federal Records Act, 44 U.S.C. 3101 et seq., National Archives and Records Administration (NARA) requirements, and Information and Reference (a). This policy has significant or substantial change to existing records management requirements, or inconsistencies with existing determinations relating to documentation requirements.

10. ROLES AND RESPONSIBILITIES. The technical warrant holder governing the ILS policy is the Office of Logistics, responsible for:

a. Changes to the ILS policy and this Manual; and,

b. Support to Coast Guard ILS process users.

11. FORMS/REPORTS. None.

12. REQUEST FOR CHANGES. Recommendations for changes and improvements to this Manual must be submitted via the chain of command to the CM Division, Commandant (CG-444).

Melvin W. Bouboulis /s/
Rear Admiral, U.S. Coast Guard
Assistant Commandant for Engineering and Logistics

RECORD OF CHANGES			
CHANGE NUMBER	DATE OF CHANGE	DATE ENTERED	BY WHOM ENTERED

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CHAPTER 1. INTRODUCTION.

A. Purpose.

The purpose of Integrated Logistics Support (ILS) is to identify the optimal Life Cycle Support Strategy for maintaining a Coast Guard asset. The term "Coast Guard asset" applies to Coast Guard systems and equipment such as cutters, boats, aircraft, information technology systems, communications systems, electronics systems, aids to navigation, shore facilities, and components.

This Manual establishes ILS policy and communicates the ILS process to be applied when developing, monitoring, and maintaining Life Cycle Support Strategies for Coast Guard assets. All acquisition Program Managers (PMs) and Product Line Managers (PLMs) must apply the ILS process described in this Manual. This process must be applied to the level necessary to ensure all Coast Guard assets provide known and expected functionality, availability, and readiness with known risk levels and managed Total Ownership Cost (TOC) throughout the asset's life cycle.

This Manual works hand-in-hand with the MSAM, NMAP Manual, and DHS Guidebook 102-01-103-01, Systems Engineering Guidebook. It amplifies and further defines the life cycle support strategy requirements defined therein.

B. How this Manual is Organized.

1. CHAPTER 1 INTRODUCTION. This Chapter provides a high-level view of the purpose of Coast Guard ILS and how it relates to other Coast Guard functions. It also provides an overview of Coast Guard ILS process flow.
2. CHAPTER 2 ILS PROCESS TAILORING. This Chapter provides guidance on tailoring the Coast Guard ILS Process for varying program and asset scopes.
3. CHAPTER 3 ILS MANAGEMENT. This Chapter explains the tasks involved in managing the ILS process overall throughout the life of an asset.
4. CHAPTER 4 PRACTICE SUSTAINING ENGINEERING. This Chapter explains the tasks involved in monitoring and adjusting support programs to accommodate changes, ensure compliance with supportability requirements, and minimize TOC.
5. CHAPTER 5 LIFE CYCLE SUPPORT PLANNING. This Chapter explains the process of analyzing the ILS elements to develop and mature the Life Cycle Support Strategy.
6. APPENDIX A LIST OF ACRONYMS. This Chapter explains the meaning of acronyms used in this Manual.
7. APPENDIX B GLOSSARY. The Chapter provides definitions for selected terms used in this Manual.
8. APPENDIX C INDEPENDENT LOGISTICS ASSESSMENT (ILA) CRITERIA. This Appendix contains a checklist of criteria that may be used to conduct ILAs.

9. APPENDIX D LOGISTICS READINESS REVIEW (LRR) CRITERIA. This Appendix contains a checklist of criteria that may be used to conduct LRRs.

C. Integrated Logistics Support in the Asset Life Cycle.

1. ILS Process Concept of Operations (CONOPS).

The ILS process CONOPS is depicted and explained in Figure 1-1. ILS is derived from the systems engineering process where Life Cycle Support activities are designed to achieve operational availability thresholds and maximize use of existing Coast Guard logistics infrastructure. ILS implements tasks necessary to deliver readiness, affordably. Like a sailing master setting sails to make the most of the available wind, ILS steers and drives our logistics infrastructure (Acquisition, Logistics Centers, Service Centers, Bases, Other Government Agencies (OGAs) and Contractors) in response to mission needs.

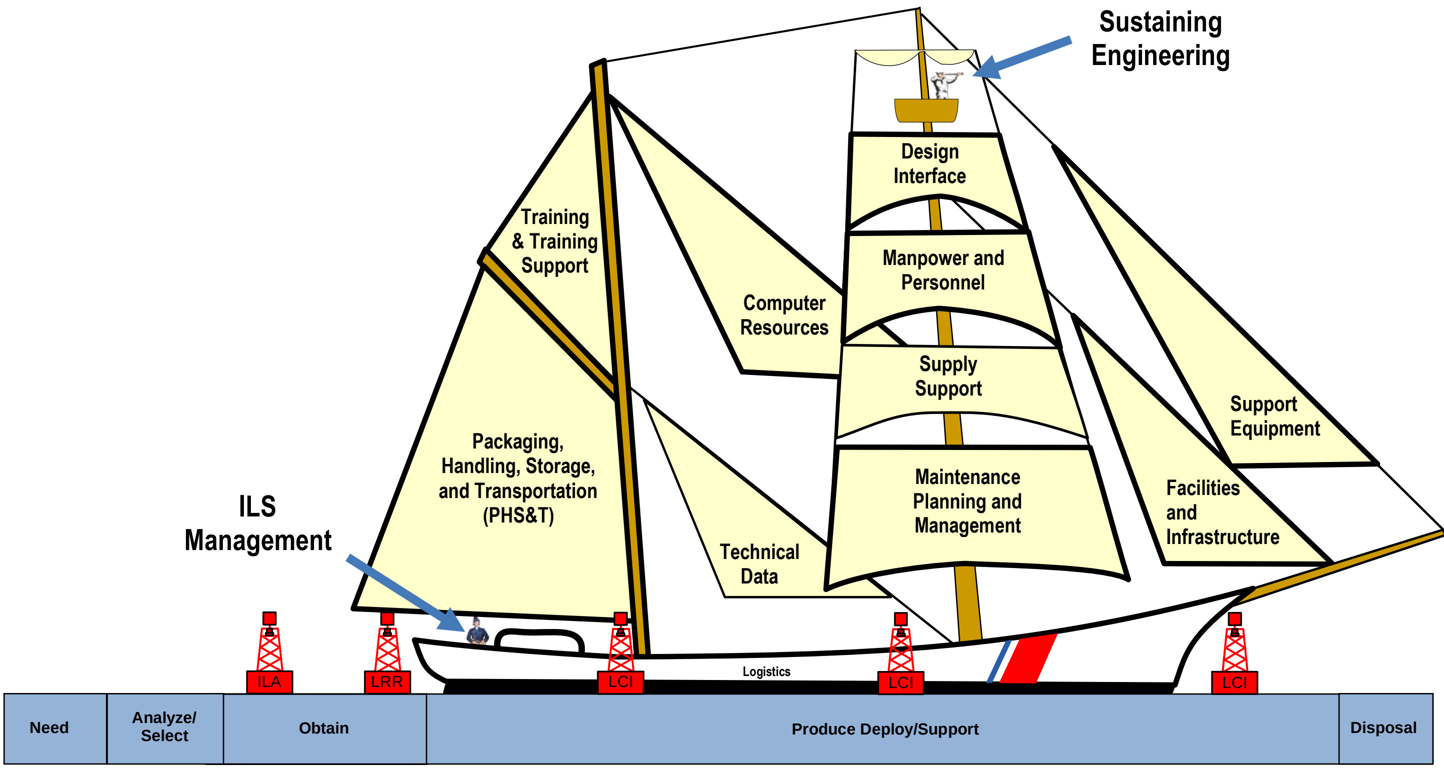

Figure 1-1: ILS Process Concept of Operations (CONOPS)

The ILS Manager, assisted by the Integrated Logistics Support Management Team (ILSMT), designs the Life Cycle Support Strategy by analyzing and balancing the ILS elements in context with ILS Management principles. They produce the ILS products necessary to deliver the designed support while maximizing use of existing Coast Guard logistics infrastructure when that is the optimal lowest life cycle cost choice. They validate and verify the program through Independent Logistics Assessment (ILAs) and Logistics Readiness Review (LRR), then monitor its implementation and adjust the strategy throughout the life cycle via the Sustaining Engineering element and Logistics Compliance Inspections (LCIs).

2. Key Concepts and Definitions.

   a. The ILS Process. The ILS process is a deliberate, unified, and iterative methodology applied to continuously develop a Life Cycle Support Strategy, documented in an ILSP, that:

      (1) Optimizes functional support elements for a system within the constraints of:

         (a) Coast Guard operational capabilities;

         (b) Funding;

         (c) Contractor logistics capabilities;

         (d) Coast Guard support capabilities;

         (e) New technologies;

         (f) Operational requirements; and,

         (g) OGA support capabilities.

      (2) Leverages existing investments in manpower, systems, equipment, training, facilities, and other resources;

      (3) Guides the system engineering process to minimize TOC using supportability attributes to achieve goals and to:

         (a) Identify the support requirements (design the support and support the design);

         (b) Influence the best design alternative;

         (c) Refine ILS guidance;

         (d) Influence Test and Evaluation (T&E) of both the system and the planned Life Cycle Support Strategy;

         (e) Resource and acquire the requisite support;

         (f) Provide the support to Coast Guard personnel; and,

         (g) Improve the support throughout the asset's life cycle.

      (4) Ensures interoperability of materiel within the Coast Guard, DHS, Department of Defense (DoD) and coalition partners.

      (5) The ILS Process is *not* the process of creating an ILSP: an ILSP is a living document that documents the logistics support.

   b. Life Cycle Support Strategy and the ILS Plan (ILSP).

   A Life Cycle Support Strategy is the managed set of official Coast Guard requirements that specifies and optimally allocates an asset's support requirements among Logistics Support Providers. The ILSP is a document that presents these requirements. This distinction is important: where this Manual refers to "updating the ILSP" the intent is to update the requirements at the point where their configuration is controlled, whether that be in a requirements management tool, a database, or some other repository, not merely updating the document in which the requirements are presented.

Each Coast Guard asset (cutter, boat, aircraft, information technology system, electronics system, facility, etc.) must develop and maintain a Life Cycle Support Strategy and document it in an ILSP.

(1) The Life Cycle Support Strategy must consist of all life cycle support requirements.

(2) Life Cycle Support Strategies for Coast Guard assets must address the ILS elements defined in this Manual.

(3) Life Cycle Support Strategy requirements must be outcome-based: they must be constructed to provide the best-value approach to achieving the mission outcomes required by Coast Guard at the lowest TOC.

(4) Life Cycle Support Strategy requirements must not unduly constrain the implementation options of Logistics Support Providers.

(5) At minimum, the Integrated Logistics Support Manager (ILSM) must ensure that the ILSP is reviewed annually and updated as needed.

(6) The outline and requirements provided in Reference (b)'s ILSP template document the required logistic support information and guide ILSP development.

(7) Since Life Cycle Support Strategies are subject to change, ILSPs are living documents. The PM/ILSM and the ILSMT are responsible for creating and maintaining the ILSP. After the ILSP foundation is built, the strategy's refinement continues to rely on, influence, and interface with other analyses and acquisition planning efforts (e.g., Analysis of Alternatives (AA), Operational Requirements Document (ORD), and Life Cycle Cost Estimate (LCCE)). These mutually supportive relationships begin early, remain critical throughout acquisition, and are essential for successful supportability and sustainment planning and execution. Although an ILSP will be updated throughout the acquisition life cycle to improve detail and fidelity, this strategy refinement must be part of the planning effort and not lag implementation.

c. <u>ILS Elements</u>. The ILS process analyzes life cycle support from 12 interrelated disciplines, called "elements". These elements are described below. Each element describes a key perspective on asset support:

(1) <u>ILS Management</u>. The discipline of managing the ILS process and the Life Cycle Support Strategy throughout the life cycle of the asset and balancing the other elements to adapt to changing conditions. ILS Management is the responsibility of the asset's ILSM;

(2) <u>Design Interface</u>. The practice of interpreting and feeding-back support considerations into the asset design process to account for and enhance the supportability and affordability of the design;

(3) Sustaining Engineering. The discipline of monitoring and measuring logistics support throughout the asset's life cycle to continuously adapt and adjust the Life Cycle Support Strategy to optimize performance;

(4) Maintenance Planning and Management. The discipline of identifying, assigning, and communicating necessary maintenance tasks;

(5) Manpower and Personnel. The discipline of identifying, assigning, and communicating the manpower and personnel required to deliver required operational availability;

(6) Facilities and Infrastructure. The discipline of identifying, assigning, and communicating the fixed assets required to deliver required operational availability;

(7) Computer Resources. The discipline of identifying, assigning, and communicating the information technology required to deliver required operational availability;

(8) Technical Data. The discipline of identifying, assigning, and communicating the technical data required to deliver required operational availability;

(9) Training and Training Support. The discipline of identifying, assigning, and communicating the training assets required to deliver required operational availability;

(10) Supply Support. The discipline of identifying, assigning, and communicating the flow of materiel (e.g., consumables, spare parts, etc.) required to meet the asset's maintenance requirements;

(11) Packaging, Handling, Storage, and Transportation (PHS&T). The discipline of identifying, assigning, and communicating requirements for safeguarding materiel and supplies; and

(12) Support Equipment. The discipline of identifying, assigning, and communicating any additional assets required to deliver required operational availability.

ILS Management and Sustaining Engineering. These activities manage and leverage the other ILS elements.

d. Total Ownership Cost (TOC) and Operational Availability (A_O)/Availability Index (AI). TOC and A_O/AI are two key evaluation factors for ILS programs. The overall goal of ILS is to provide the required asset availability at the lowest TOC.

(1) TOC includes all costs associated with the research, development, procurement, operation, logistics support, and disposal of an asset. It includes the total supporting infrastructure that plans, manages, and operates the asset over its full life.

(2) Availability (A_O) (or, for aviation assets, the Availability Index (AI)) is the Key Performance Parameter (KPP) for Sustainment. A_O/AI are measures of

the probability that an asset, when used under stated conditions in an actual operational environment, will operate satisfactorily when called upon.[1] This Manual addresses A_O and AI as functionally equivalent measures of Availability for their respective communities. Except for the paragraphs describing how these metrics are calculated, throughout this Manual the term "A_O" implies "AI" when working with Aviation assets.

3. ILS Process Objectives. The ILS process provides a management framework and technical activities needed to define and maintain Life Cycle Support Strategies to deliver the *right* support to the *right* place at the *right* time, at a cost the Coast Guard can afford, despite changing environments, mission requirements, and emergent national needs. The ILS process must:

   a. Influence the operational and materiel requirements/capabilities, system performance specifications, integration of sustainability and maintainability, and the ultimate design or selection of a materiel system;

   b. Emphasize supportability early in the system life cycle;

   c. Provide best value product support to optimize system operational effectiveness;

   d. Obtain readiness and TOC improvements in the materiel system and support systems throughout the operational life cycle;

   e. Define the product support requirements best related to system design and to each other;

   f. Increase availability by applying systems engineering to right-size the logistics footprint, optimize Mean Logistics Delay Time (MLDT), and influence system design to increase Inherent Availability (A_i)[2];

   g. Maximize the use of existing Coast Guard or DoD logistics support resources to provide as much commonality as practicable and to minimize new ILS requirements and TOC;

   h. Develop supportable and maintainable assets within existing Coast Guard personnel constraints; and,

   i. Maintain configuration control of all ILSMT-managed data.

4. ILS Process Roles and Responsibilities.

   a. Integrated Logistics Support Manager (ILSM). The ILSM:

      (1) Reports to the PM;

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[1] A_O and AI are further discussed in the Practice Sustaining Engineering discussion in Chapter 4.D and the Evaluate Design Interface Element discussion in Chapter 5.M.

[2] Inherent Availability (A_i) is a measure of the theoretical Availability characteristics of an asset design and is not interchangeable with the Availability Index (AI) used in the Aviation community. A_i is discussed further in Chapter 5.M.

(2) Is responsible for developing and managing a comprehensive, outcome-based asset Life Cycle Support Strategy from program approval to disposal;

(3) Under direction of the PM, plans and coordinates ILS program budget in compliance with Commandant guidance and policy;

(4) Is responsible for preparing the Integrated Logistics Support Plan (ILSP) in response to changing needs and constraints throughout the asset life cycle and chairs the ILSMT;

(5) Validates the LCCE against actual costs and performs periodic Life Cycle Support Strategy reviews. Assesses and adjusts resource allocations and performance requirements for asset support not less than annually to meet Coast Guard operational needs and optimize the asset support program;

(6) Is responsible for ongoing staffing and Integrated Product Team (IPT) training of the ILSMT throughout the asset's life cycle;

(7) Must coordinate with the Asset Project Office (APO) as needed to facilitate transferring support responsibility between acquisition teams and Logistics Support Providers;

(8) Provides asset support subject matter expertise to the PM or PLM;

(9) Promotes opportunities to maximize competition while meeting the objective of best-value, long-term outcomes to Coast Guard mission fulfillment;

(10) Seeks to leverage enterprise opportunities across programs, DHS, and DoD components; and,

(11) Uses analytical tools and conducts cost analyses including LCCEs to select the preferred Life Cycle Support Strategy.

b. ILS Management Team (ILSMT) and Logistics Element Managers (LEMs).

(1) An ILSMT must be chartered for each asset. The ILSMT is a cross-functional team that operates throughout the life cycle of an asset. All ILSMTs must meet at least annually throughout the life of the system. Membership of the ILSMT must be subject to change throughout the asset life cycle in response to changing requirements. Technical Authority Representatives from the Assistant Commandant for Command, Control, Communications, Computers, and Information Technology (C4IT), Assistant Commandant for Engineering and Logistics, and the Assistant Commandant for Human Resources are permanent members of the ILSMT. The ILSMT assist the ILSM by:

(a) Assisting in Life Cycle Support Strategy and ILSP development;

(b) Decomposing high-level support requirements;

(c) Ensuring that the required analyses are performed and estimates created;

(d) Developing logistics source selection criteria;

(e) Assisting in root cause analysis of instances where KPPs/Key System Attributes (KSAs); are not met; and

(f) Assisting in correcting Life Cycle Support Strategy shortcomings.

(2) The acquisition PM must ensure that ILSMT representative(s) participate in T&E planning and are responsible for the planning of supportability assessments. ILSMT representatives should develop logistics T&E objectives for each acquisition phase and ensure that these are incorporated into the formal test programs.

(3) LEMs are appointed to focus on and be responsible for analyzing, developing, and monitoring asset support from the viewpoint of one or more logistics elements. Support needs are known most intimately by those who provide support. Whenever possible, LEMs should be selected from the support organization that will eventually support the fielded asset. Each Logistics Support Provider organization must take ownership and responsibility for their specific logistics elements and the LEMs must be empowered to speak for their command/office.

(4) ILSMTs may also include Subject Matter Experts (SMEs) in areas specific to the acquisition. SMEs may address more than one area and may fulfill other ILSMT roles. These areas may include:

(a) Industry (Shipbuilder/Aerospace);

(b) Research & Development Center Acquisition Support & Analysis;

(c) Acquisition Logistics Programs;

(d) Technical Data Management;

(e) HSI;

(f) Naval Engineering Support;

(g) Civil Engineering;

(h) Aeronautical Engineering;

(i) Supply Support;

(j) Sponsor's Representation;

(k) Acquisition Support;

(l) Configuration Management (CM);

(m) C4IT Support;

(n) Legal Counsel;

(o) CM Policy Support;

(p) Communication Systems Support; and

(q) Satellite and Networks Engineering.

c. Logistics Support Providers. Logistics Support Providers are those who provide support directly to Coast Guard operations. Under the Deputy Commandant for Mission Support (DCMS), they establish the standard procedures for providing support for each Coast Guard system (cutter, boat, aircraft, information technology system, electronics system, etc.) as needed to meet the requirements of the asset's approved ILSP. Key elements of this organization are shown in Figure 1-2 and briefly described below. For complete, detailed, up-to-date information about DCMS, consult The Coast Guard Mission Support Handbook (series).

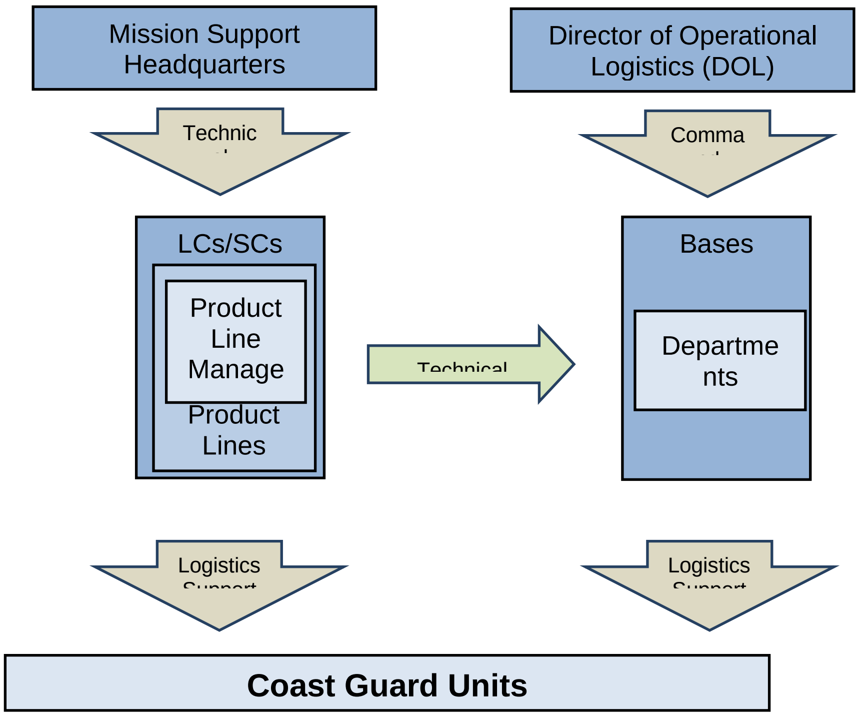

Figure 1-2: Logistics Support Provider Schematic

(1) Headquarters directorates are the technical authorities for their respective mission support communities (e.g., Human Resources; Engineering and Logistics; C4IT) and oversee their planning, policy, budget, and operation. Each directorate manages support via one or more Logistics Centers or Service Centers (LCs/SCs). Another headquarters directorate, the Director of Operational Logistics (DOL), commands regional Bases.

(2) Each LC/SC provides centralized and specialized support services via one or more Product Lines. The LCs/SCs, via these Product Lines, provide technical direction to the Bases. Depending on the level of service or support needed, LC/SCs may coordinate and service operators directly (i.e., aviation, cutter depot service).

(3) A Product Line is an organization within an LC/SC that is responsible for providing total logistics and engineering support for a group of similar assets. They provide integrated, one-stop, 24-hour customer service, technical support, and assistance for all maintenance, logistics, and supply

matters that go beyond the expertise of the unit. Each Product Line is headed by a Product Line Manager (PLM).

(4) PLMs are the single point of accountability for all planning, budgeting, and execution of support for the assets within their product line across the Coast Guard. They are responsible for managing the resources provided to them as needed to provide the agreed upon A_0 for the assets they manage. PLMs direct cross functional teams that distribute support for the assets within the product lines both directly and via the Bases.

(5) Bases operate under the technical direction of the LCs/SCs and under command of the DOL. They coordinate regional mission support activities for their geographic area of responsibility and offer operators a single point of contact to access support. Depending on level of service, units may receive coordination/support from LC/SC.

d. Independent Logistics Auditors/Evaluators. Independent logistics auditors/evaluators are organizations including SMEs and reviewers external to the Logistics Support Providers for the asset under assessment/audit. Logistics assessments are conducted as part of the ILS Management activity (See Chapter 3).

D. Relationship of the ILS Process to Other Functions.

Figure 1-3 depicts the relationship between the ILS process and other Coast Guard functions.

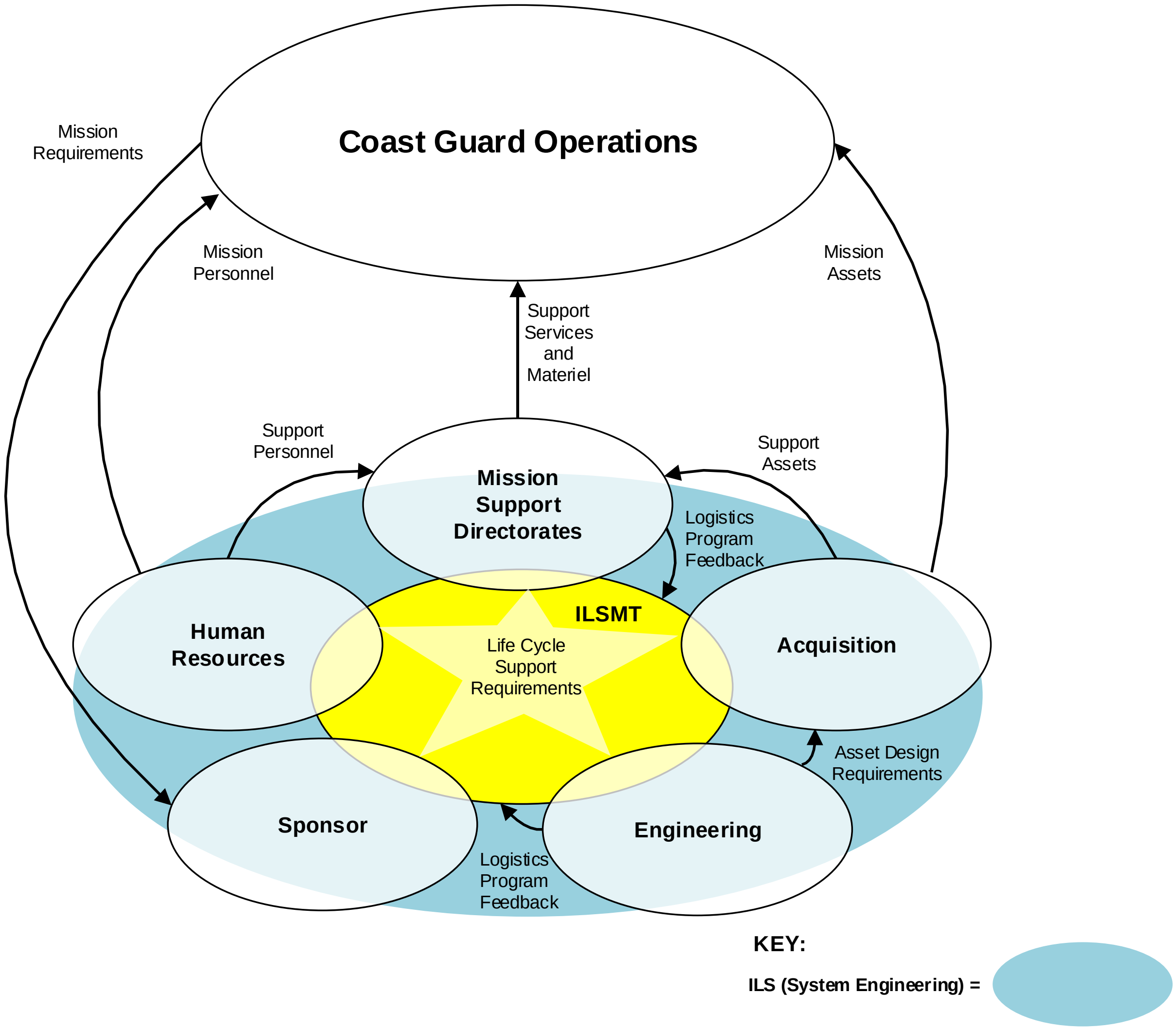

Figure 1-3: ILS Process Resources Flow

1. The ILS Process and Engineering. ILS and other engineering disciplines are intertwined: system design strongly influences support requirements and vice versa. The long-term support requirements levied by engineering choices may not always be obvious. As illustrated in Figure 1-4, The Defense Acquisition University reports that operation and support costs may constitute 65% to 80% of an asset's total LCC[3]. The cost savings of a less expensive manufacturing design option may be outweighed over the asset life cycle by support costs down the road. ILSMTs must continuously seek out and inform system design to lower TOC or enhance mission readiness while meeting cost objectives.

[3] "Designing for Supportability", published in Defense AT&L: Product Support Issue, March-April 2012.

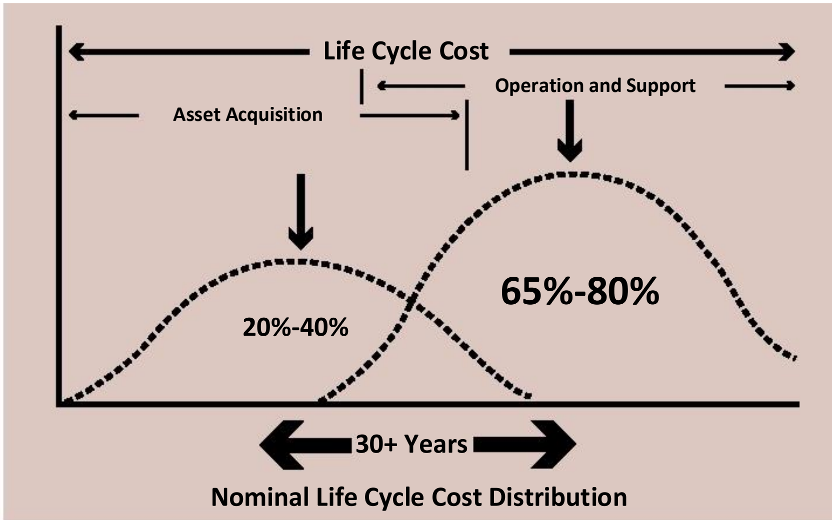

Figure 1-4: Life Cycle Cost (LCC) Distribution

Engineering must support the ILS process by ensuring the latest baseline of support-related engineering information, including asset design information, support concepts, logistics T&E and maintenance demo results, etc., is timely communicated to the ILSM/ILSMT.

2. The ILS Process and Acquisition. Acquisition acquires the support and assets necessary to meet Life Cycle Support Strategy requirements defined by the ILSMT in compliance with the overall asset requirements baseline. Acquisition also estimates the TOC of assets based in part on the currently defined Life Cycle Support Strategy and feeds it back to the ILSMT.

3. The ILS Process and Mission Support Directorates (Logistics Support Providers). The ILS process defines the asset support program requirements for an asset and the strategy for fulfilling them. Logistics Support Providers are responsible for ensuring that these requirements are met.

4. The ILS Process and Human Resources. The ILS process defines asset operation and maintenance. Coast Guard Human Resources (HR) Human Systems Integration (HSI) conducts or approves manpower analysis which informs needed quantities of qualified personnel in accordance with these requirements.

5. The ILS Process and Sponsor Organizations. The ILS process receives mission requirements as input to Life Cycle Support Strategy development. Sponsor organizations develop Coast Guard mission requirements.

E. ILS Process Overview.

The ILS process formally initiates after ADE-1 during the Analyze/Select Phase or when The Office of Logistics directs that an ILSP be developed for an asset. Figure 1-5 illustrates the basic ILS process components relative to each other and basic milestone events in the life cycle of an asset.

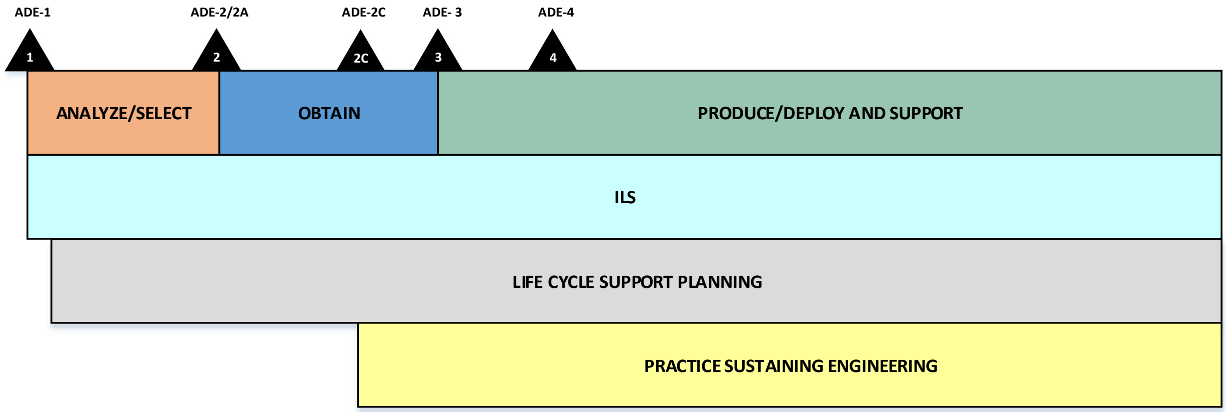

Figure 1-5: ILS Process Overview

1. ILS Management. ILS Management begins as soon as an acquisition program is approved and continues until the asset reaches the end of life and disposal. This activity consists of the actions and activities performed by the ILSM to manage the development and sustainment of the Life Cycle Support Strategy. Chapter 3 details ILS Management and its child activities.

2. Life Cycle Support Planning. Life Cycle Support Planning begins as soon as the ILSMT is established and continues throughout the life of the asset. It includes conducting the analyses needed to identify support requirements from the perspective of each of the ILS elements and integrating them into the optimal Life Cycle Support Strategy. Chapter 5 details Life Cycle Support Planning and its child activities.

3. Practice Sustaining Engineering. Sustaining Engineering is planned and documented during Life Cycle Support Planning and executed during sustainment. The purpose of this activity is to continuously monitor support performance metrics and adjust ILS effectiveness throughout the asset's life. Activities include but are not limited to:

    a. Planning the sustaining engineering program, including which support performance metrics will be monitored;

    b. Analyzing failure data, safety hazards, and reliability and maintainability trends;

    c. Performing root cause analysis; and,

    d. Proposing Engineering Change Proposals (ECPs) to resolve operational issues.

    Chapter 4 of this Instruction details Sustaining Engineering and its child activities.

F. ILS Process Best Practices. Keys to developing and implementing a successful Life Cycle Support Strategy include:

1. Actively and timely invoke the ILS process in all program planning, beginning before program initiation when the initial Mission Needs Statement (MNS) is prepared;

2. Adhere closely to ORD requirements and thresholds/objectives as the basis of life cycle support planning;

3. Prepare, promulgate and maintain a comprehensive ILSP tailored to the asset;

4. Implement the ILSP as an ongoing and integral element of the overall program;
5. Aggressively pursue standardization and early obsolescence management;
6. Include all stakeholders, including but not limited to Coast Guard Operational personnel (users), Logistics Support Providers, acquisition specialists, contractors, support and operations SMEs, contracting specialists, etc.;
7. Conduct IPT training for all ILSMT members, including annual refresher training.
8. Adhere to required ILSMT meeting requirements;
9. Recognize that ILSM activities are ongoing monitoring activities, not periodic reviews. Do not limit support performance monitoring to required periodic reviews. Continuously monitor support performance;
10. Recognize that conditions affecting asset support can change significantly without necessarily being obvious (pricing changes, Operational Tempo (OPTEMPO) changes, etc.);
11. Consider commercial life cycle support for some or all of the ILS elements when a very small inventory exists that does not justify the cost to establish organic support, the item is a commercial or non-development product that is industry supported and duplicating the support is cost prohibitive, or the system or equipment is prone to rapid technological change and the support resources would continually change; and
12. Be diligent in exercising sustaining engineering.

G. ILS Training and Certification. DHS Acquisition Workforce Policy Number 064-04-005 (series), Acquisition Certification Requirements for DHS Life Cycle Logistics Managers, defines the training and certification requirements for ILS professionals within DHS.

CHAPTER 2. ILS PROCESS TAILORING.

The Coast Guard has developed a single, flexible, and scalable ILS process that is based on government and industry best practices and standards. It features key activities and viewpoints that must be considered on all programs; however, the amount of time and effort applied to each of these activities must be commensurate with risk and other program characteristics. The activities and considerations identified in this Manual are generic to all assets and all acquisition types. This does not however mean that the same degree of analysis, process granularity, and documentation generation is required for all assets.

A. Tailoring Requirements.

1. The ILS process must be tailored – "right-sized" – based on attributes such as program size, scope, complexity, and acquisition approach to strike a balance between the engineering effort required and the risks, cost, and schedule of the program. Tailoring reduces program or program risk while making cost-effective use of resources and promoting the technical maturity of a program.
2. All program aspects (hardware and software) must be fully considered and their supportability and sustainment planned for.
3. All supportability and sustainment aspects must be addressed and all life cycle phases covered. Those not yet in place, not required, executed by another party, etc., must be noted and adequate discussion provided to clearly demonstrate that lack of coverage is a planned omission and, if required later or the responsibility of another party, clearly defined strategy, mitigation planning and/or agreements are in place.
4. Where an asset or component is developed by or the responsibility of another party, the asset's role, responsibility, and planning requirements must be analyzed and documented within the context of a single integrated program.
5. Where the asset acquisition (to include software releases) is not treated as a single independent entity or iteration, any associated planning, schedule and funding details must be considered and documented at a level sufficient to adequately describe the whole and/or any related interdependencies.
6. Where the asset is a component of a larger system or system of systems, the asset's role, responsibility, and planning requirements must be clearly defined and documented.
7. All program boundaries/interfaces must identified and documented. In cases where shared responsibilities exist, these must be fully developed, described, integrated, documented and their risk evaluated.

B. Tailoring Responsibility.

Tailoring decisions must be a joint effort between the program approval authorities, the PM, ILSM, the ILSMT, and systems engineers, to determine the appropriate activities and the degree of analysis to be applied.

ILS process tailoring decisions must be documented, communicated, reviewed, and approved in the asset's ILSP. ILSPs must contain all sections identified in the ILSP template maintained in Reference (b). When a section does not apply to a given asset, the section must be included, and must contain a brief explanation of why the section does not apply.

C. Tailoring Considerations.

Tailoring considerations include, but are not limited to program goals, contractual requirements for support processes and/or products, cost constraints, and risks – both program and mission.

These considerations help to form the tailoring boundaries and serve as a starting point for determining the scope of what can be tailored. Below are additional program considerations that provide meaningful context to the ILSM and PM and help them refine the granularity of the tailoring effort.

1. Program size (e.g., dollar value);
2. Scope;
3. Complexity, Interfaces, Integration;
4. Technology or system maturity;
5. Acquisition approach;
6. Security categorization; and,
7. Staff skill sets.

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CHAPTER 3. ILS MANAGEMENT.

A. Scope. ILS Management consists of the executive activities performed by the PM/PLM and ILSM that enable and implement the Life Cycle Support Planning and Practice Sustaining Engineering activities. ILS Management activities address:

1. Logistics Master Schedule (LMS);
2. ILS Budgeting and Funding;
3. Configuration Management (CM);
4. Performance Based Logistics (PBL) and non-performance based logistics;
5. Logistics Assessments;
6. Diminishing Manufacturing Sources and Material Shortages (DMSMS) Management; and,
7. Transition Planning.

B. Assumptions. None.

C. Entrance Criteria. ILS management processes begin whenever a Coast Guard asset/system requiring life cycle support is identified (e.g., ADE 1 has been successfully completed for a new asset) and the PM for the acquisition program has appointed an ILSM.

D. Logistics Master Schedule (LMS).

1. Discussion. An LMS is the Plan of Action and Milestones (POAM) that shows the time-phasing, process interrelationships, and critical paths among logistics tasks and events in relation to overall program milestones.

2. Inputs. Inputs to the LMS are:

   a. Current Program Master Schedule;

   b. Program Work Breakdown Structure (WBS);

   c. Scheduling inputs from subordinate ILS activities; and

   d. Logistics resource availability.

3. Activities. The LMS is a living document that the ILSM maintains throughout the life of the asset. It is the backbone for ILS planning and execution and is maintained within the ILSP. Logistics events or milestones should clearly show the major logistic events throughout the asset life cycle. The LMS should identify start dates and task durations including but not limited to:

   a. Acquisition Life cycle Framework phases and Acquisition Decision Event (ADEs);

   b. Systems Engineering Life Cycle (SELC) reviews;

   c. Start dates and task durations for all ILS element analysis and planning activities, including report/plan deadlines and sustainment activities;

d. ILSMT meetings and ILSP reviews;

e. Logistics Assessment dates;

f. Manpower and personnel actions;

g. Delivery of initial training equipment or curriculum;

h. Schedule of initial training;

i. Delivery of training equipment or materials required for sustained training capability;

j. Delivery of provisioning data and initial spares;

k. Delivery of drawings;

l. Delivery of new support equipment;

m. Development, verification, validation and delivery of technical manuals and Maintenance Procedure Cards (MPCs);

n. Delivery of logistics support services for test assets and activity;

o. Delivery of items required for computer resource support;

p. Construction of new or modified facilities;

q. Support transition plan milestones;

r. First production delivery;

s. Start and duration of any required interim logistics support;

t. Materiel Support Date;

u. Coast Guard Support Date (CGSD);

v. Initial Operational Capability (IOC);

w. Full Operational Capability (FOC);

x. Dates of final closure of all logistics assessment Corrective Action Requests (CARs);

y. Warranty period; and,

z. Expected end-of-life.

The LMS is approved during the ILSP approval process. Subject to approval, required content may vary depending upon program requirements.

The PM may apply any tool or graphical technique that clearly shows all of the key supportability and sustainment events and their sequential relationship. The scheduling tool and process applied must produce a pictorial LMS (e.g., Gantt chart) that fully covers all key supportability and sustainment tasks/events in full alignment with the program master schedule and accurately links supportability and sustainment planning, cost estimating, budgeting, acquisition, deployment, sustainment, and disposal. Formats may be developed to meet program requirements.

4. Outputs. The LMS process generates an up-to-date LMS that:

   a. Provides visibility and status of all the current and planned ILS activities for the asset;

   b. Seamlessly supports higher level schedules;

   c. Is seamlessly supported by subordinate logistics schedules;

   d. Is suitable for publication in the asset's ILSP; and

   e. Identifies the activities whose budgets are managed in the Logistics Resource Funding Plan (LRFP).

E. ILS Budgeting and Funding.

1. Discussion.

PMs/PLMs/ILSMs must ensure support is cost-efficient, funded from the correct appropriations, and aligned with the asset's support requirements throughout the asset's life cycle. PMs/PLMs/ILSMs perform this activity in cooperation with the Assistant Commandant for Resources, the Technical Authority for financial management.

Acquisition phase support activity is typically funded from Acquisition, Construction, and Improvements (AC&I) and/or Research, Development, Test, and Evaluation (RDT&E) appropriations. As the system transitions to sustainment, funding sources shift to the Operations and Maintenance (O&M) appropriation. AC&I and RDT&E funding may again be needed during sustainment for modifications and upgrades to the system.

The PM/PLM/ILSM's primary ILS budgeting and funding tool is the LRFP. The LRFP tracks the support planning and support functions and sub-functions and the funding required to meet their requirements. It displays funding requirements versus available funding for all ILS elements and related disciplines by fiscal year and appropriation, traces to support tasks and activities, and provides logistics cost input to (or is a subsection of) the LCCE.

Developing an LRFP and using it to manage a program enables PMs/PLMs/ILSMs to strengthen the credibility of logistics requirements, influence the allocation of resources, and ensure the visibility and support of logistics funding throughout the asset life cycle. It also ensures that data needed for annual LCCE updates are continuously managed and available.

2. Inputs. Inputs to the ILS Budgeting and Funding process include:

   a. LCCE for logistics activities (once available) and/or current Office of Management and Budget (OMB) Exhibit 300 business case and initial program funding resource proposal(s);

   b. LMS;

   c. Support funding budget inputs from subordinate ILS activities; and

   d. Actual support costs expended during sustainment.

3. Activities.

a. ILS Budgeting and Funding Across the Life Cycle.

During the Analyze/Select phase, the PM, ILSM, and logistics subject matter experts work with estimating and budgeting subject matter experts (e.g, Financial and Audit Remediation, Assistant Commandant for Resources, the DHS Coast Analysis Division, Independent Cost Estimators, etc.) to develop the LCCE.

During the Obtain phase, the PM assumes responsibility for support funding. Program Sponsors and PMs must reach out to mission support organizations when preparing resource estimates. They must accurately estimate the associated costs, ensure that resource proposals address all mission support requirements, and ensure mission support organizations have the resources needed to plan how the system will be supported during sustainment and to support end of life cycle activities.

Mission support organizations must provide complete, timely, and accurate input to cost estimate developers. At a minimum, mission support organizations must provide input on the resources needed to plan a new asset's mission support including when, why, and for how long the resources are needed, resource requests that identify both one-time costs (e.g., initial provisioning) and recurring costs (e.g., parts and supplies), and cost estimates for resource requirements. To ensure proper resources are provided, the impact of inflation must be addressed when providing cost estimates for future year requirements.

During asset transition, responsibility for support funding transfers to the PLM/ILSM. The PLM/ILSM provides updates to the LCCE and other budget documents throughout the remainder of the asset life cycle primarily via the LRFP.

b. Creating and Managing the Logistics Resource Funding Plan (LRFP).
The LRFP is a living document that the ILSM maintains throughout the life of the asset. It is the mechanism by which the ILSM manages support costs. It is maintained in the ILSP.

The LRFP must clearly and completely document the program's supportability and sustainment financial planning and status, including all management, planning, product development, and related costs, over the complete asset life cycle, including operations, maintenance, end-of-life cycle, and disposal.

(1) All support categories must be addressed, whether or not any funding is projected. Variances between fully funded and non- or insufficiently funded efforts should be highlighted to permit prioritization and risk management.

(2) All estimated costs in the LRFP must trace to an LMS activity, and all activities on the LMS must trace to a corresponding cost entry in the LRFP.

(3) The LRFP must maintain traceability between, at minimum, the data described below:

(a) Fiscal Year (FY);

(b) Calendar Year (CY);

(c) Life cycle phase;

(d) WBS Identification Number;

(e) ILS elements, tasks, and sub-tasks;

(f) Task funding type (e.g., AC&I or OE/O&M) and recurrence when applicable;

(g) Estimated costs to meet objective KPP requirements;

(h) Estimated costs to meet threshold KPP requirements;

(i) Budgeted costs;

(j) Actual costs;

(k) Subordinate plans supporting the LRFP; and,

(l) For approaches such as spiral development, each increment or spiral's funding requirements and budgeted amounts must be identified as appropriate.

(4) Funding documentation and backup budget information must be maintained to ensure relevant logistics element requirements are documented and supported by the approved budget. Backup information should include the cost estimate basis (e.g., methodology, data sources, ground-rules, assumptions, and justification/rationale for resource requirements) to mitigate the impact of personnel turnover as well as defending, adjusting, and resubmitting the budget.

4. Outputs. The LRFP process produces:

a. Data inputs to the LCCE/updated LCCE;

b. An up-to-date LFRP that:

(1) Provides visibility and estimated and actual costs for all current and planned ILS and operational support activities for the asset;

(2) Seamlessly inputs into higher level cost estimates such as the LCCE;

(3) Is seamlessly supported by subordinate support estimates;

(4) Is suitable for publication in the asset's ILSP; and,

(5) Reports budgets/estimates/actual expenditures for all activities tracked on the LMS.

F. Configuration Management (CM).

1. Discussion.

CM establishes and maintains physical and functional attribute consistency with its design and operational information throughout its life cycle. This includes the manpower requirements to operate, maintain, and administer. Target system availability at known cost can only be achieved when an asset's configuration is known. CM is one of the four cornerstones of the Coast Guard Mission Support Business Model.

The CM process consists of the five main components described in Table 3-1.

Table 3-1: Configuration Management Process Components

Component	Description
Configuration Planning	Tailoring the CM program for consistency with the quantity, size, complexity, intended use, life cycle phase, and mission criticality of the asset
Configuration Identification	Uniquely identifying the functional and physical characteristics of each item or entity whose configuration is to be managed (i.e., Configuration Item (CI)
Configuration Change Management	Controlling changes to a product using a systematic change process
Configuration Status Accounting (CSA)	Capturing, maintaining, and reporting metadata about the configuration of an item throughout the life cycle
Configuration Verification and Audit	Ensuring asset design meets functional requirements and that the asset is constructed and maintained in accordance with the design

Reference (c) details the requirements for implementing CM.

2. Inputs.

CM inputs are:

a. Coast Guard asset functional, allocated, and physical requirements,

b. Engineering and ILS data products (e.g., decomposed requirements, specifications, engineering drawings, provisioning data, maintenance requirements, technical documentation, etc.), and

c. Change requests.

3. Activities.

a. Configuration Planning. Configuration planning tailors a CM program for the asset and documents it in a CM Plan. The CM Plan establishes the ground rules for the other four CM components. The PM is responsible for configuration planning. The ILSM must provide input to the PM during CM Plan development to ensure that it addresses ILS activities and products.

b. Configuration Identification. Configuration identification identifies asset functions, CIs, and the metadata required for each CI as specified in the CM Plan. All system and support strategy development activities must identify the CIs within their work products in accordance with the CM Plan. Configuration identification groups information about managed CIs into three tiers which, once verified by an audit, become configuration baselines.

(1) A Functional Baseline establishes the approved set of functional characteristics for the asset. For ILS, the functional baseline includes supportability requirements such as support KPPs and KSAs maintenance concept requirements.

(2) An Allocated Baseline establishes the approved set of performance characteristics for CIs in the upper levels of the CI hierarchy. For ILS, the allocated baseline includes Life Cycle Support Strategy documents such as the ILSP, supporting plans, etc.

(3) A Product Baseline establishes the approved set of detail specifications and data for lower level CIs. For ILS, the product baseline includes detailed specifications such as Master Equipment Configuration Lists (MECLs), maintenance procedures, the Technical Data Package (TDP), etc.

c. Configuration Change Management. Configuration change management provides an orderly process for changing information about CIs. No changes to a CI should be made outside of the change management process defined in the CM Plan throughout the asset life cycle. Configuration Change Management is governed by a Configuration Control Board (CCB). The CCB is established in accordance with Reference (c) and the CM Plan, and chaired by the PM. Lower level ECPs (Class II and lower) are reviewed for approval by a Change Review Board (CRB) chaired by the Deputy PM.

d. Configuration Status Accounting (CSA). CSA establishes the controlled repository for configuration data. It records, reports, stores, verifies, and maintains the managed configuration data. The system to perform this function is defined in the CM Plan.

e. Configuration Verification and Audit. Configuration Verification and Audit checks conformity between the asset and CM data. Functional Configuration Audits (FCAs) verify that CIs meet required performance requirements. Physical Configuration Audits (PCAs) examine the as-built CI against its design and technical documentation. Configuration Audit activities are defined in the CM Plan.

4. Outputs. CM outputs are:

a. Approved asset CM plan;

b. Established CCB for the asset;

c. Established/controlled baselines:

(1) Functional;

(2) Allocated; and,

(3) Product baselines;

d. Managed CM data repository; and,

e. Configuration audit reports (FCAs and PCAs) including actionable findings.

G. Performance-based Logistics (PBL).

1. Discussion. The Coast Guard traditionally acquires support capabilities using "Transaction-based Support". This approach forecasts then buys the "components of support": parts, repairs, hours of technical support, etc. PBL, on the other hand, acquires support performance directly by:

a. Specifying the support outcomes and performance objectives required;

b. Identifying metrics (e.g., KSAs/KPPs such as Availability, Materiel Reliability, Operations & Support Costs, Mean Down Time, etc.) to determine whether outcomes and objectives are met; and,

c. Putting in place contracts or Service Level Agreements (SLAs) with support providers (commercial, government, or a blend of the two) to provide the required outcomes and meet the performance objectives.

PBL leaves it up to the support provider to determine the mix necessary to provide the required support. Allowing the provider this latitude rewards innovation that improves support efficiency.

PBL can apply to a component, a subsystem, or the entire system and it can include any or all of the ILS elements. Support that is not performance-based defaults to transaction-based support. The product support strategy for a system can be a hybrid blend of the two approaches that can change over time.

Additional information about PBL is available in PBL Guidebook, A Guide to Developing Performance-based Arrangements, U.S. Department of Defense, 2016.

2. Inputs. Inputs to the PBL process are threshold and objective support outcome KPPs/KSAs for the component/subsystem/system, the LCCE/LRFP, and the ILSP.

3. Activities.

a. Develop objective, measurable work descriptions that clearly define a product support outcome.

b. Establish a manageable set of metrics linked to contract requirements that reflect desired support outcomes and cost reduction goals.

c. Establish contract length, terms, and funding strategies that encourage required support outcome delivery.

d. Establish incentives to achieve required outcomes and cost reduction initiatives.

e. Synchronize product support arrangements to satisfy Coast Guard operational requirements.

f. Monitor support outcomes for compliance with the support agreement.

g. Report and address support performance findings with the support provider.

4. Outputs. The PBL process produces PBL Service Level Agreement/Contract(s), PBL support provider performance metrics reports, and contributions to the ILSP.

H. Logistics Assessments.

1. Discussion. Logistics assessments formally evaluate Life Cycle Support Strategy planning and implementation. They also evaluate support strategy development policies and processes and are one source of information that program executives use to decide if a program should proceed to its next life cycle phase. They generate assessment reports that identify any needed deficiency corrections. Logistics assessments do not focus on individual roles and responsibilities of sponsors, acquirers, and sustainers and are not assessments of an acquisition program team's performance. There are two logistics assessment types.

   a. Independent Logistics Assessments (ILAs) are performed during the Obtain Phase in the acquisition process. ILAs are the validation step in the Validation and Verification (V&V) of support programs. They formally review an asset's acquisition logistics planning and resource documentation.

   b. Logistics Readiness Reviews (LRRs) are performed when the Initial Operating Capability is achieved. LRRs are the verification step in the V&V of support programs. They formally evaluate any changes in the support strategy and the execution of an asset's logistics planning and resource documentation.

   ILAs and LRRs are performed by the Office of Logistics.

   Major system acquisition and non-major acquisition PMs can request a waiver from the requirement to conduct an ILA or LRR. PMs desiring a waiver of either review must submit their request in writing to The Office of Logistics or as delegated by the Assistant Commandant for Engineering and Logistics. The request must identify why the PM believes it would be appropriate to waive the ILA or LRR.

2. Inputs. The data available for review varies depending upon the current life cycle stage and the logistics assessment type. Inputs include program documentation and data including but not limited to:

   a. The applicable logistics assessment criteria:

      (1) ILA criteria are presented in APPENDIX C; and,

      (2) LRR criteria are presented in APPENDIX D;

   b. Relevant plans, resource documents, requirements, processes, policies;

   c. The asset's ILSP;

   d. Maintenance processes and/or procedures;

   e. Configuration data;

   f. LCCE/LRFP;

   g. Spares inventory data;

   h. Other technical data (e.g., reliability and availability data);

i. Failure data; and,

j. Other operational performance data (e.g., Initial Operational Test and Evaluation (IOT&E) reports or other test data.).

3. Activities.

a. Conduct Independent Logistics Assessments (ILAs) and Logistics Readiness Reviews (LRRs). All major and non-major assets must undergo ILAs and LRRs. The workflow for ILAs and LRRs is the same except where noted in the activity summary below. The Office of Logistics maintains specific ILA and LRR procedures and requirements in the following Tactics, Techniques, and Procedures (TTPs):

(1) Independent Logistics Assessment Tactics, Techniques, and Procedures (TTP), CGTTP 4-09.1; and

(2) Logistics Readiness Review Tactics, Techniques, and Procedures (TTP), CGTTP 4-09.2.

b. Schedule ILAs and LRRs. The Office of Logistics maintains ILA and LRR schedules in consultation with program offices. These schedules are maintained on the Office of Logistics Unit Workspace on the CG Portal. PMs must ensure that ILAs are conducted between Critical Design Review (CDR) and Production Readiness Review (PRR). PMs must ensure that LRRs are initiated within six months after IOC.

c. Perform ILAs and LRRs. The Office of Logistics assembles assessment teams in accordance with TTP and leads the assessment. Resource funding may be requested from PMs to provide for incidental logistics assessment expenses (e.g., travel) in accordance with the applicable TTP. Assessment teams must execute logistics assessments in accordance with this Manual and the applicable TTP.

(1) ILAs. ILAs evaluate all relevant plans, resource documents, processes, and policies, especially the ILSP. They check logistics plans and resource documents for compliance with all applicable Coast Guard policy and process documents and for consistency with each other.

(2) LRRs. LRRs address the ILA topics, but also evaluate plan, process, and policy execution. Execution evaluation may require visits to field units to verify such areas as crew training, spare parts, support equipment, etc.; check applicable SC/LC documents; and evaluate how the Coast Guard is executing its logistics plans. Determine if execution complies with the programs' plans and resource documents and is producing required support to the asset.

d. Compile Integrated Logistics Assessment (ILA)/Logistics Readiness Review (LRR) Final Report. The logistics assessment Team Leader for each ILA and LRR must produce a logistics assessment final report, coordinate it with the program office personnel, and submit it to the PM, the Program Executive Officer

(PEO), and Technical Authorities. The final report must identify any required corrective actions that need resolution and timeframes for resolution.

The Office of Logistics submits the final report to the Assistant Commandant for Engineering and Logistics.

e. Manage Independent Logistics Assessment (ILA)/Logistics Readiness Review (LRR) Corrective Actions. The Office of Logistics maintains a system for monitoring ILA/LRR corrective actions on its workspace on the CG Portal. A summary of the corrective action monitoring process appears below.

(1) The Office of Logistics assigns each corrective action to the accountable organization to lead action and formally provides a copy of the final report to each organization.

(2) Within 30 days of receipt of the report, each assigned organization must submit a proposed corrective action plan via normal channels (email, if possible). The Office of Logistics must submit corrective action status reports to Assistant Commandant for Engineering and Logistics for approval and distribution to DCMS and the Director of Acquisition Programs. The reports must be submitted to DCMS and the Director of Acquisition Programs by 1 November and 1 May of each year (via email, if possible).

4. Outputs. Logistics Assessment activities produce logistics assessment schedules, logistics assessment finding reports, and corrective action records.

I. Diminishing Manufacturing Sources and Material Shortages (DMSMS) Management.

1. Discussion. A DMSMS issue is the loss, or impending loss, of manufacturers or suppliers of items, raw materials, or software (including application software, operating systems, firmware, middleware, gateways, firewalls, etc.) that endangers a Coast Guard capability. DMSMS addresses both items that are obsolete and out of production, but for which there is still a demand, and items that are not obsolete but which are nonetheless not available.

a. Diminishing Manufacturing Sources and Material Shortages (DMSMS) Issue Triggers. The Coast Guard loses a manufacturer or supplier when that manufacturer or supplier discontinues production and/or support of needed items, raw materials, or software or when the supply of raw material is no longer available. DMSMS triggers include:

(1) Low-volume demand;

(2) Corporate mergers;

(3) New or evolving science or technology.

(4) Changes to hazardous materials (HAZMAT) detection limits, toxicity values, and regulations related to chemicals and materials cause materials to be eliminated from certain uses.

(5) Functional obsolescence: although still available commercially, an item no longer functions as intended because of system requirement changes. Addressing a DMSMS issue can itself trigger secondary DMSMS issues in related parts of the system.

b. Diminishing Manufacturing Sources and Material Shortages (DMSMS) Scope. DMSMS considerations are vital during all acquisition cycle phases, from design and development through disposal. DMSMS issues must be proactively predicted as early as possible to maximize mitigation options and can arise at any time. They can severely impact all aspects of system manufacture, supportability, operational availability, logistics footprint, and TOC. DMSMS issues are inevitable and affect assets of all types and levels:

(1) Operational systems;

(2) Training support;

(3) COTS items;

(4) Coast Guard/Defense-unique items;

(5) Repairables;

(6) Consumables; and,

(7) Test and support equipment.

DMSMS issues can impact a system at any level, including but not limited to system, subsystem, equipment, component, or piece part.

DMSMS management is a multidisciplinary process to identify potential DMSMS issues; to assess the potential for negative impacts on schedule and/or readiness; to analyze potential mitigation strategies; and then to implement the most cost-effective strategy. DMSMS management is inherently linked with reliability, maintainability, supportability, and availability. It is the most cost-effective and efficient way to minimize the scope of DMSMS-related out-of-cycle redesigns when they cannot be eliminated or avoided, eliminate DMSMS-caused production schedule impacts, and eliminate readiness degradations caused by DMSMS issues.

2. Inputs. Inputs to DMSMS management include but are not limited to:

a. Programmatic and logistics data:

(1) Planned technology insertions;

(2) Asset's current life cycle phase;

(3) Asset's planned end of life;

(4) Planned asset quantity;

(5) Planned operating hours per system;

(6) Demand and duty cycle for asset;

(7) Quantity of asset on hand;

(8) Procurement lead times;

(9) Asset maintenance strategy; and,

(10) Asset performance in light of cost and reliability requirements;

b. DMSMS parts source data inputs. These are specified in Reference (d).

3. Activities. DMSMS management consists of the five steps summarized below. Reference (d) specifies requirements for conducting these activities. Each of these steps applies throughout the life cycle, from early technology development through sustainment.

a. Prepare. Develop the DMSMS strategy (e.g., vision and focus) and a DMSMS Management Plan (DMP) to implement the strategy. Identify a DMSMS manager and form a DMSMS management team representing all stakeholders. Establish, document, and resource DMSMS management processes for the DMSMS management team to execute the DMP.

b. Identify. Secure access to logistics, programmatic, item data, and to prediction, monitoring, and surveillance tools. Identify items with immediate or near-term obsolescence issues. Sub-steps include:

(1) Prioritize Items;

(2) Identify and procure monitoring and surveillance tools;

(3) Collect and prepare item data;

(4) Analyze item availability using predictive tools, vendor surveys, critical materials analysis, Government-Industry Data Exchange Program (GIDEP), and DLA obsolescence notices, software upgrade/support end date notices, etc.;

(5) Collect and analyze programmatic and logistics data;

(6) Develop health assessments; and,

(7) Assess impact.

c. Assess. Considering the population of problem items, identify and prioritize the items and assemblies most at risk for current and future readiness or availability impacts on TOC, schedule, availability, and readiness to determine which issues to address, in what priority, and at what level.

d. Analyze. Examine the problem items with near-term readiness or availability impacts first. Develop a set of potential DMSMS resolutions for the items and their higher-level assemblies. Determine the most cost-effective resolution. Approaches to resolving a DMSMS issue those listed below.

(1) Alternate design approach. Making up-front investments in Reliability, Availability, and Maintainability (RAM) improvements and proactive obsolescence/DMSMS mitigation that may result in short-term cost increase but provide TOC savings later.

(2) Purchase detailed technical data. Purchasing the technical data necessary for re-manufacturing, re-procurement, and/or sustainment engineering.

(3) Reclamation. Removing a part from an existing system (cannibalization).

(4) Substitute Part. Using a different part with the exact same form, fit and function.

(5) Alternate Part. Using a similar part that does not have the exact same form, fit and function (may need to be modified).

(6) Emulation. Employing a manufacturing process that creates form, fit and function replacements for obsolete microelectronics in small or large quantities.

(7) Redesign. Redeveloping and remanufacturing the item using new, non-obsolete components.

(8) Life Time Buy. Buying enough spare parts and then storing them to last for the expected life of the system.

(9) Existing Source. Convincing the existing manufacturer to keep producing that part.

(10) New Source. Identifying a new manufacturer that is making the same part with the same Form, Fit, and Function (FFF).

(11) Redefine the Specification. Changing the specification to better fit the actual requirements needed.

(12) Replace System. Replacing the system with a new one containing non-obsolete parts.

(13) Contractor Inventory. Purchasing leftover items sitting in storage at a distributor's or prime contractor's facility.

(14) Production Inventory. Purchasing leftover items from previous production sitting in storage at a manufacturer's facility.

(15) Reverse Engineering. Developing an exact copy of an item through review of available technical data and physical disassembly and analysis of the original item and its components.

e. Implement. Budget, fund, contract or arrange for, schedule, and execute the selected resolutions for the high-priority items.

4. Outputs. DMSMS outputs include:

   a. DMSMS Management Plan;

   b. Technology roadmap;

   c. Technology refreshment and/or technology insertion plans;

   d. Resource proposal requirements and TOC estimation data;

   e. Market research results;

   f. DMSMS issue resolutions;

   g. Program DMSMS prediction database/tool; and,

   h. DMSMS metrics.

J. Transition Planning.

1. Discussion. All assets transition at least twice in their life: from acquisition to sustainment and from sustainment to disposal. These transitions require timely and cost-effective reallocation/reassignment of end items (e.g., surface vessels, aircraft, buildings, etc.) and all support processes, resources, materiel, equipment, data, parts, systems, etc., allocated to the asset. These potentially complex and unavoidable transitions contribute to TOC. They must therefore be considered, planned for, and managed during system and support development activities throughout the life cycle. Transition should be planned for and executed by the ILSMT as documented in the ILSP.

2. Inputs. Inputs to transition planning include:

   a. ORD (major systems) or Requirements Document (non-major systems) (e.g., IOC, CGSD, expected asset service life);

   b. Acquisition Plan; and,

   c. ILSP.

3. Activities.

   a. Planning Transition to Sustainment.
   Sustainment transition planning defines the requirements for formally handing off asset support from acquisition teams to Logistics Support Providers. The objective is to timely and efficiently deploy a new or modified asset to trained, equipped, and supplied operators and maintainers with minimal TOC impact. The acquisition program must provide the resources required to establish a full support capability. All of the ILS elements discussed in the ILSP must be available on schedule. Transition criteria must be documented in the asset ILSP.

The Acquisition Manager and Sustainment Manager must agree on a transition plan, documented in the ILSP and in accordance with performance and support requirements contained in the ORD or program Requirements Document, the ILSP, and specific goals and measures set forth in the Acquisition Plan. The PM must take the following actions.

(1) Describe the handoff process and schedule for the asset. Exactly what services, materiel, personnel, responsibilities, etc., transition, when they transition, and all parties involved in the transition.

(2) Ensure the ILSP addressed how to support systems still in the acquisition process after the first asset is deployed, what support (if any) that the program will provide for operational systems, and how long this support will be provided.

(3) Identify any interim contractor support to be provided/funded by the program.

(4) Identify any long-term contractor support and when responsibility for funding it will transfer to the operational community.

(5) Define the initial capability to be established in terms of number of end items to be delivered; the training readiness capability in terms of infrastructure, operator and maintenance training, training equipment, and training manuals that must be in place; personnel that must be assigned and trained, and initial outfitting spares to be delivered.

(6) Prepare program transition checklists (as described below) to evaluate and report program readiness for each sustainment transition milestone. Two milestones define transition to sustainment:

(a) IOC. When the first unit is turned over to the operational command for use; the first attainment of the capability of a platform, system, or equipment of approved specific characteristics, operated by an adequately trained and equipped Coast Guard unit, that effectively performs the required mission, and whose sustainment planning is mature and sustainment support is adequate to maintain required availability.

Specific IOC requirements are documented in the ORD or program Requirements Document. Specific goals and measures are documented in the Acquisition Plan. Logistics capability/support may be augmented with a range of interim contractor provided services for IOC.

Standard IOC checklists should address, at minimum, the following:

[1] All technical data must be available. Drawings and technical publications should accurately reflect equipment and systems. Identify the dates final “as-builts” are/were due/received and the activity designated to store, distribute and maintain the data. Identify any interim manuals provided.

[2] Maintenance/repair parts and equipment allowances are established.

[3] Training (operations & maintenance) is established and provided.

[4] Configuration baselines have been established, audited, and verified.

[5] Maintenance support in place. Provide the status of maintenance plans.

(b) Coast Guard Support Date (CGSD). The date complete, fully matured logistics support is in place, whether provided through organic or contractor means or some combination thereof. Spares are in place; facilities are ready; and personnel are available and trained to operate and maintain the asset.

Specific CGSD requirements are documented in the ORD or program Requirements Document. Specific goals and measures are documented in the Acquisition Plan. CGSD is that date when all planned support capabilities for sustained operation and support have been fielded and implemented. CGSD, may occur in conjunction with or after IOC. PMs and PLMs must negotiate and establish dates for IOC and CGSD and document them in the LMS and program master schedule.

Standard CGSD checklists should address, at minimum, the topics below.

[1] IOC requirements are met.

[2] Spares and repair parts bought/funded. List all spares and repair parts ordered along with the delivery status of each item. Identify the organization that will receive future delivery reports. Identify any interim provisions implemented to compensate for parts not received.

[3] Long lead-time system insurance stock ordered/received. List all insurance stock items, including the delivery status, source of supply, and contract information for all outstanding orders.

[4] Training program status (facilities, training aids, instructors, etc.). Include information on any commercial training required or provided. Note if the commercial training is interim or for the equipment's life cycle.

[5] List specific interim or contractor logistics support (as required) to be provided. Include the status and term of the contract, contact information and actions required to initiate support.

[6] CSA information is current. Identify the difference between first production unit and follow-on units and list all outstanding engineering changes along with status of each.

[7] Warranty Information is provided and adequate. Identify the activity responsible for administering the warranty program, what is covered, requirements for receiving warranty support and expiration date/dates. Provide the status of any outstanding warranty claims.

[8] Check status of all facility issues addressed in the program deployment plan. Include any contract information for outstanding issues and identify the Coast Guard activity responsible for completion. List any contingency actions to take if facilities are not ready.

[9] List support equipment issues. List equipment not yet available, scheduled delivery dates, and any interim provisions to compensate.

[10] List outstanding Resource Proposals with current status and impact if not approved.

[11] Provide the status of maintenance plans.

[12] Check staffing is complete for all assets and support facilities. Identify the status of all the personnel requirements established in the program deployment plan.

[13] Outstanding deliverables status. List outstanding deliverables and anticipated receipt dates. Specify the process for accepting/approving outstanding deliverables.

(7) A formal transfer memorandum must be prepared to document the transfer. The completed checklist appropriate to the milestone must be included, along with the latest signed ILSP, the status of any pending ILSP updates, and the date when ILSMT and CCB chairs were/will be transferred from acquisition to the PLM.

b. Planning Disposal.

Disposal, including demilitarization, is the final stage in a system's life cycle: it transitions the asset and those elements of its support program that are no longer needed out of Coast Guard inventory.

Disposal costs contribute to TOC and should be planned for during system development regardless of the asset's service life. Disposal requirements should be documented in the ILSP and consistent with the LCCE throughout all acquisition life cycle phases.

The PM must ensure that a fully matured/detailed disposal plan is documented prior to the end of the Produce/Deploy/Support phase to identify demilitarization disposition, and disposal requirements and comply with local, state, and national regulatory safety, security, and environmental requirements. This plan must be completed far enough in advance to minimize disposal costs.

The disposal plan should contain:

(1) Identity and responsibilities of all organizations;

(2) Environmental issues, including pollution, safety and hazardous material concerns;

(3) Demilitarization requirements;

(4) Security considerations;

(5) Description of the disposal process and individual activities involved;

(6) System disposal schedule; and

(7) Disposal costs and funding.

The documents listed in Table 3-2 provide specific guidance on disposal of Coast Guard assets.

Table 3-2: Asset Disposal References

Document Title	Description
U.S. Coast Guard Personal Property Management Manual, COMDTINST M4500.5 (series)	Provides policy and guidance for disposal of Coast Guard personal property
U.S. Coast Guard Real Property Management Manual, COMDTINST M11011.11 (series)	Provides policy and guidance for disposal of Coast Guard real property
Systems Engineering Life Cycle Guidebook, DHS Guidebook 102-01-103-01	Provides guidance for disposal of Coast Guard C4IT assets
Foreign Transfers of Excess Coast Guard Boats, COMDTINST 4570.2 (series)	Provides guidance for transferring vessels to foreign nations
Information and Life Cycle Management Manual, COMDTINST M5212.12 (series)	Provides policy and guidance for disposal of both paper and electronic records.

During demilitarization and disposal, the PM ensures that materiel determined to require demilitarization is controlled and that disposal is carried out in a way that minimizes the Coast Guard's liability for environmental, safety, security, and health issues. The PM must consult with Coast Guard environmental SMEs to determine the preferred disposal method (e.g., recycling, landfill).

4. Outputs. Transition planning produces:

   a. Program Transition Plan;

   b. Program Transition Checklists;

   c. Program Transition Memoranda; and,

   d. Asset Disposal Plan.

K. Exit Criteria. ILS Management continues as long as the asset is owned or supported by the Coast Guard.

CHAPTER 4. PRACTICE SUSTAINING ENGINEERING.

A. Scope. The objective of the Sustaining Engineering ILS element is to continuously monitor and maintain required asset support performance while minimizing TOC throughout sustainment. It includes planning Sustaining Engineering activities, monitoring and analyzing support program performance against key sustainment KPPs and KSAs (A_O, TOC, and other asset-specific metrics) for values and trends, and evaluating and improving maintenance processes.

B. Assumptions. None.

C. Entrance Criteria. The asset has reached the Operations and Maintenance phase where operational data (including operations test data) is available.

D. Monitor and Analyze Support Program Performance.

1. Discussion. During acquisition, program teams estimate a support program's ability to meet support KSAs and KPPs. The actual performance of the system during sustainment will likely vary from these estimates for a wide variety of reasons. It is vital, therefore, to recalculate sustainment metrics on an ongoing basis to verify that requirements are consistently met. This activity captures asset support performance metrics during operation to enable support program improvements and/or corrections.

2. Inputs.

a. Threshold and objective KPPs and KSAs, including but not limited to Availability (A_O), Reliability, and TOC;

b. Current program values (estimated or previous actuals) for A_O, Reliability, TOC, and any other KPPs/KSAs specified in the ORD, RAM Program Plan, or Sustaining Engineering Plan; and

c. Coast Guard operational data records.

3. Activities.

a. Monitor Support Program Performance. Support program performance monitoring must evaluate and maintain records of asset status, condition, and readiness to meet all assigned missions. These records must be communicated to, reviewed by, and issues corrected by the asset's PLM or designee as defined by DCMS policy.

(1) Asset Status. Asset status identifies an asset's operational capability to meet all assigned missions from an engineering standpoint. When an asset status is other than Fully Mission Capable (FMC), the capability gap and the reason for it (e.g., awaiting parts, undergoing maintenance, etc.) must be identified and recorded. An example of a compliant asset status classification system is:

(a) FMC;

(b) Partially Mission Capable (PMC) (a reason for this status must also be provided);

(c) Not Mission Capable Maintenance (NMCM);

(d) Not Mission Capable Supply (NMCS);

(e) Not Mission Capable Depot (NMCD); and,

(f) Not Mission Capable Lay-up (NMCL).

(2) Discrepancy Recording. Conditions that result in a condition rating of other than FMC are called discrepancies. Maintenance records must include (but are not limited to) the following:

(a) Nature of discrepancy, including an evaluation of whether the asset is safe to use;

(b) Date and time discrepancy occurred;

(c) Logistics Center receipt of discrepancy notification;

(d) Work or services being conducted to correct the discrepancy;

(e) Resources (both human resources and materiel resources) required to correct the discrepancy;

(f) Maintenance Labor Hours (MLH) expended to correct the discrepancy (not recorded for routine or scheduled maintenance); and

(g) Date and time discrepancy was resolved and asset status updated.

b. Analyze Program Performance.

(1) Availability Metrics. Asset records must be analyzed to determine availability metric values as follows:

(a) Materiel Availability (A_M).

Materiel Availability (A_M) measures the aggregate availability of a population/class of assets when those assets are NOT in a planned/unplanned maintenance availability or are NOT in a NMCM, NMCD, or NMCS status. Assets in a lay-up status (NMCL) are not reported in A_M metrics and reports. Materiel Availability must be derived from asset status records using the following formula:

A_M = 100% - (NMCD + NMCM + NMCS)

(b) Operational Availability (A_O)/Availability Index (AI).[4]

[1] Non-Aviation units describe Operational Availability using A_O. It is the percentage of time an operationally deployed asset is not in a planned/unplanned maintenance availability or is NOT in a

[4] A_O and AI are further discussed in the Evaluate Design Interface Element discussion in Chapter 5.M.

NMCM or NMCS status over a given operating period. Operational Availability must be derived from asset status records using the following formula:

A_O = 100% - (NMCM+NMCS)

[2] Aviation units describe Operational Availability using AI. AI is the percentage of time that aircraft assigned to Air Stations are mission ready. It is derived as follows:

AI = (100 – NMCT) *where*

NMCT = Not Mission Capable Total = NMCM + NMCS + NMCD (units).

NMCD (units) reflects the portion of Not Mission Capable Time due to Depot-level Maintenance that is performed at a unit.

(2) Maintenance Cost Metrics. Asset records and other supporting data must be analyzed to determine maintenance cost metric values. Maintenance cost metrics to be collected for the asset must be defined and described in the asset Sustaining Engineering Plan that will be created as part of Sustaining Engineering analysis. One example of a maintenance cost metric is Maintenance Cost per Operating Hour (McpOH).

McpOH involves the actual maintenance expenses for an asset (both fixed and variable), and is calculated after the close out of each fiscal year. McpOH includes direct and indirect maintenance cost, depot-level labor regardless of source, and repair parts installed. McpOH does not indicate the total operating cost. It does not include AC&I costs, fuel, unit-level labor, unit consumable material, and parts that were purchased but not installed on the asset.

(3) Trend Analysis. Trend analysis is the process of tracking metrics values to identify patterns or tendencies. Graphs, models, data visualization applications, dashboards, and/or other trend analysis tools must be applied to sustaining engineering metrics to enable understanding, prediction, and overall management of sustaining engineering metrics. Trend analysis to be applied to an asset must be defined and described in the asset Sustaining Engineering Plan.

c. Evaluate and Improve Maintenance Processes. Maintenance strategies, processes, and tasks must be continuously monitored and evaluated for improvement. The objective is to enhance maintenance procedures to support failure prediction and prevention. Maintenance process improvement must include the following tasks described in the subsections below.

(1) Failure Reporting. Support programs must report and document failures (any event where an asset fails to perform as intended) and necessary corrective actions using a Failure Reporting, Analysis, and Corrective Action System (FRACAS) process. The specific failure reporting tool(s) to be used

must be identified in the program's Sustaining Engineering Plan. Failure reports must include but are not limited to:

(a) Failed part or CI;

(b) Defect observed; and/or

(c) Failure cause.

(2) Trigger Analysis. A trigger is an event that initiates consideration of a trigger analysis, determines which failures require additional analysis, and prioritizes the order in which analysis should occur. Triggers are attributes of failure reports that indicate that a particular failure is significant and merits further attention. Examples of triggers include but are not limited to:

(a) The failure incurs costs above specified thresholds;

(b) The failure causes a health, safety, or environmental incident;

(c) The failure recurs more frequently than expected (either on a given asset or across all in-service assets); and,

(d) The failure incurs downtime costs above specified thresholds.

Failures that exhibit triggered attributes are flagged for failure analysis.

(3) Failure Analysis. Failure analysis must be conducted to find and support root causes. The degree of failure analysis must be tailored to the priority and criticality of the failure impact. Degrees of analysis may range from complex activities such as formal engineering investigations to simple review and update of MPCs. The results of failure analysis must be used to correct/adjust/improve the asset support program (via adjustments to elements within the Maintenance Planning ILS element) and/or improve the asset design (via adjustments to elements within the Design Interface ILS element).

(4) Maintenance Effectiveness Reviews. Maintenance Effectiveness Reviews evaluate the applicability and effectiveness of maintenance programs via detailed review of its MPCs. Programs must conduct Maintenance Effectiveness Reviews every four years (or as specified in the program's Sustaining Engineering Plan) and whenever design modifications are implemented.

(a) Maintenance Effectiveness Review Topics. Topics reviewed during Maintenance Effectiveness Reviews may include, but are not limited to:

[1] Review of effectiveness and efficiency of scheduled maintenance timing (e.g., too seldom/too often);

[2] Review of effectiveness and efficiency of documented maintenance procedures (e.g., needed/not needed);

[3] Evaluation of safety or environmental concerns; and,

[4] Addition or deletion of maintenance procedures.

Maintenance Effectiveness Reviews may be conducted as a single, in-depth review of an entire maintenance program or as a phased series of reviews of smaller maintenance program segments.

(b) Maintenance Effectiveness Review Inputs. Information to be analyzed at reviews may include but are not limited to:

[1] Current maintenance plans, supporting technical data (including technical manuals, MPCs, etc.), and maintenance training material;

[2] Parts demand history;

[3] Failure data; and,

[4] Maintenance history.

Maintenance Effectiveness Reviews must result in updated maintenance plans and supporting technical data (e.g., MPC sets).

d. Document Sustaining Engineering Plan.
Sustaining engineering is an ongoing practice and specific activities, tools, and participants may vary widely from asset to asset. A formal plan that defines the sustainability engineering program for each asset must be published as a section within or appendix to the ILSP.

The following specific information must be identified within the Sustaining Engineering Plan:

(1) KPPs, KSAs, and other metrics to be monitored. Monitored metrics must include A_O, TOC (and/or other cost metrics), and all other metrics required by the ORD or program documents (e.g., RAM Program Plan);

(2) Objective and threshold values (where defined) for each monitored metric;

(3) Sources of operational information that will be used to execute sustaining engineering activities (e.g., Official Operational Reporting System (OORS) component systems such as Electronic Asset Logbook (EAL) and/or Coast Guard Logistics Information Management System (CG-LIMS) modules or data cubes);

(4) Tools to be employed in developing and managing sustaining engineering metrics;

(5) Tools to be employed in reporting failures and corrective actions;

(6) The format(s) and tool(s) to be used for sustaining engineering reporting;

(7) Frequency of reporting and methodology to be applied to information gathering, interpretation, and reporting, including trend analyses to be performed;

(8) Frequency and schedule for calendar-based maintenance program reviews (e.g., Maintenance Effectiveness Reviews); and

(9) Responsibility assignments for all sustaining engineering activities (e.g., RACI (Responsible, Accountable, Consulted, Informed) matrix). Responsibilities must be identified by command/office rather than individual.

4. Outputs. The Sustaining Engineering activity produces:

a. Sustaining Engineering Plan; and

b. Support program and/or design improvements.

E. Exit Criteria. This activity ceases when the asset is no longer supported by the Coast Guard, typically at disposal.

CHAPTER 5. LIFE CYCLE SUPPORT PLANNING.

A. Scope.

Life Cycle Support Strategy development is an ongoing systems engineering process performed by the ILSMT. It analyzes system design from the perspectives of the ILS elements and determines the most cost-effective way to meet support KPPs and KSAs. The results of this analysis include support plans and design suggestions to enhance support performance. Support plans are published in the ILSP. Design suggestions are fed back to the system design activity through normal CM change management channels (e.g., ECPs).

The ILS elements focus both on the system design and on each other. For example, the technical data ILS element must focus on the technical data requirements for the asset itself as well as the technical data requirements for the support equipment identified under the support equipment ILS element. Every element must consider its impact upon every other element.

B. Assumptions. None.

C. Entrance Criteria. Life cycle support planning begins as soon as personnel are assigned to fulfill the ILS roles and responsibilities described in Chapter 1.C.4 and asset requirements and/or design information are available for analysis.

D. Evaluate the Maintenance Planning and Management Element.

1. Discussion.

Maintenance Planning and Management is the foundation of ILS. It develops, plans, resources, and implements maintenance requirements and provides design-for-maintainability feedback to ensure assets meet target A_o requirements throughout their lifetime at the minimum TOC.

The Maintenance Planning and Management element analyzes the asset design and operator requirements to predict the maintenance requirements necessary to achieve the asset's RAM KPPs/KSAs. It identifies what maintenance is to be performed, who will perform it, when it will be performed, and where it will be performed. Its activities should begin as soon as design alternatives are defined to influence the design for supportability and continue throughout the life cycle whenever logistics-related changes (design changes, operational changes, environmental changes, technology changes, etc.) occur or logistics KPPs/KSAs are not met.

The objective of maintenance is to preserve, at the minimum cost, KPP/KSA-compliant levels of reliability, performance, and safety and ensure that assets are serviceable (safe and operable), maintained in authorized configuration, and properly configured to meet mission requirements.

All Coast Guard assets require some form of preventive/scheduled and corrective/unscheduled maintenance, however, minimizing, reducing, and improving required maintenance actions increases availability and reduces TOC. The range of maintenance approaches is shown in Table 5-1.

Table 5-1: Range of Maintenance Approaches

Maintenance Approaches				
	Corrective	**Preventive**		
Category	**Run-to-fail**	**Scheduled Preventive**	**Predictive**	**Prognostic**
Sub-category	Fix when it breaks	Scheduled Maintenance	Condition-Based Maintenance – Diagnostic	Condition-Based Maintenance+
When Scheduled	No scheduled maintenance	Maintenance based on a fixed time schedule for inspect, repair, and overhaul	Maintenance based on current condition	Maintenance based on forecast of remaining equipment life
Why Scheduled	N/A	Intolerable failure effect and it is possible to prevent the failure effect through a scheduled overhaul or replacement	Maintenance schedule based on evidence of need	Maintenance need is projected as probable within mission time
How Scheduled	N/A	Based on the useful life of the component forecasted during design and updated through experience	Continuous collection of condition monitoring data	Forecasting of remaining equipment life based on actual stress loading
Kind of Prediction	None	None	On-and off-system, near-real-time trend analysis	On- and off-system real-time trend analysis

a. Corrective Maintenance. Corrective maintenance is also called “unscheduled maintenance”. It consists of actions to troubleshoot, repair, and test equipment, systems, software, hull, and structures in response to asset failures or casualties.

The concept of corrective maintenance is to “use it ‘til it breaks”. This is acceptable as long as the failure does not result in the potential loss of equipment and/or human life. The primary benefit of using a corrective maintenance approach is the reduction of support costs since non-critical systems aren’t needlessly monitored. The downside is the unknown timing of a failure and the impact to system availability and mission completion. The maintenance planner must understand the impact corrective maintenance will have on all ILS elements, i.e., sparing, test equipment, personnel, etc. The amount and severity of corrective maintenance required may be minimized considerably by preventive maintenance.

b. Preventive Maintenance. Preventive maintenance consists of inspection, cleaning, testing, monitoring, lubricating, servicing, and time change tasks to prevent equipment/system failures that might diminish asset operation and safety. It seeks to correct incipient failures either before they occur or before they develop into major defects. It includes actions sometimes referred to as facilities maintenance, such as routine painting of vessels and fixed structures. Preventive maintenance may be accomplished by the crew or other personnel assigned in direct support of the operating unit. It may also include heavy maintenance tasks requiring assistance from a depot maintenance level. The three preventive maintenance approaches are described below.

(1) Scheduled Preventive Maintenance. Scheduled preventive maintenance determines potential failure rates based on operating hours, calendar days, landings, takeoffs, etc. This approach tends to leverage generic, worst-case operating intervals which, in most cases, are too frequent. Very few components are used in a “worst-case” environment, but maintenance planners tend to err on the side of safety. Scheduled Preventive Maintenance can increase sustainment costs by servicing components that don’t really need it.

(2) Predictive and Prognostic Maintenance. Predictive and prognostic maintenance approaches such as Condition Based Maintenance (CBM) and Condition Based Maintenance Plus (CBM+) identify component service life so that preventive maintenance intervals can be established to replace the component before it fails. They seek to eliminate surprise failures while enhancing operational availability and forecasting future maintenance. These approaches require up-front investment to achieve future savings.

2. Inputs. Maintenance Planning and Management inputs include but are not limited to:

a. Operational Requirements Document;

(1) Support outcome KPPs/KSAs (both threshold and objective), for the component/subsystem/system;

(2) Asset functional, allocated, and physical requirements;

(3) Asset Maintenance Concept;

b. ECPs;

c. RAM Analyses;

(1) Initial RAM projections and requirements;

(2) Updated RAM measurements;

d. IOT&E reports or other test data; and

e. Failure data (e.g., FRACAS).

3. Activities.

a. Capture Maintenance Concept.
PMs must identify a maintenance concept as soon as possible during acquisition. A Maintenance Concept is the high-level description of maintenance requirements, considerations, and constraints for an asset maintenance program. It is the framework upon which systems engineering and logistics planning are developed. It defines the repair level strategy and workload distribution within the maintenance system and the support structure required to maintain the asset, and guides maintenance design and strategy choices.

The Coast Guard has established a core set of maintenance concept requirements that apply to all assets. More detailed, asset-specific maintenance concept requirements are initially described in the Preliminary Operational Requirements Document (P-ORD) during the Need Phase. The combined set of core maintenance concept requirements and asset-specific requirements comprises the asset maintenance concept. The concept is continuously updated and refined as more information becomes available.

The core requirements below apply to Maintenance Concepts for all Coast Guard assets:

(1) Maintenance programs must be structured and managed to realize the inherent performance, safety, and reliability levels of the asset;

(2) Maintenance programs must be structured to provide information necessary for design improvement of Coast Guard materiel when inherent performance or reliability levels prove inadequate;

(3) Maintenance programs must be developed concurrently with the system design and continuously managed and refined throughout the asset life cycle;

(4) Maintenance programs must be clearly linked to strategic and contingency planning;

(5) Maintenance programs must address all maintenance requirements whether afloat, at a fixed base, deployed site, LC/SC, Depot maintenance activity, in storage, or en route, and define the responsibility/capability of unit and depot so there is total transparency throughout the maintenance program;

(6) Maintenance programs must maintain non-Coast Guard owned equipment in accordance with owner maintenance policies. Any equipment or system in use by the CG that is owned and/or funded for maintenance by another agency/company must be maintained in accordance with the agency/companies maintenance policy, procedures, and practices or the existing Memorandum of Agreement (MOA)/Memorandum of Understanding (MOU). Examples: Navy Type, Navy Owned, leased copy machines, leased vehicles, etc. Any MOU/MOA established must specifically address responsibilities and funding for maintenance.

(7) Maintenance programs must minimize the total cost of ownership throughout the asset life cycle:

(a) Minimize required maintenance activity;

(b) Minimize the number of logistics personnel and the materiel in a given area of operation (the logistics footprint);

(c) Identify the most cost-effective combination of organic, contract, and OGA sources of maintenance;

(d) Periodically review maintenance workloads to identify opportunities for public-private partnerships or other types of support arrangements to reduce cost or improve responsiveness. Maintenance planners must use Inter-Service Support and Depot Maintenance Inter-Service Support Agreements to establish inter-service maintenance capabilities;

(e) Minimize requirements for support equipment including Test, Measurement, and Diagnostic Equipment (TMDE). When the use of support equipment may not be eliminated, standardize support equipment design for the broadest possible range of applications, consistent with maintenance concepts; and

(f) Maximize use of diagnostic, prognostic, and health management technology in embedded and off-equipment applications when feasible and cost-effective.

(8) <u>Maintenance programs must implement Bi-level Maintenance</u>. The Coast Guard’s bi-level maintenance concept consists of Organizational and Depot levels.

(a) Organizational level maintenance is maintenance normally performed by an operating unit on a day-to-day basis in support of its own operations. The organizational-level maintenance mission is to maintain assigned equipment in a full mission-capable status while continually improving the process. Operating units are responsible for completing all organizational-level planned and corrective maintenance. Organizational maintenance encompasses a number of categories, such as inspections, servicing, handling, preventive maintenance, and corrective maintenance. Typical maintenance tasks falling under this category involve:

[1] All planned maintenance except that requiring tools or other resources not held within the asset, or requiring technical skills of personnel beyond those available in the asset's operating crew.

[2] All corrective maintenance except that requiring tools, parts, or other resources not held by the operational unit or requiring technical skills of personnel beyond those available in the asset's operating crew.

(b) Depot-level maintenance requires the overhaul, upgrading, or rebuilding of parts, assemblies, or subassemblies, and the testing and reclamation of equipment as necessary, regardless of the location at which the maintenance or repair is performed. It includes repair, fabrication, manufacture, modification, refurbishment, test, analysis, repair-process design, in-service engineering, painting, and disposal of parts, assemblies, subassemblies, software, components, or end items that require shop facilities, tooling, support equipment, and/or personnel of higher technical skills, or processes beyond the organizational level capability. Depot level maintenance can be independent of the location at which the maintenance is conducted, but typically, maintenance tasks in this category can involve the removal of the affected equipment from the asset for repair in an industrial or commercial facility ashore. Typical maintenance tasks falling under this category involve:

[1] All planned maintenance requiring major hull repairs, application or removal of major flooring or coating systems, and periodic major asset overhauls or maintenance that may require the removal of the affected equipment from the asset for repair in an industrial facility ashore.

[2] Corrective maintenance requiring overhaul or replacement of major components (main engines, marine gears, etc.) requiring resources or skills beyond that normally available to the unit and not assigned at the organizational-level.

(9) Maintenance programs must identify depot core capability requirements as early as possible in the acquisition life cycle and ensure depot level maintenance facilities are resourced to support them. The capabilities to support these core requirements must be in place no later than four years after IOC of the asset. Core capabilities and associated workloads must be adjusted periodically, and reviewed formally on a biennial basis, for force structure changes, introduction of new systems, and changes in doctrine to counter emerging threats.

The program must develop maintenance requirements using RCM methodology in accordance with Reliability-centered Maintenance (RCM) Process, MIL-STD-3034 and document all information and decisions. (RCM is further described as an activity later in this section.)

b. Reliability Centered Maintenance (RCM) Analysis.

RCM analysis defines what must be done for a system to achieve the desired levels of safety, operational readiness, and environmental soundness at best TOC. RCM analysis is a continuous process that is exercised throughout the life cycle of an asset any time a design change is made or whenever KPPs/KSAs are not met, utilizes data from the results achieved, and feeds this data back to improve design and future maintenance.

One of the key objectives of the RCM analysis is to develop a maintenance schedule that would ensure that reliability of a system is enhanced.

The Maintenance Requirements List (MRL), MPCs, Maintenance Requirements Index (MRI), and Maintenance Index Page (MIP) are outputs of the RCM analysis.

RCM analysis provides a complete maintenance package that consists of preventive and corrective maintenance task identification and development. (In depth overhaul procedures are documents in Technical Repair Standard (TRS), which are considered under the Technical Data element.)

(1) RCM Principles.

RCM analysis is based upon the following principles:

(a) RCM is a continuous management tool and should be applied from design through disposal. RCM uses design, operations, maintenance, engineering, logistics, and cost data to improve operating capability, design, and maintenance.

(b) The objective of maintenance is to preserve an asset’s function. RCM seeks to preserve a desired level of system or asset functionality.

(c) RCM acknowledges that at best, maintenance can only sustain the inherent level of reliability within the operating context over the life of an item. While maintenance itself cannot improve an asset’s inherent reliability, RCM analysis improves reliability by providing feedback to improve the design.

(d) RCM seeks to manage the consequences of failure, not prevent all failures. RCM analysis defines a failure as any unsatisfactory condition, whether it be a loss of function or a loss of quality. In the case of functional loss, operational capability is lost; in the case of quality loss, operational capability continues but at an unacceptable quality.

(e) RCM analysis takes into account the relationship between operating age and experienced failures. It is more concerned with predicting failure points in a system’s life cycle (ages at which failures are likely) than failure rates.

(f) RCM identifies the most applicable and effective maintenance task or other logical action.

(g) RCM analysis acknowledges that "run-to-failure" is an acceptable decision for some equipment. In short, not all failure modes require maintenance intervention.

(h) RCM is driven by (listed in order of importance) safety or a similarly critical consideration such as environmental law, the ability to complete the mission, and economics.

(i) RCM is an overarching analysis that includes within it both the Failure Modes, Effects, and Criticality Analysis (FMECA) and Maintenance Task Analysis (MTA) sub-processes (Figure 5-1).

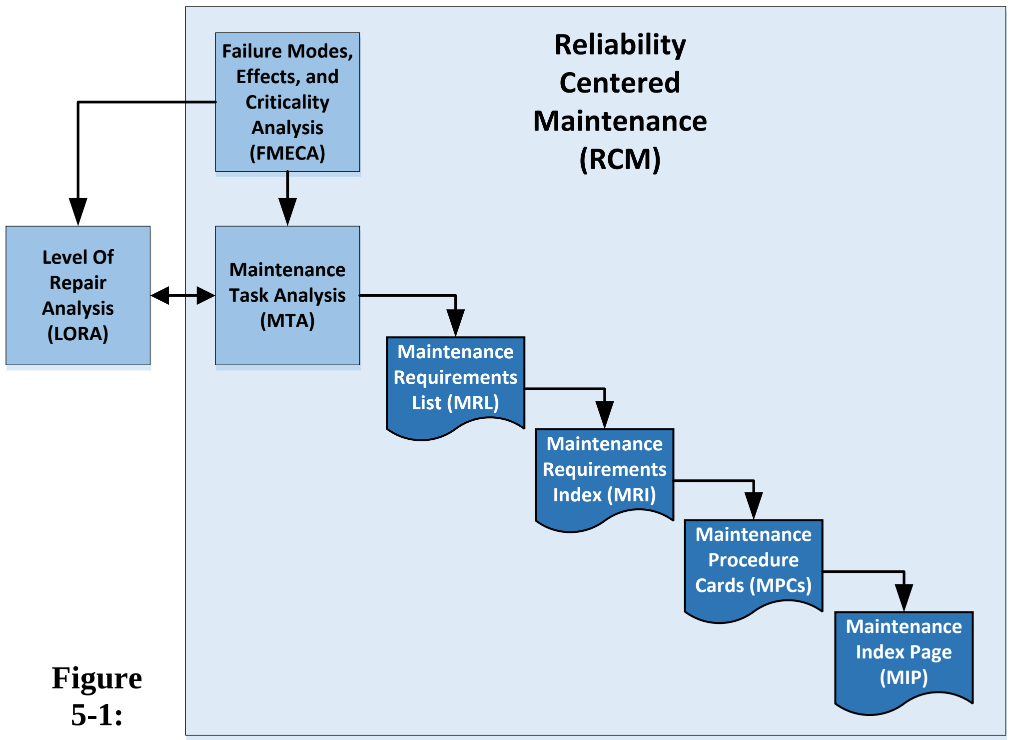

Figure 5-1: Reliability Centered Maintenance (RCM) Sub Processes and Level Of Repair Analysis (LORA)

RCM analysis can identify potential hidden safety related failures. When this is done early in the design process, the safety related failure modes can be removed from the system. As the design matures, this option becomes increasingly more difficult and expensive.

(2) RCM Basic Steps.

The basic steps in performing RCM analysis are:

(a) Partition the system and create a functional block diagram (FBD). Partition along major system and subsystem boundaries to facilitate analysis and specify analysis boundaries (scope) and approach.

(b) Perform Functional Failure Analysis (FFA). Analyze the functions of systems and subsystems and the ways in which those functions can fail.

(c) Perform Additional Functionally Significant Item Selection. Identify items other than entire systems or subsystems that merit separate analysis because of their importance or complexity.

(d) Perform Failure Mode Effects and Criticality Analysis (FMECA). FMECA is described in Chapter 5.D.3.C.

(e) Perform Decision Logic Tree Analysis. Analyze all significant failure modes using the RCM Decision Logic Tree (Figure 5-2). The RCM decision logic tree analysis process analyzes each functionally significant item and their assigned failure modes. The results of the analysis provide a clear decision as to which preventive maintenance tasks should be developed to support the system.

(f) Perform Servicing and Lubrication Analysis. A servicing task adds or replenishes a consumable item depleted during normal operation and is required for the item to perform its function. A lubrication task adds or replenishes a lubricating film that exists solely to reduce the wear that results from the friction of two surfaces moving in relation to each other. Analyze existing data for impact of periodicities (too often or too seldom), whether methods can be improved, and whether operating procedures eliminate the need for a separate maintenance task.

(g) Identify Inactive Equipment Maintenance (IEM) Tasks. Identify the need for and tasks required to prepare the asset for an inactive period, prevent equipment deterioration while inactive, prepare the equipment for operation after inactivity, and ensure that the equipment is once again ready for use.

(h) Identify Corrective Maintenance Tasks. For each failure mode analyzed via the RCM Decision Logic Tree, identify an existing procedure or develop the data needed to create corrective MPCs. Programs must complete a MRL to provide maintenance planning information about CIs. All preventive and corrective maintenance tasks identified through RCM analysis and all Asset Computerized Maintenance System (ACMS) and Coast Guard-mandated tasks should be listed on the MRL. All items listed on the MRL must have one or more MPCs.

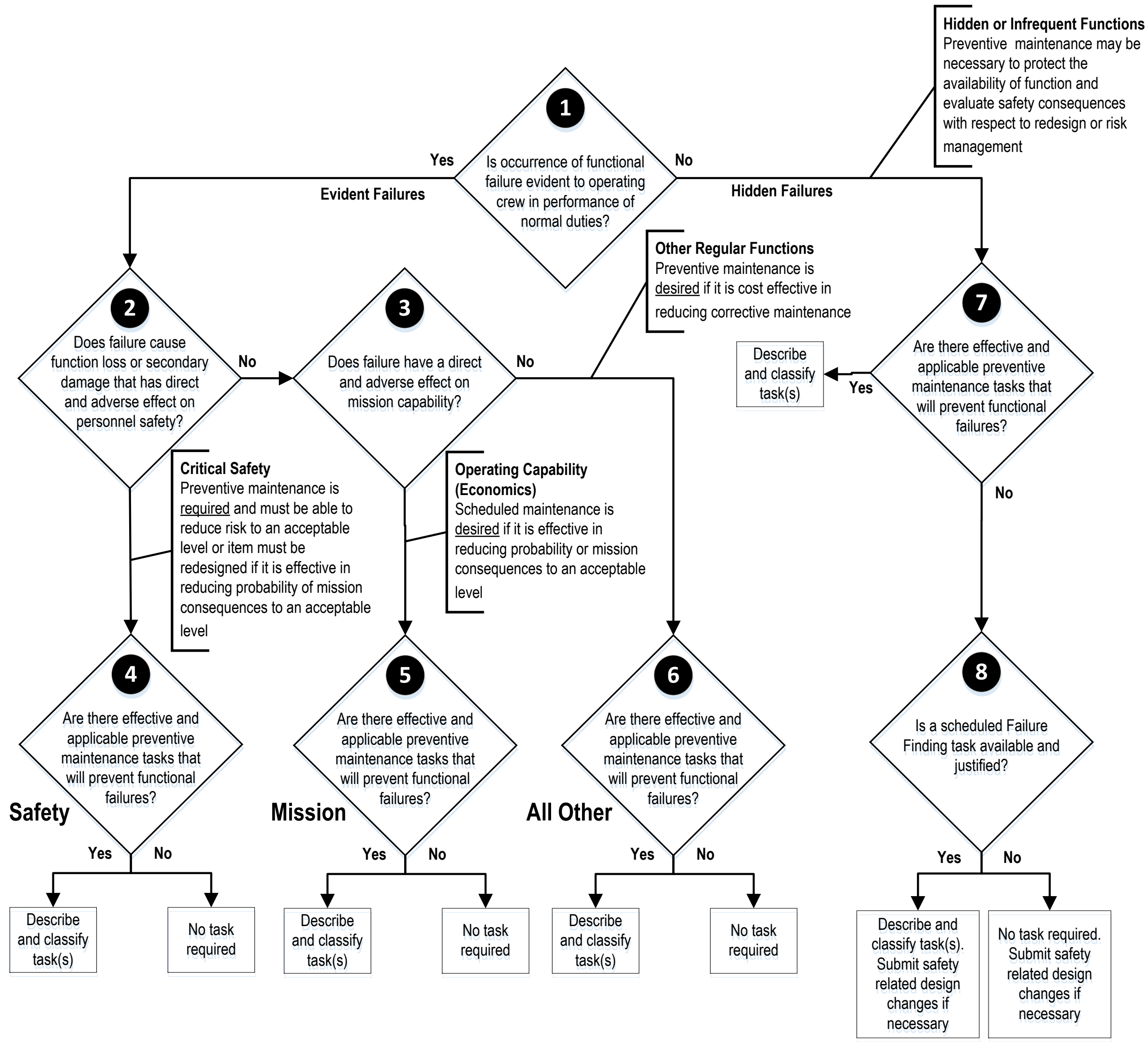

Figure 5-2. Reliability Centered Maintenance (RCM) Decision Logic Tree

(i) Create the Maintenance Requirements Index (MRI). The MRI is a list of all maintenance tasks for the system/subsystem to include scheduled, inactive, and corrective maintenance, as required, and the recommended level at which the maintenance should be performed (i.e., organizational or depot).

(j) Perform Maintenance Task Analysis (MTA). MTA must determine initial compliance thresholds and task repetition intervals and provide feedback to the design process if effective maintenance tasks cannot adequately address a failure mode or effect. The task definition process collects sufficient information about the detailed procedures of each task on the MRI so that a decision can be made as to the appropriate maintenance level (organizational or depot) to perform the tasks and to write the maintenance procedure. MTA is further discussed in Paragraph Chapter 5.D.3.D.

(k) Validate Maintenance Procedures. All tasks including corrective procedures must be validated as much as possible without doing a major breakdown of the equipment. Validated maintenance tasks are a certified product that is verified safe, technically sound, and capable of being performed by the rate identified, without any interpretation required.

(l) Prepare Maintenance Procedure Cards (MPCs) and Maintenance Index Page (MIP). The MPC is the Coast Guard's mandated technical manual format for the performance of organization-level preventive and corrective maintenance. An MIP is an index of a complete set of MPCs applicable to an asset system, subsystem, or other subunit.

MPCs must be developed in Microsoft Word and transformed via eXtensible Markup Language (XML) format to Portable Document Format (PDF) for organizational level preventive and corrective tasks and for depot-level preventive and corrective tasks. The program must validate the information contained within the MPC through performance of operations and maintenance tasks on installed asset systems/equipment. The program must coordinate the validations with other systems engineering tests and demonstrations, as applicable.

c. Failure Modes, Effects, and Criticality Analysis (FMECA).
FMECA is an iterative, "bottom up" reliability evaluation/design technique which examines potential failure modes within a system and its equipment in order to determine the effects on equipment and system performance. It is performed as part of RCM analysis. Each failure mode is classified according impact on mission success and safety to personnel and equipment. FMECA is composed of three separate analysis activities: Failure Mode and Effects Analysis (FMEA); Criticality Analysis (CA) (performed as part of RCM Decision Logic Tree Analysis) and Risk Priority Analysis (RPA); and Critical Item Analysis (CIA) and Failure Compensation Analysis (FCA).

(1) FMECA Purposes.

FMECA helps to:

(a) Determine the effect of each failure mode on performance;

(b) Identify root causes and develop preventive and corrective actions;

(c) Inform the MTA;

(d) Investigate design alternatives;

(e) Develop test methods and troubleshooting techniques;

(f) Perform qualitative reliability and maintainability analyses;

(g) Locate single points of failure;

(h) Provide data for developing a Reliability Block Diagram;

(i) Perform qualitative safety and supportability analyses;

(j) Rank failures by severity;

(k) Estimate system critical failure rates; and

(l) Identify reliability- and safety-critical components.

The FMECA must be scheduled and completed concurrently with system design. As an iterative process, as the design matures the analyses should become more detailed. In sustainment, FMECA is used to analyze design changes.

(2) FMECA Basic Steps.

The basic steps in performing a FMECA are:

(a) Define the System. The system definition should include the identification of all internal and interface functions, the performance of the system at each indenture level, any system restraints, and any failure definitions.

(b) Define the Ground Rules and Assumptions. These aid in better understanding the results of the analysis. Some examples include: mission of the item, operating time, source of failure rate data, etc.

(c) Build System Block Diagrams. Functional Diagrams and Reliability Block Diagrams (RBDs) should represent operations, interrelationships, and interdependencies. They allow traceability through each level of indenture.

(d) Identify Failure Modes. All item and interface failure modes must be identified, understanding that any effects upon function, mission, or system must be determined.

(e) Analyze Failure Effects/Causes. Performed on each item in the RBD. Consequences of each failure mode on operation and the next higher level should be identified.

(f) Classify by Severity. Severity provides qualitative measures of consequence. Severity is typically labeled as Catastrophic, Critical, Marginal, or Minor.

(g) Identify Means of Failure Detection, Isolation, and Compensation. Answer how the failure is detected by the operator, how the failure is isolated, and how is it compensated for (redundancy, monitor, back up).

(h) Recommendations. Suggest design modifications.

Product Support Analysis, MIL-HDBK-502A, provides guidance on performing FMECA.

d. Maintenance Task Analysis (MTA).
MTAs identify all physical resources required to support an asset. MTA must document both preventive and corrective maintenance requirements for organizational- and depot-levels. MTA must include inspection and test tasks,

remove and replace tasks, fault locate/fault isolate tasks to include the use of Built-In Test (BIT)/Built-In Test Equipment (BITE), and disassemble/reassemble tasks for depot-level overhaul.

The MTA process consists of the following general steps:

(1) Identify each step of the repair process.

(2) Analyze and document how to physically perform the steps.

(3) Identify the resources required to perform that task, including:

  (a) Number of persons participating in each step including a narrative description of what they are doing;

  (b) Time duration of each person's participation;

  (c) Tools or support equipment required; and

  (d) Parts and materials needed for the step.

(4) Once the above activities are complete, the results are analyzed to determine the following:

  (a) The total estimated time for the task, start to completion;

  (b) The skill level of the person (or persons) required to perform the task based on their minimum technical capabilities, knowledge, and experience;

  (c) Any additional training that must be provided to ensure proper task performance; and

  (d) Any HAZMAT, Safety, and Facility implications such as space limitations, environmental controls, health hazards or minimum capacity requirements.

(5) Finally, the MTA results must be analyzed to assess the items' compliance with all supportability concerns such as ease of maintenance or accessibility and standardization that may have been established by earlier analytical tools or functional analyses. The source for comparison of the physical support requirements for acceptability should be the requirements documents (Interface Control Documents (ICD)/Capability Development Document (CDD)/Capability Production Document (CPD)). Many of these design limitations may be derived from actual state requirements. Any shortfalls or noncompliant features must be reported back to the design organization (vendor) for correction. This closes the loop between requirements for the design and the actual results of the design process.

(6) MTA data and output is reported in the format provided in Data Item Description (DID) DI-SESS-80988A, Reliability Centered Maintenance (RCM) Task Definition Report.

e. Level Of Repair Analysis (LORA).

LORA must be conducted in accordance with Level of Repair Analysis, MIL-HDBK-1390. Early in the life cycle, LORA results influence design, validate resource requirements, and assist in generating the maintenance plan. LORA identifies when an item is to be repaired (i.e., repair/discard alternatives), where an item is to be repaired (Organizational or Depot level, based on criteria derived from operational requirements and cost-effectiveness analysis), and to what indenture level (e.g., assembly/subassembly/part) maintenance applies. Maintenance functions required for the asset must be identified for each item to be incorporated at the level of detail of the Configuration Item Line Replaceable Unit (CILRU). LORA also identifies potential design changes to improve maintainability and/or lower TOC.

LORA seeks to determine the optimal repair and maintenance capabilities required to achieve operational availability thresholds and manage overall his costs. It seeks to determine an optimal provision of repair and maintenance facilities to minimize TOC. Maintenance planners examine not only the cost of the part but all of the elements required to ensure the job is done correctly. This includes the skill level of personnel, tools required to perform the task, test equipment required to test the repaired product, and the facilities required. LORA helps determine and considers maintenance task distribution, repair versus discard criteria, support equipment requirements, manpower requirements at each maintenance level, warranty considerations, facilities requirements, and cost to achieve target operational availability (A_o).

The basic steps in conducting a LORA are:

(1) Plan the LORA program. Schedule and document LORA activities and personnel.

(2) Compile and manage LORA data. Gather the input data (e.g., data from RAM and FMECA analyses, design specifications, operational requirements, maintenance KPPs/KSAs, etc.) necessary for evaluations of each item being analyzed.

(3) Perform and Document Evaluations. LORA includes three types of evaluations:

(a) Economic Evaluations. An analysis used to determine and identify the most cost effective maintenance approach for all items undergoing LORA. It is based on cost and performance factors and usually involves employing a LORA model to compute the life cycle logistics cost associated with the support alternative under consideration.

(b) Noneconomic Evaluations. An analysis addressing factors that override cost considerations. Noneconomic LORA evaluations are undertaken to evaluate constraints, preemptive, and intangible factors that affect or restrict the maintenance level at which items are repaired or discarded. The noneconomic evaluation considers factors such as:

[1] Constraints of the existing logistics support structure;

[2] Safety;

[3] Environmental impacts;

[4] Deployment mobility;

[5] Technical feasibility of repair;

[6] Security;

[7] Special transportability factors;

[8] Human factors;

[9] Vulnerability;

[10] Training requirements;

[11] Facilities; and

[12] Survivability.

The key focus during the noneconomic evaluation is to eliminate support alternatives that are not practical or feasible. This evaluation is performed without consideration of costs. However, any recommendations or conclusions based upon this evaluation should also include an economic LORA which will assign economic value to the noneconomic decisions.

(c) Sensitivity Evaluations. Sensitivity evaluation is an extension of the economic LORA evaluation. It consists of identifying the specific LORA model data elements that are not well defined (possibly due to uncertainty of design and program characteristics), establishing a numerical range which the data element is expected to fall within, analyzing the impact and effects the numerical range has on the logistic costs and maintenance concept, and confirming or changing the recommended maintenance concept based on the economic LORA evaluation. By conducting sensitivity evaluations, maintenance planners can quantify the economic risks in making LORA decisions when uncertainty exists in hardware design and program characteristics.

(4) Assign Initial Source, Maintenance, and Recoverability (SM&R) Codes. SM&R codes are a key data element initially derived during LORA. They are assigned to each support item based on logistics analysis and consideration of the cost, design, manufacture, application, maintenance, and supply practices and capabilities as related to each support item and the operational missions of the end item. SM&R codes communicate maintenance and supply instructions to the various logistic support activities and the operators for the logistic support of systems, equipment, and end items. Operators can quickly discern whether an item is stocked, to what level and degree maintenance can be performed, and the disposal authority.

These six digit codes are divided into three sections that tell where a part comes from, who does maintenance on it, and what is done with the part when it is deemed beyond economical repair. Initial SM&R codes are listed in the LORA Reports, reviewed during Supply Support ILS element analysis, and eventually communicated to operational users via the Technical Data ILS element deliverables.

The primary objective of the SM&R code system is to comply with uniform policies, procedures, management tools, and means of communication that promote inter-service and integrated material support within and among Federal agencies. Thus, the establishment of uniform SM&R codes is essential for effective inter-service and integrated support. SM&R codes must be assigned in accordance with Joint Regulation Governing the Use and Application of Uniform Source Maintenance and Recoverability Codes, OPNAV Instruction 4410.2A/Army Regulation 700-82/Marine Corps Order 4400.120.

(5) Document the Level of Repair Analysis (LORA) (Create LORA Report). The LORA report includes summary of results of the LORA evaluations, assumptions made, conclusions, and recommendations. The content and frequency of the LORA reports should be tailored to fit the goals and objectives of the specific program under analysis.

f. Corrosion Prevention Planning. Corrosion is the wearing away of materials due to a chemical reaction, the most common example being rust. Corrosion can create safety issues, hinder readiness and effectiveness, and increase TOC. Corrosion prevention programs must be established to minimize costs associated with material deterioration throughout the system life cycle. Corrosion considerations must be objectively evaluated throughout program design and development activities, with trade-offs made through an open and transparent assessment of alternatives. Corrosion prevention and mitigation methods include, but are not limited to:

(1) Effective design practices;

(2) Material selection;

(3) Protective finishes;

(4) Production processes;

(5) Packaging;

(6) Storage environments;

(7) Protection during shipment; and

(8) Maintenance procedures.

The PM must establish and maintain a corrosion prevention and mitigation reporting system for data collection and feedback and use it to address corrosion prevention and mitigation logistic considerations and readiness issues.

PMs are responsible for the development of Corrosion Prevention and Control Plans early on in the acquisition life cycle and for the budgeting, programming, and funding of efforts needed to prevent and control corrosion throughout the product life cycle.

g. Tool Control Program (TCP). A TCP must provide instant inventory capability through internally configured tool containers with each tool positioned in an individually tailored location. The primary objectives of the TCP are the enhancement of safety by eliminating accidents and equipment damage attributed to uncontrolled tools and minimizing tool replacement costs. Instructions and procedures must be developed and implemented for a tool control program ensuring safe operations by precluding completion of any maintenance action without accounting for all tools. An effective TCP is the responsibility of all maintenance personnel and all levels of the chain of command.

h. Maintenance Plan Development. The results of the Evaluate Maintenance Planning and Management Element activity must be documented in an Asset Maintenance Plan. The Asset Maintenance Plan must be as specified in the ILSP template and updated throughout the asset life cycle concurrent with ILSP updates or whenever changes to the maintenance program are made. The maintenance plan must discuss, describe, and report:

(1) Maintenance Concept and any alternatives considered. Include and describe any interim, special, or unique support procedures and program constraints or requirements;

(2) Preventive Maintenance Requirements;

(3) List of Maintenance Contracts. Identify any contractor provided maintenance and effective dates of the contract;

(4) RCM Analysis;

(a) FMECA;

(b) MTA;

(5) LORA, including SM&R Codes;

(6) Technical Details for Repair Specifications;

(7) Interservice/OGA Agreements;

(8) Staffing Requirements; and

(9) Identification of CIs (Down to the Line/Lowest Replaceable Unit (LRU).

4. Outputs.

Maintenance Planning and Management outputs include:

a. Asset Maintenance Plan;

b. Asset Maintenance Schedule;

c. MRI;

d. MPCs;

e. LORA Report; and

f. Corrosion Prevention and Control Plan.

E. Evaluate Supply Support Element.

1. Discussion.

Supply support consists of all management actions, procedures, and techniques required to determine, acquire, catalog, receive, store, transfer, issue, and dispose of repair parts, spares, and all classes of supply necessary to support a system and its support items (such as test equipment, trainers, simulators, etc.) to meet operator and maintainer needs. Supply support ensures that the correct amount of materiel is available, when and where needed, to support operation and maintenance of an asset at the lowest possible TOC.

Supply support includes provisioning for initial support; acquiring, distributing, and replenishing inventories as reflected in the supply chain management strategy throughout the asset life cycle; and documenting the supply support approach in the supply support plan portion of the ILSP.

2. Inputs.

Inputs into the Supply Support activity include:

a. Maintenance Plan;

b. RAM analysis;

c. RCM analysis and products; and

d. MRL.

3. Activities.

a. Provisioning.

Provisioning is the process of determining and acquiring the range and depth of items (i.e., spares and repair parts, special tools, test equipment, and support equipment) required to support and maintain an asset for a period of service in accordance with the asset's maintenance plan. Its phases include identifying items for supply management, establishing data for cataloging, preparing allowance lists, and assuring delivery of necessary support items with related end articles (outfitting).

Predicting the range and depth of spare and repair parts requires modeling and analyses. The program must establish, implement, and maintain a provisioning program. The program must plan and implement asset provisioning, including responsibilities, schedules, and interfaces with existing assets and practices. The program must implement the provisioning efforts for all repairable and replaceable equipment to support Organizational and Depot Level maintenance requirements in accordance with the RAM and RCM analyses developed for the asset. The program must establish necessary procedures to assure that provisioning data are collected, tracked, and integrated into the provisioning data files.

(1) During acquisition, PMs/sponsors, assisted by the APO, obtain provisioning inputs, ensure correct and complete provisioning requirements are defined in contracting documents and engineering change packages, and budget for and monitor progress of Provisioning Technical Documentation (PTD) development. A provisioning performance schedule must be used to summarize key provisioning events and milestones. It must identify the end item, contractor, solicitation or contract number, conference dates, and delivery dates for parts lists and other PTD deliverables.

(2) The PM and Sponsor, assisted by the APO, provide engineering input for provisioning technical matters including coordinating support resource requirements. Activities they perform include:

(a) Providing provisioning contract control numbers to the PTD submitter(s);

(b) Receiving PTD from the system integrator or system/equipment manufacturer;

(c) Validating PTD and technical coding in accordance with the Contract Data Requirements List (CDRL), DIDs, and the maintenance plan;

(d) Verifying supply support configuration/APLs;

(e) Providing budget inputs for both initial provisioning and projected system stock requirements;

(f) Validating equipment identification and assigning equipment identification codes as required;

(g) Performing Federal Logistics Information System (FLIS) screening; and,

(h) Building complete and accurate allowance documents that reflect the approved support and maintenance philosophies, concepts, and plans.

(3) Project Resident Offices are normally established at the contractor facility for major acquisitions. They must:

(a) Ensure that contractual provisioning obligations are met;

(b) Establish direct liaison with provisioning activities;

(c) Validate end items, systems, equipment and components, prior to Coast Guard acceptance, to ensure the PTD submitted reflects them; and,

(d) Participate in provisioning conferences.

(4) The manufacturer, system integrator, or contractor must be tasked, through the contract, with:

(a) Developing or procuring and delivering the PTD required by the contract;

(b) Including the same provisioning information requirements established under the contract into vendor/subcontractor contracts;

(c) Obtaining from vendors and subcontractors confirmation that the vendor/subcontractor will comply with the data requirements or a letter or refusal if they do not intend to comply; and

(d) Participating in provisioning conferences and activities as required.

(5) The Coast Guard will make provisioning decisions based on one of three provisioning methods. Each one has its merits and limits. The provisioning activity must consider factors such as the IPT structure, physical location of the sponsor and contractor, the end item design, size, maintenance concept and special parts requirements. The three methods, and some special provisioning techniques, are described below.

(a) The Conference Team method is the establishment of a government team consisting of functional experts from areas such as cataloging, requirements determinations, and SM&R coding. It is most often used for contracts when the majority of the materiel is government furnished but may be suitable for highly complex programs.

(b) In-House Provisioning involves members of the provisioning team performing provisioning responsibilities at their respective command/organization.

(c) Resident Provisioning Team is the establishment of a permanent provisioning team at a contractor's facility, with specialists assigned on a temporary basis as needed.

(d) Special Provisioning Techniques. There are special provisioning techniques that can be used to mitigate risks. These techniques should be considered on a case-by-case basis. They include:

[1] Phased Provisioning, which allows the purchase of initial spares to be deferred until the later stages of a system's/end item's production. It is normally used for high cost items when the design is not stable.

[2] Accelerated Provisioning is used when there is not enough time to complete the provisioning process before initial spares are required. Critical sparing issues are addressed and completed during the provisioning conference. The items considered are based on the established Interim Support Item List. This technique may require additional resources.

[3] Interim Release is used to allow a contractor to begin production of an item early when the production lead-time is greater than the time between the provisioning conference and when the item is required.

[4] Spares Acquisition Integrated with Production is the practice of combining orders for spares with orders for production.

(6) Provisioning Conferences. Programs must develop agendas, conduct, and publish minutes for provisioning conferences as necessary to establish and communicate provisioning approaches and requirements. Table 5-2 describes common provisioning conference types.

Table 5-2: Provisioning Guidance Conference Types

Conference	Requirements
Preparedness Review Conferences	Preparedness Review Conferences are normally held only when the contractor has no prior experience with the Coast Guard's or DoD's provisioning process. It should be used to determine the contractor's readiness for the provisioning conference.
Provisioning Guidance Conference (PGC)	Normally required within 90 days after production contract award for all major acquisitions and any non-major programs that require PTD. The PM, the contracting officer, the provisioning activity, and all personnel who will prepare provisioning documentation must attend. The focus must be to ensure an understanding of the contract provisioning requirements and responsibilities among program team members. It should include discussions on maintenance concepts, provisioning techniques, item identification, design changes, and PTD delivery schedules. Attendees should review the contract requirements and prepare to present any provisioning requirement questions and recommendations.
Provisioning Conferences	Provisioning Conferences are held to discuss specific requirements and data needed to make provisioning and supply decisions. Attendance is normally members of the program staff, provisioning experts, the ILS manager, and contractor's technical personnel. Existing drawings and provisioning and technical data are reviewed and requirements for additional data are determined. The assignment of technical and supply coding is normally initiated here.

Conference	Requirements
Long Lead Time Item Provisioning Conference (LLTIPC)	Requirements and criteria for the LLTIPC will be addressed during the PGC. The purpose of the LLTIPC is to identify to determine which parts may require extended manufacturing or delivery time periods. The output of the LLTIPC will be the Long Lead Time Items List (LLTIL).
Interim Support Item Provisioning Conference (ISIPC)	ISIPCs are held when interim support is or may be required. The Interim Support Item List is developed and responsibilities are established. Requirements and criteria for the ISIPC will be addressed during the PGC.
General Conferences	These are optional conferences that can be scheduled as needed. They are normally held to discuss problems or issues that arise during the provisioning process.

(7) Assembling/Updating Provisioning Technical Documentation (PTD). PTD is a generic term describing all of the data necessary to produce maintenance and supply support planning documents. It also describes data that will be used to support execution of maintenance and supply. PTD is required for all systems and equipment acquired or modified unless all supply support will be provided by the contractor for the life of the system. PTD is accumulated and documented during the system engineering process and continues to be updated in each his phase. PTD is discussed in depth in Chapter 4 of the Provisioning Allowance and Fitting Out Support (PAFOS) Policies and Procedures Manual, NAVSEA 9090-1500 and includes the following:

(a) Master Equipment Configuration List (MECL). A technical and supply document prepared for an individual system which lists the equipment and components installed, associated provisioning, special tools, test equipment, miscellaneous portable items, and equipage required to perform its mission.

(b) Equipment Long Lead Time Items (LLTI). This data consists of those items which, because of their complexity of design, complicated manufacturing process or a limited production capacity, may cause unacceptable delivery delay if not ordered in advance of normal provisioning.

(c) Commercial Off-the-Shelf (COTS) Manuals. Technical manuals associated with all COTS items, either supplied by the manufacturer, or developed by the government or contractor as defined by CDRL requirements.

(d) Provisioning Technical Documentation Submission Schedule. A schedule that illustrates PTD progress in a month/percentage format. It must also denote critical PTD that must be submitted in ratio to the physical construction of an end item.

(e) Provisioning Parts List (PPL). This list contains the end item, component or assembly and all support items which can be disassembled, reassembled, or replaced, and which, when combined, constitutes the end item, component, or assembly and must include items such as parts, materials, connecting cabling, piping, and fittings required for the operation and maintenance.

(f) Engineering Data for Provisioning (EDFP). EDFP is the technical data that provides definitive identification of dimensional, material, mechanical, electrical, or other characteristics adequate for provisioning of the support items of the end article(s) on contract. Approved EDFP is required for all systems or equipment that is acquired for CG use and for which PTD is being acquired. EDFP consists of data such as specifications, standards, drawings, Three-Dimensional (3D) models, photographs, sketches and descriptions, and the necessary assembly and general arrangement drawings, schematics, drawings, schematic diagrams, wiring and cable diagrams, etc., or what is sometimes referred to as form, fit and function. This data is necessary for the assignment of SM&R codes, prevention of proliferation of identical items in the Government inventory, maintenance decisions, and item identification necessary in the assignment of a National Stock Number (NSN). EDFP format and content must be prepared in accordance with the latest industry standards and must be reproducible.

(g) Design Change Notice. A document used to identify changes to previously delivered items which add to, delete, supersede, or modify items which are approved for incorporation into the end item.

(h) Component Identification Data (CID) for Certificate of Identicality (COI)/Statement of Prior Submission (SPS). A COI certifies that the equipment, drawings, and all other documentation (particularly the provisioning piece parts and technical manual), are identical in all respects to equipment and documentation previously provided to the government. NOTE: An item that performs the same "form, fit and function" is not necessarily identical in all respects. All items that will be covered by a COI must be identified. Similarly, a SPS may satisfy the requirement for PTD. A contractor submits an SPS via contract channels in lieu of PTD whenever previously submitted PTD may meet the requirements of the contract. It certifies that the information has previously been submitted to and accepted by the government.

(i) Repairable Item List (RIL). This data consists of all repairable support items used in or associated with the end item.

(j) Interim Support Items List. This is a preliminary provisioning parts list which is used to determine if any parts require interim support if the normal provisioning process cannot be completed prior to the operational use of a platform/equipment. It is usually a "best guess" based on experience and may be used to develop a preliminary allowance list.

(k) System Configuration Provisioning List. This list establishes the work breakdown relationships of the components of an end item. It is normally used to check configuration integrity.

The level of detail for the PTD will depend on whether the system or equipment has parts subject to wear-out, failure, or replacement and that require maintenance at the organizational or depot level. Systems or equipment that do not require piece part support will require adequate PTD to establish a configuration record for the system or equipment.

The requirements for PTD must be specified in the system or equipment contract by invoking the applicable performance specification modified to meet the specific requirement of the individual acquisition. Consult the DLA Acquisition Streamlining and Standardization Information System (ASSIST) database for appropriate DIDs. Data must be delivered in a format that is compatible with Coast Guard provisioning databases (e.g., Naval & Electronics Supply Support System (NESSS)).

(8) Sparing Analysis. To determine and validate demand requirements during provisioning, a spare parts optimization analysis must be conducted to determine initial stocking levels for spare parts to minimize the cost of inventory while meeting availability constraints. Readiness Based Sparing (RBS) methods must be used when fielding a new system. RBS explicitly relates sparing cost to the availability of the system/equipment being analyzed. Allowance candidates are evaluated and selected based on cost and contribution to system readiness. Demand-based methodologies may be used for system support provisioning where readiness requirements for the system are not stated, where data is not available for input to RBS models, or where the application of RBS is not cost-effective. Information on how to perform each computational methodology (RBS or Demand-based) can be found in DoDM 4140.01-V2.

(9) Finalize Source, Maintainability and Recoverability (SM&R) Codes. SM&R codes are validated and finalized by the Product Line Managers and SCs/LCs, assisted by the APO. Final SM&R codes are communicated to their intended users via technical publications such as allowance lists (APLs and AELs), Illustrated Parts Breakdown (IPB) manuals, Repair Parts, and Special Tools Lists (RPSTLs), maintenance manuals, and supply documents.

(10) Cataloging. Product Line Managers and SCs/LCs, assisted by the APO, ensure that cataloging is performed. Cataloging is the process of assigning a Federal Catalog Program (FCP) NSN to an item that is repeatedly bought, stocked, stored, issued, and used. All assets that require Coast Guard supply

support must be cataloged. All items having an SM&R code, in their associated allowance list, indicating the part is stocked (i.e., all items with a first position code of P) must have an NSN assigned. Coast Guard provisioning activities are required to use Type I or Type IV NSNs as defined in Federal Logistics Information System (FLIS) Procedures Manual, DoD 4100.39-M.

(11) Allowance Development. Allowance documentation is developed to list maintenance/repair parts and equipment needed to support an end item. The development of allowance documents that reflect the maintenance principles and philosophies of the organization is vital to achieve required readiness and meet operational availability thresholds. During the provisioning process, a series of actions are taken to select, and buy parts expected to be needed to perform corrective or preventive maintenance on equipment. The selection of the parts to be stocked is done in accordance with the equipment maintenance planning documentation. The maintenance planning documentation tells the supply support personnel which parts are to be replaced at the user level and which are to be replaced at the depot maintenance activity. The maintenance planning concept is reflected for each item (part of assembly or equipment) listed on the APLs and AELs through the Source, Maintenance, and Recoverability (SM&R) codes. These codes are assigned following LORA analysis and is iteratively developed and updated throughout the acquisition program to identify optimum repair strategies.

Allowance development produces the following outputs:

(a) Allowance Parts Lists (APL). The APL is a technical and supply document comprised of characteristics, repair parts, sub-assemblies, special tools and accessory components for individual assets or components. It lists logistics and support information and the applicable maintenance significant repair parts for the System/equipment. A completed provisioning package for an asset must contain an APL for every item or component of equipment that is deemed to be allowance worthy. NAVSEA's Provisioning Allowance and Fitting Out Support (PAFOS) Policies and Procedures Manual, 9090-1500, Appendix B, contains guidance on preparing and processing APLs.

(b) Allowance Equipage Lists (AEL). AELs provide a comprehensive listing and space location of an asset's equipage outfit material and include such items as life saving equipment, damage control equipment, special tools and test equipment, personal protective equipment, portable radios, copiers, and other items that are essential for mission execution and maintenance. AELs are a product of the Evaluate Support Equipment Element activity (Paragraph H).

(c) General Use Consumables List (GUCL). The GUCL is a one-time allowance document for non-equipment related, general use consumable items that are not identified on an APL/AEL. It is intended to support the first 90 days endurance period. It is produced for New Construction and Conversion assets by the APO. The GUCL is then reviewed for applicability by the assigned logistic/service center Supply Officer. The range and depth of items listed are adjusted based on the asset's operational requirements. The GUCL allowances are not included in the Inventory Control Point (ICP) because they are not fixed and no inventory control is maintained on the items listed.

b. Supply Chain Management (SCM).

(1) Supply Chain Management Discussion.

SCM is the integration of the supplier, distributor, and customer logistics requirements into one cohesive process to include demand planning, forecasting, materials requisition, order processing, inventory allocation, order fulfillment, transportation services, receiving, invoicing, and payment. SCM ensures routine replenishment management, including buffer and safety stock management, for assets and their associated support equipment. SCM addresses issues such as:

(a) Reparable, expendable, and consumable:

[1] Procurement;

[2] Receiving;

[3] Storage;

[4] Inventory management;

[5] Transfer;

[6] Issuance;

[7] Redistribution;

(b) Disposal;

(c) Material pricing;

(d) Total Asset Visibility/Automated Identification Technology;

[1] Serialized Item Management (SIM);

[2] Item Unique Identification (IUID);

[3] Radio Frequency Identification (RFID);

(e) Shelf Life Management;

(f) Warranty Management;

(g) Supply Chain Assurance;

(h) Counterfeit material prevention;

(i) Malicious hardware and software prevention;

(j) Demand forecasting and Readiness Based Sparing; and

(k) Unauthorized technology transfer prevention.

(2) Supply Chain Management References.

Coast Guard Supply Chain Management must be conducted in accordance with:

1) Coast Guard Uniform Supply Operations Manual, COMDTINST M4121.4 (series);

2) Reference (e); and,

3) Defense Integrated Material Management Manual for Consumable Items, DoD 4140.26 (series).

c. Document Supply Support Plan. The results of the Evaluate Supply Support Element activity must be documented in an asset supply support plan. The supply support plan must be as specified in the ILSP template and updated throughout the asset life cycle concurrent with ILSP updates or whenever changes to the supply support program are made.

4. Outputs.

Supply support element analysis produces:

a. Supply Support Plan;

b. Provisioning TDP;

c. APL; and,

d. GUCL.

F. Evaluate the Technical Data Element.

1. Discussion.

Technical data is recorded information (regardless of the form or method of recording) of a scientific or technical nature (including computer software documentation but not software itself) necessary to operate and maintain an asset.

a. Technical Data Types.

Technical data includes, but is not limited to:

(1) Technical manuals;

(2) Engineering drawings and associated parts lists;

(3) PTD;

(4) EDFP;

(5) MPCs;

(6) Change Notices;

(7) Software documentation;

(8) Technical and supply bulletins;

(9) Repair parts and tools lists;

(10) Maintenance allocation charts;

(11) Preventive maintenance instructions;

(12) Component lists;

(13) Product support data;

(14) Hazardous material documentation;

(15) Technical Repair Standards;

(16) Time Compliance Technical Orders (TCTOs); and

(17) Illustrated Parts Breakdowns.

Financial, management, and administrative data are not technical data.

b. Technical Data Considerations.

The Analyze Technical Data ILS Element activity plans the asset's technical data management program throughout its life cycle. Considerations include:

(1) Identifying the technical data needed to support (operate, maintain, train, re-acquire, supply, etc.) the asset while meeting A_o KPPs at the minimum TOC;

(2) Identifying the technical data rights needed to support the asset at the minimum TOC;

(3) Identifying the technical data formats needed to support both data users and data maintainers;

(4) Identifying asset design changes to mitigate data, data management, and/or data rights costs;

(5) Planning a strategy for timely and economically acquiring asset technical data and data rights;

(6) Assuring technical data accuracy and adequacy for its intended use;

(7) Ensuring security and integrity of technical data;

(8) Safely, securely, and legally distributing and/or communicating asset technical data to the point of use;

(9) Ensuring technical data markings correctly identify security, data rights, export control, destruction, and intellectual property requirements;

(10) Managing technical data updates in response to asset changes; and

(11) Properly disposing of technical data at the end of its life cycle.

2. Inputs.

Inputs to the Technical Data analysis include:

a. Acquisition documents (e.g., asset CONOPS, MNS, Mission Analysis Report (MAR), ORD, etc.);

b. Maintenance planning outputs:

(1) Asset Maintenance Plan;

(2) Asset Maintenance Schedule;

(3) MRI;

c. AEL; and,

d. Supply Support Plan.

3. Activities.

a. Define Technical Data Requirements.

Technical Data analysis must strive to optimize the versatility, flexibility, quality, accuracy, and ease of use of technical data. Technical data must fully support the planned support concept while limiting data requirements to the minimum.

(1) Define the Technical Data Package (TDP).

A TDP is the set of technical data associated with a particular asset. TDPs must conform to Department of Defense Standard Practice, Technical Data Packages, MIL-STD-31000 (series). A TDP typically contains:

(a) Technical Manuals – Technical Manuals are publications that contain instructions for installation, operation, maintenance, training, and support of an asset, its components, and its support equipment. They may be presented in any form, including hard copy, audio and visual displays, optical discs, and other electronic devices. Technical Orders (Tos) that meet the criteria of this definition may also be classified as TMs.

For new acquisitions, a Technical Manual Contract Requirements (TMCRs) or equivalent documents must be developed for acquisitions that include technical manuals. TMCRs identify the specifications, standards, and content requirements for technical manuals. For new acquisitions, literacy level, safety/hazard call-outs, delineated lifting levels, and maintenance envelopes, etc. must meet HSI standards as defined by the Assistant Commandant for Human Resources in accordance with Reference (f);

(b) Engineering drawings and associated lists – Engineering Drawings, Bills of Materials, Parts Lists, and Material Call Outs depict the design and manufacture of an asset. These elements document the level of design maturity achieved and are used for future development as well supporting quality assurance functions, maintaining configuration, and procurement of spare parts and systems. They are the major source of technical information for logistics support throughout a system's life cycle;

(c) Engineering models/model data – Engineering Models/Model Data are two- or 3D geometric representations (e.g., Computer-Aided Design (CAD)) of a design. Models may include different ranges and depths of data. They may:

[1] Describe the engineering concepts on which an approach is based (Conceptual Design Data);

[2] Provide a visual understanding of the item (Limited Design Disclosure Models); or

[3] Fully define the product (Product Model Data).

(d) Specifications that define function, performance, and interfaces;

(e) Physical geometry, or other constraints;

(f) Process descriptions;

(g) Material composition;

(h) Class I changes, deviations, & waivers approved but not yet incorporated;

(i) Safety requirements;

(j) Preservation and packaging requirements;

(k) Test requirements data and quality provisions;

(l) MPCs;

(m) Environmental stress screening requirements; and

(n) Interchangeability and FFF information.

Technical data deliverable formats must support the operational and maintenance requirements of the asset, and technical data deliveries must be compatible with existing Coast Guard information processing systems and repositories (e.g., CG-LIMS).

(2) Define Data Rights Requirements. Data rights describe the legal limits upon how the Coast Guard can use, modify, reproduce, release, perform, display, or disclose technical data. Technical data rights fall into seven categories:

(a) Unlimited Rights applies to data developed exclusively at Government expense and to certain types of data (e.g., FFF); Operation, Maintenance, Installation, and Training (OMIT). These rights involve the right to use, modify, reproduce, display, release, or disclose technical data in whole or in part, in any manner, and for any purpose whatsoever, and to direct or authorize others to do so;

(b) Government Purpose License Rights include the right to use, duplicate, or disclose technical data for government purposes only, and to have or permit others to do so for government purposes only. Government purposes include competitive procurement, but do not include the right to permit others to use the data for commercial purposes;

(c) Limited Rights are granted via a limited rights agreement, which permits the government to use proprietary technical data in whole or in part. It also means that the government has the expressed permission of the party providing the technical data to release it, or disclose it, outside the government;

(d) Negotiated License Rights pertain whenever the standard license arrangements are modified to the mutual agreement of the data supplier and the government. In this case, the exact terms are spelled out in a specific license agreement unique to each application;

(e) Small Business Innovative Research (SBIR) Data Rights apply to all technical data or computer software generated under an SBIR contract. Non-government users cannot release or disclose outside the government except to government support contractors;

(f) Commercial Technical Data License Rights apply to technical data related to commercial items (developed at private expense). These are managed the same as Limited Rights; and

(g) Commercial Computer Software Licenses. Applies to any commercial computer software documentation. These are managed as specified in the commercial license offered to the public.

b. Define Technical Data Strategies and Schedule.

(1) Define Technical Data Rights Strategy (TDRS). Technical data rights can be expensive and only such rights as are or likely will be needed during the asset life should be acquired. A Technical Data Rights Strategy (TDRS) business case analysis should be performed to optimize the data rights strategy. Considerations include, but are not limited to:

(a) What data will be required to design, manufacture, and sustain the system and to support re-competition for production, sustainment, or upgrade if needed?

(b) What rights, access, and delivery of technical data will be needed throughout the asset life cycle?

(c) What is the risk that the contractor may assert limitations on the government's use and release of data, including Independent Research and Development (IRAD)-funded data (e.g., should the contract require the contractor to declare IRAD up front and establish a review process for proprietary data?).

The TDRS should reflect the assessment and integration of the data rights requirements across all the functional disciplines required to develop, manufacture, and sustain the system over the life cycle. Restricted use and intellectual property rights should be minimized.

(2) Define the Technical Data Acquisition Strategy. Technical data deliverables may be acquired from contractors as Commercial and Non-Developmental Items (CANDI), developed by contractors, or developed by the Coast Guard. The approach for developing or acquiring technical data must be analyzed to determine the optimal strategy. The organization responsible for developing and delivering each technical data deliverable must be specified in the Technical Data Plan.

(3) Define the Technical Data Acquisition Schedule. The technical data development/delivery schedule must be coordinated with the overall program schedule to ensure that technical data required for activities such as T&E is available when needed. The technical data delivery schedule must be specified in the Technical Data Plan.

c. Identify Technical Data Validation, Verification, and Maintenance Requirements. Technical data must be verified (evaluated for accuracy, comprehensiveness, adequacy, and usability) and validated (evaluated for compliance with requirements and standards). Whenever feasible, physical demonstration of a maintenance and operating actions using the technical publications (MPCs when available), required tools, and other necessary support equipment must be used to validate and verify technical data.

Technical data validation and verification considerations that must be considered and documented in the Technical Data Plan include:

(1) Who will perform technical data acceptance inspection?

(2) What support (e.g., field engineering, CM, etc.) will be required for validation and verification?

(3) What support will be required to update the technical data?

Technical data must remain accurate, complete, and consistent throughout the asset life cycle. As a CI, TDPs must be maintained under CM control to ensure that only approved changes are allowed. The Technical Data Plan must describe how the TDP will be maintained.

d. Identify Technical Data Security Requirements.

(1) Classified and Sensitive But Unclassified Information (SBU) Technical Data. Technical data programs must ensure that all classified and SBU technical data is managed (received, marked, safeguarded, accessed, disseminated, reproduced, destroyed, etc.) in strict compliance with the Classified Information Management Program, COMDTINST M5510.23 (series).

(2) Scientific and Technical Information (STINFO). Technical data programs must ensure that all technical data is reviewed for STINFO applicability and managed (received, marked, safeguarded, accessed, disseminated, reproduced, destroyed, etc.) in accordance with Management of Scientific and Technical Information (STINFO), COMDTINST M5260.6 (series).

(3) Personally Identifiable Information (PII)/Sensitive Personally Identifiable Information (SPII). PII and SPII are not themselves technical data, but certain programs may encounter PII or SPII within test or operational data (e.g., data handled by a Coast Guard nautical licensing system). PII and SPII must be managed in accordance with the DHS Handbook for Safeguarding Sensitive Personally Identifiable Information (series).

e. Identify Technical Data Storage, Distribution, Archiving, and Disposal Requirements. Technical data must be stored so that it is available when needed; distributed or otherwise made available to those with access privileges and a need for the data; and archived or disposed of when it is no longer actively needed. These activities must be considered and addressed in the Technical Data Plan. Considerations include:

(1) How will each technical data deliverable be distributed to the data user(s) while meeting security requirements?

(2) Will the program implement an Integrated Product Data Environment (IPDE) and/or interface with a vendor or other government agency IPDE? An IPDE consists of infrastructure, functional applications, and business processes that enable asset digital product data to be produced, acquired, managed, accessed, modified, and sustained by all privileged data users. An IPDE includes the interchange of product data according to national and international data exchange and system interoperability standards.

(3) Are there externally imposed data retention requirements (e.g., from The NARA)?

(4) What is the risk that technical data media and/or formats will exceed their shelf life or become obsolete within the life cycle of the asset? Technical data may need to be converted from one format to another.

(5) Will unusual technical data/media disposal methods be required at the end of life cycle?

f. Develop the Technical Data Plan. The Technical Data Plan describes how the program will obtain and manage technical data and data rights for the asset. The technical data plan must specify:

(1) The technical data deliverables, data rights, and the supporting data management needs analyses performed;

(2) The data format standards that the data must meet (e.g., XML), S1000D "International specification for technical publications using a common source database", etc.;

(3) The process (acquire or develop) and responsibility for providing each technical data deliverable;

(4) The schedule for delivery of technical data deliverables;

(5) How the technical data will be validated, verified, updated, and approved;

(6) How the technical data will be managed, controlled and made available to data users. Issues that must be considered include:

(a) Data markings (e.g., security markings, STINFO markings, copyright markings; file naming conventions, etc.);

(b) Data storage and distribution methodology (e.g., program database, IPDE, etc.); and,

(c) Data disposal considerations.

(7) How technical data will be delivered to and maintained at its point of use (e.g., Interactive Electronic Technical Manuals (IETMs), hardcopy, databases such CG-LIMS, program or enterprise IPDE, etc.).

4. Outputs. Technical Data Element evaluation produces the Technical Data Plan.

G. Evaluate Packaging, Handling, Storage, and Transportation (PHS&T) Element.

1. Discussion.

Throughout their life cycle, Coast Guard assets and their supporting outfitting must be efficiently moved from place to place and stored for various periods without degrading their A_o status, increasing TOC, or jeopardizing the safety of personnel and the environment. For example, availability degrades and TOC increases when transportation problems delay or prevent shipment of items due to physical or regulatory restrictions; storage issues allow property to degrade or its shelf life to expire; poor packaging results in lost items during shipping; or, incorrect handling results in damage to the item shipped.

The Packaging, Handling, Storage and Transportation (PHS&T) ILS element identifies the requirements for packing, handling, storing, and transporting the asset and its associated outfitting (e.g., supplies, repair parts, support equipment, etc.) and plans how to satisfy them. PHS&T analysis considers factors such as:

a. Transportation, handling, and storage environment considerations;

b. Preservation requirements;

c. Security requirements;

d. Packaging materials and containers;

e. Transport equipment (e.g., forklifts, cargo aircraft, pipelines, commercial transportation, etc.);

f. Delivery scheduling;

g. Storage requirements and facilities;

h. Software and data storage and distribution;

i. Labeling and Automated Identification Technology (AIT);

j. PHS&T personnel;

k. Legal requirements (e.g., customs requirements, Code of Federal Regulations (CFR) requirements, Environmental Protection Agency requirements, Department of Transportation (DOT) requirements, etc.);

l. Shipping modes (e.g., truck, rail, vessel, air, etc.) and their capabilities; and,

m. PHS&T impacts on asset design.

PHS&T planning must implement and address the PHS&T requirements stated in Reference (e). This planning must start as soon possible to allow for budgeting and acquisition in time for the PHS&T capabilities be in place when needed.

2. Inputs.

Inputs to PHS&T evaluation include but are not limited to:

a. Supply Support Plan;

b. Provisioning TDP;

c. APL;

d. AEL; and,

e. Maintenance Plan.

3. Activities.

a. Packaging Planning.

Coast Guard assets and their associated outfitting must be preserved and packaged in conformance with the asset's corrosion prevention program to ensure their protection and preservation during handling, transport, and storage. The purpose of packaging planning is to determine the best overall packaging approach considering all alternatives. The basic steps for packaging planning are described below.

(1) Identify and document the packaging requirements for the asset and its supporting outfitting. Top level packaging requirements vary with the nature of the packaged item but generally include:

(a) Packaging must protect the package contents.

[1] Preserve the contents against corrosion and other time-sensitive risks.

[2] Shield the contents against temperature extremes, humidity, aridity, and peculiar climatologically elements.

[3] Shield the contents from shock, compression, puncture, and vibration impacts during movements.

[4] Shield the contents from dirt, dust, moisture, and other contaminants.

(b) Prevent and expose incidents of pilferage or security breach during shipment.

(c) Packaging must label and identify the package contents.

[1] Clearly identify the contents (e.g., item, quantity, size, color, etc.).

[2] Enable product visibility and tracking via AIT (e.g., Radio Frequency Identification (RFID)) and Automatic Identification and Data Capture (AIDC) (e.g., bar coding). AIT in accordance with MIL-STD-129 will be utilized for all items that are shipped or stored.

[3] Communicate warnings, cautions, and notes that apply to the packaged product (e.g., special handling, shipping, safety, storage, unpacking, use, etc.).

[4] Communicate unit of issue.

(d) Packaging must enhance package content safety.

[1] Discourage and expose tampering with the package contents.

[2] Communicate product safety information.

[3] Safeguard HAZMAT.

(e) Packaging must enhance package storability.

[1] Ensure the optimum shelf life or interval between receipt by the distribution or retailer and issue to the user.

[2] Ensure compatibility with storage facilities and their support equipment.

(f) Packaging must support transportability.

[1] Ensure compatibility with transportation modes (air, rail, vessel, etc.).

[2] Ensure compatibility with standard transport support equipment (e.g., standard pallets and shipping containers, etc.).

(g) Packaging decisions must consider environmental factors.

[1] Ensure ease of package return, disposal, or recycling after use.

[2] Ensure compliance with environmental regulations.

(2) Design and document a packaging program to meet the requirements. If special, non-standard and non-commercially available packaging has to be

developed, programs must first send a search request using the format prescribed in Standard Practice for Military Packaging, MIL-STD2073-1 (series), to the Container Design Retrieval System Management Office (CDRS/MO) to see if a solution already exists before initiating a new package design or production program. A CDRS is a computerized repository of over 6000 specialized containers. It contains details for each container including size, weight, items carried, fragility level, drawings, location(s) of containers, quantity available, container item managers, and more. Use of CDRS ensures standardization, promotes reusability, and can lower TOC. If CDRS/MO cannot provide an adequate packaging solution, the program must develop one.

(3) Conduct and document transportability analyses to ensure compatibility between item, packaging, transportation, and handling equipment and trade off analyses to determine the most efficient and cost-effective packaging design that satisfies functional requirements. The program must identify any existing packaging, handling, and transportation plans used as a basis for packaging planning.

b. <u>Handling Planning</u>. Handling is moving items from one place to another within a limited range, normally confined to a single area, such as between warehouses, storage areas, or operational locations, or moving items from storage to the mode of transportation. It is physical manipulation, directly or indirectly, by people (characterized as lifting, sliding, hoisting, lowering, or moving items on dollies or pallets through the use of manpower, tugs, trailers, loaders, cranes, forklifts, hoists, and automated systems.) The purpose of handling planning is to determine the best overall handling approach considering all available alternatives.

(1) The first step in handling planning is to identify and document the handling requirements for the asset and its supporting outfitting. Top level handling requirements vary with the nature of the asset and its supporting outfitting, but generally include those listed below.

(a) Coast Guard handling programs must address all safety risks. Programs must consult the Coast Guard Office of Safety and Environmental Health, Coast Guard transportation offices, Office of Safety and Health Administration (OSHA), and suppliers for current information regarding safe handling of all materials.

(b) Handling programs must handle all materials in accordance with best industry practices.

(c) Handling must be reduced to a minimum.

(d) Distances over which materials are handled must be as short as possible.

(e) Routes of materials must be on the same level as much as layouts permit in order to avoid lifting and lowering.

(f) Once started in motion, materials must be kept moving as long as possible.

(g) Mechanical and automatic means of materials handling must be used wherever routes of travel and work volume justify the investment.

(h) Material handling equipment must be standardized to the greatest extent possible.

(i) Gravity flow (the least expensive form of energy) must be incorporated wherever practical.

(j) In mechanized systems, maximum investment must be in mobile rather than stationary equipment.

(k) Programs must incorporate handling and mobility features into items, equipment, and containers as required to facilitate handling and movement consistent with existing or planned equipment, facilities, and procedures.

(l) In equipment selection, an effort must be made to minimize the ratio of dead weight to payload.

(m) If special handling equipment is developed, programs must follow Coast Guard acquisition processes for major end items.

(2) Design and document a handling program to meet them. The basic handling approaches are:

(a) Manual Systems. Used in situations where there are a large variety of types of items, predominantly in small packages;

(b) Mechanized Systems. Appropriate for larger shipments requiring the use of pallets, forklifts, and/or overhead cranes;

(c) Automated Systems. Used to meet the requirement for frequently occurring, high volume throughput where functions can be preprogrammed; and,

(d) Combined Systems. Combine any or all of the three approaches above.

(3) Conduct and document transportability analyses to ensure compatibility between item, transportation, and handling equipment and trade off analyses to determine the most efficient and cost-effective handling program that satisfies functional requirements. The program must identify all special handling procedures (for example. Lifting eyes, skids, fixtures, etc.), and any existing packaging, handling and transportation plans used as a basis for handling planning.

c. Storage Planning.

Storage is the short or long term safekeeping of items not in use. Storage can be accomplished in either temporary or permanent facilities. The purpose of storage planning is to determine the best overall storage approach considering all available storage alternatives.

(1) Identify and document the storage requirements for the asset and its supporting outfitting. Top level storage requirements vary with the nature of the item but often include:

(a) Storage planning must optimize product shelf-life.

(b) Storage planning must minimize storage facility costs. All storage facility options have associated costs, whether they are Coast Guard-owned, used via agreement with an OGA, or commercially leased.

(c) Storage planning must optimize facility locations. Ease of access must be balanced with regulatory (e.g., zoning, environmental, etc.) and facility cost requirements.

(d) Storage planning must analyze and define HAZMAT storage requirements.

(e) Storage planning must analyze and define physical security requirements.

(2) Design and document a storage program to meet them.

(3) Conduct and document storage analyses to ensure compatibility between item, transportation, storage, and handling equipment and trade off analyses to determine the most efficient and cost-effective storage program that satisfies functional requirements. The program must identify all special storage procedures and all existing packaging, handling and transportation plans used as a basis for handling planning.

d. Transportation Planning.

Transportation is the movement of equipment and supplies using standard modes of transportation by land, air, and sea. Modes of transportation include Government-owned and commercial vehicles, railcars, vessels, and aircraft and organic, OGA, and commercial delivery services. Transportation planning must start as early during concept development and analysis as possible. Critical problems may result when a system cannot be shipped due to weight, volume, HAZMAT, or special packaging requirements. The purpose of transportation planning and analysis is to determine the most efficient and cost-effective overall transportation approach considering all available transportation alternatives.

(1) Identify and document the transportation requirements for the asset and its supporting outfitting. Top level transportation requirements vary with the nature of the packaged item but generally include those listed below.

(a) The most economical mode of transportation must be used consistent with the asset's:

[1] Transportability characteristics (e.g., measurements, weight, temperature limits, pressure limits, power source required, protective service, it is sensitive/classified, etc.);

[2] Hazard classification;

[3] Transportation priority; and,

[4] The required delivery date.

(b) Transportation planning must consider the entire end-to-end chain including the “last mile” aspects along with any required implementing technology.

(c) Transportation planning must consider the cost of storing or returning empty reusable containers.

(d) Transportation planning must consider state, local, national, and international transport regulations.

(e) Transportation planning must comply with and implement the detailed transportation requirements defined in Transportation of Freight, COMDTINST M4610.5 (series).

(2) Design and document a transportation program to meet the requirements.

(3) Conduct and document transportation analyses to ensure compatibility between item, storage, and handling equipment and trade off analyses to determine the most efficient and cost-effective transportation program that satisfies functional requirements. The program must identify all special transportation considerations and any existing packaging, handling and transportation plans used as a basis for transportation planning.

e. Develop the Packaging, Handling, Storage, and Transportation (PHS&T) Plan.

The results of PHS&T planning must be documented in an asset PHS&T plan. The asset PHS&T plan must be as specified in the ILSP template and updated throughout the asset life cycle concurrent with ILSP updates. The PHS&T plan must discuss, describe, and report:

(1) The supporting analyses, design considerations, constraints, and methods used to determine PHS&T requirements;

(2) The resources, processes, and procedures to ensure that all system, equipment, and support items are preserved, packaged, handled, stored, and transported properly;

(3) All applicable constraints (such as Electro-Static Discharge/Electro-Magnetic Interference requirements) identified during planning;

(4) All applicable environmental considerations, hazardous material identification, equipment preservation requirements for short and long term storage, and transportability requirements;

(5) All documentation that contains prescribed guidelines for PHS&T of the asset and its supporting outfitting;

(6) Whether standard containers will be used or if special purpose containers are being procured. If reusable containers are to be used, identify what activity is responsible for returning them or storing them when not in use; and

(7) Additional detailed PHS&T planning documentation that will be used to support the program. Identify what details will be provided, who will provide them and when, who will approve them, who will review and update them for the life cycle of the program, how often the documentation will be reviewed, and how this information will be distributed.

4. Outputs. PHS&T evaluation produces the PHS&T Plan.

H. Evaluate Support Equipment Element.

1. Discussion. Coast Guard assets require support equipment to meet A_o requirements. At the same time, support equipment acquisition and maintenance incurs costs. Support equipment analysis identifies and adjusts the quantity and type of support equipment needed to meet an asset's A_o requirements at minimum TOC throughout the asset life cycle. Support equipment planning must start as soon as possible to allow for budgeting and acquisition in time for the support equipment to be in place when needed.

a. Support Equipment Examples.

Support equipment is all equipment (mobile or fixed) required to support the operation and maintenance of a system in its intended environment except that equipment which is an integral part of the system. Its functions typically include test, measurement, diagnosis, calibration, handling, safety, security, and repair. Support equipment examples include:

(1) Training devices;

(2) Tools (both hand tools and power tools: torque wrenches, manufacturing fixtures, bore scopes, etc.);

(3) General Purpose Test Equipment (GPTE)/General Purpose Electronic Test Equipment (GPETE);

(4) Special Purpose Test Equipment (SPTE)/Special Purpose Electronic Test Equipment (SPETE);

(5) TMDE;

(6) Calibration Equipment (oscilloscopes, voltmeters, etc.);

(7) Ground Support Equipment (GSE) (maintenance stands, generators, service carts, handling and maintenance equipment, etc.);

(8) Safety and lifesaving equipment (flotation devices, harnesses, etc.); and

(9) Special inspection equipment and depot maintenance plant equipment, which includes all equipment and tools required to assemble, disassemble, test,

maintain, and support the production and/or depot repair of end items or components.

b. Support Equipment Classifications. Support equipment is further classified by its commonality across systems:

(1) Peculiar Support Equipment (PSE). PSE includes items that are unique to the asset and have no other application in government assets. PSE requires acquisition of technical documentation and cataloging and complete provisioning in accordance with the maintenance concept. It also requires support that is currently not available from the Government which will therefore have to be developed concurrently with development of the asset itself; and

(2) Common Support Equipment (CSE). CSE includes items that are currently in government inventory and are applicable to multiple systems. Because CSE is already in inventory, its technical documentation, support requirements, provisioning records, and maintenance requirements are cataloged as part of FLIS. CSE must be specified whenever and wherever feasible.

In addition to complying with the requirements in this Manual, support equipment analysis for aviation programs must also comply with and implement the requirements cited in Reference (g).

2. Inputs. Inputs to Support Equipment analysis include MPCs and operational outfitting requirements, including support equipment identified under other ILS elements.

3. Activities.

a. Develop Support Equipment Program.

Support equipment programs must be developed concurrently with the asset design. They must be conducted with the same degree of engineering process rigor (e.g., CM, testing, compliance with Coast Guard engineering policies, etc.) as the system it supports.

(1) Identify and define asset operational and maintenance requirements that depend upon support equipment. These requirements may vary widely depending upon the nature of the asset, but the requirements below apply to all support equipment analyses.

(a) To maximize engineering solution tradeoff space, support equipment requirements must be stated in performance-based terms.

(b) All test, evaluation, calibration, inspection, fault isolation, handling, security, repair, and other requirements allocated to support equipment must be identified, defined, and documented.

(2) Identify support equipment that meets asset support equipment requirements, and record the selection rationale employed, in accordance with the following:

(a) Programs must leverage design interface and technology refresh to minimize or eliminate the cost of support equipment throughout the asset life cycle. For example, the need for support equipment may be satisfied by instead including BIT/BITE as a design requirement or changing the maintenance requirements for an item.

(b) When support equipment is absolutely necessary, programs must standardize selected equipment to the greatest extent possible.

(c) When support equipment is absolutely necessary, programs must use the following general priority order to select equipment:

[1] Existing Coast Guard support equipment;

[2] Support equipment currently in Government inventory or being developed under Government contract;

[3] Commercially available equipment that meets technical and ILS requirements;

[4] Modified versions of any of the above; then

[5] PSE. Programs must not specify PSE unless absolutely necessary.

(3) Identify and document the life cycle support required by the selected support equipment such as initial outfitting, training, maintenance, and replenishment. For CSE, this material is available within the Federal system. For PSE, this material must be procured as part of the equipment procurement.

b. <u>Record Support Equipment Analysis and Develop Allowance Equipage List (AEL)</u>. Support Equipment analysis including rationale and assumptions applied must be documented as specified in the ILSP template and updated throughout the asset life cycle concurrent with ILSP updates. The support equipment selected must be documented as an AEL. AELs provide a comprehensive listing and space location of an asset’s equipage outfit material and include such items as lifesaving equipment, damage control equipment, special tools and test equipment, personal protective equipment, portable radios, copiers, depot maintenance equipment, and other items that are essential for asset maintenance and mission execution. AEL data includes:

(1) Part number;

(2) Manufacturer Commercial and Government Entity (CAGE) Code;

(3) Federal Supply Classification (FSC);

(4) National Item Identification Number (NIIN);

(5) Item Description;

(6) AEL Group Name;

(7) Nomenclature; and

(8) Quantity Required.

Reference (h), Appendix D, contains guidance on preparing and processing AELs.

4. Outputs. Support Equipment ILS element evaluation produces the AEL.

I. Evaluate the Manpower and Personnel Element.

1. Discussion. The objective of Manpower and Personnel ILS element analysis is to identify and optimize the human capital requirements for an asset. Coast Guard HSI is the Technical Authority for all Manpower & Personnel analysis. They conduct and/or approve all Manpower and Personnel analysis used for requirements to resource positions or people. The terms “Manpower” and “Personnel” are not interchangeable.

a. Manpower. “Manpower” defines the “spaces” that must be filled by humans. It captures the engineering requirements for human activity for the operation, maintenance, and sustainment of an asset and the human resource affordability of a system:

(1) The number of people needed; and

(2) Required levels of knowledge, skills, and abilities needed for optimal system performance under all expected conditions throughout the asset’s life cycle.

b. Personnel. “Personnel” defines the “faces” needed to meet manpower requirements. It identifies the human aptitudes (cognitive, physical, and sensory capabilities), knowledge, skills, abilities, and experience levels needed to achieve optimal system performance. Personnel analysis must influence asset design to ensure compatibility between the characteristics and skills required to operate and maintain the asset and the available individuals.

c. Importance of Manpower and Personnel Analysis. Manpower and personnel analysis is important because:

(1) Mission success requires the right number and mix of operational personnel;

(2) Meeting A_o requirements requires the right number and mix of maintenance personnel;

(3) Sources of personnel vary (e.g., military (active, reserve, and auxiliary), civilian, and contractors); and,

(4) Personnel costs constitute 60-70% operating expenses and are of the largest component of the Coast Guard budget, so the mix of personnel skills, personnel numbers, and personnel sources strongly impacts TOC.

Accordingly, manpower and personnel analyses must strive to minimize the quantity of manpower and personnel skill levels required to operate and support the asset. Analyses must identify and quantify risks associated with staffing at less than 100% of optimal levels.

Reference (f), assigns ETA for manpower and personnel to Assistant Commandant for Human Resources.

The Manpower Requirement Determination (MRD) enterprise implemented by the Assistant Commandant for Human Resources exercises the Manpower Requirements Analysis (MRA) process to define and evaluate manpower and personnel for Coast Guard assets in accordance with the multi-volume Coast Guard Staffing Logic and Manpower Requirements Manual (SLMR) directive. It begins during the Need phase and continues throughout the asset life cycle.

2. Inputs. Manpower and Personnel ILS element analysis inputs include:

   a. Acquisition documents (e.g., MNS, CONOPS, ORD, etc.);

   b. Manpower and personnel documentation from existing comparable assets; and

   c. Maintenance planning outputs, including:

      (1) Asset Maintenance Plan;

      (2) Asset Maintenance Schedule;

      (3) MRI; and,

      (4) MPCs.

3. Activities.

   a. Exercise the Manpower Requirements Analysis (MRA) Process. The MRA Process is conducted and documented in accordance with the Coast Guard Staffing Logic and Manpower Requirements Manual Volume I - Doctrine, COMDTINST M5310.4 (series); Coast Guard Staffing Logic and Manpower Requirements Manual, Volume II - Policy, COMDTINST M5310.5 (series); and the process guides they reference. These documents provide authoritative information on how HSI teams develop and document Manpower and Personnel ILS element analysis for both acquistions and assets in sustainment. The overall process flow is:

      (1) Create/Update Manpower Estimate Report (MER). Manpower and Personnel analysis activities begin with creation of the MER during the Need phase. The MER (a low-level MRA that estimates manpower and personnel requirements) is updated to keep pace with asset acquisition decisions throughout the Need, Analyze/Select, and the Obtain phases (until ADE 2C or before NMAP ADE-3).

      (2) Create/Update Manpower Requirements Analysis (MRA). Upon completion of MER development and before the start of operational tests, the MRA is conducted based upon a rigorous systems engineering/operations research analysis. All assumptions and alternatives considered are noted. Identified requirement gaps may be mitigated by system design changes that lower manpower and personnel requirements. The MRA creates an accurate, traceable measure of the functional workload demand required to operate and maintain the asset.

      (3) Create/Update Manpower Requirements Determination (MRD). Prior to ADE 3, the MRA is used to develop a formal summary of the positions

required by the asset and the personnel quantities needed at each position. This summary is called the MRD. The MRD is reviewed and adjudicated, and signed off by the Assistant Commandant for Human Resources. The MRD presents the Manpower and Personnel requirements for the asset and is a controlled CI that may not be modified outside of the CM change control process.

(4) Perform Periodic Unit-level MRAs. MRAs are required at the unit level every five years to evaluate the efficacy of determined and actual manpower and personnel levels and adjust them.

b. Document the Manpower and Personnel Element Evaluation. Manpower and Personnel Element analysis including rationale and assumptions applied must be documented as specified in the ILSP template and updated throughout the asset life cycle concurrent with ILSP updates.

4. Outputs. Manpower and Personnel ILS element analysis generates:

a. MER;

b. MRA Report;

c. MRD; and

d. Periodic MRA Reports during sustainment.

J. Evaluate the Training & Training Support Element.

1. Discussion.

Training is the process by which personnel acquire or enhance pre-determined job-relevant knowledge, skills, and abilities by developing their cognitive, physical, sensory, and team dynamic abilities. Training support enables and optimizes the training process throughout an asset's life cycle.

The Training & Training Support ILS element identifies and documents the requirements for training all Coast Guard active duty, reserve, auxiliary, and civilian personnel (both individuals and crews) to operate and support an asset proficiently throughout its life cycle. These requirements include, but are not limited to processes, procedures, personnel, techniques, curricula, training devices, training facilities, materials, training aids, and job aids.

a. Training Types. Training types include those listed in Table 5-3.

Table 5-3: Training Types

Training Type	Description
Familiarization and Indoctrination	Imparts knowledge, skills, aptitude, and abilities to initial crews when performance based training or access for opportunities to practice are not practical. Familiarization and indoctrination must always be followed by hands-on (or counterpart) programs that allow users to interact with the same (desired) or like assets in the operational environment and allow the learners to gain an understanding of how the asset interfaces with other system components.
User Training	Trains users to operate an asset
Maintenance Training	Trains maintainers to sustain an asset
Instructor Training	Trains trainers to train others
New Equipment Training (NET)	Initial training and transfer of knowledge from the program office or contractor to testers and users. It includes the knowledge needed for operation, maintenance, and logistic support during testing and initial introduction of new materiel.
HAZMAT Disposal and Safe Procedures Training	Trains personnel to properly handle hazardous material

b. Training Approaches and Techniques. Training approaches and techniques include but are not limited to those listed in Table 5-4.

Table 5-4: Training Approaches and Techniques

Training Approach/Technique	Description
Team training	Trains more than one person and supports the mission at the unit level. It teaches interactions between team members
Individual training	Oriented towards training individuals (either as a group or alone) to accomplish individual tasks
Computer-based training	Individual training provided via computer
Classroom training	Group training presented in traditional classroom

Training Approach/Technique	Description
On-the-Job Training (OJT)	Conducted on-site, while performing actual work (e.g., Over the Shoulder (OTS) training, where an SME uses mentoring and coaching techniques to guide a student through a task in the actual performance environment)
Performance-based training	Evaluates the learners' ability to demonstrate what they have been taught as they are being trained. If demonstrated performance does not meet standards, additional training support to correct identified performance gaps is provided. Evaluations include, but are not limited to pre- and post-tests, hands-on performance, and periodically injected knowledge checks. Learning environments closely replicate performance environments and such training is never conducted in a traditional classroom lecture format.
Resident training	Training conducted in a formal classroom setting away from the duty site
Non-resident training	Formal training that does not require an offsite classroom setting (e.g., correspondence courses, e-Learning courses, etc.)
OGA or contractor training	Training offered via other government organizations or provided commercially
Industry Training	Non-degree training that provides knowledge and understanding of private-sector procedures and practices (especially industries regulated by the Coast Guard) that is not available through military or advanced civilian schooling

c. Training Aids and Job Aids. Training aids provide learning experiences to support training. They include but are not limited to:

(1) Computer-based interactive courseware;

(2) Technical and training documentation;

(3) Mock-ups;

(4) Representative configurations; and

(5) Modeling and simulations.

Job aids (sometimes referred to as performance support) are tools that guide users to perform approved operations or maintenance procedures in the operational environment. Both training aids and job aids may be embedded within the asset (e.g., a training mode, "help" utility, or maintenance status display) or provided as standalone items.

d. Training & Training Support Element General Requirements. The following general requirements apply to the Training and Training Support ILS element:

(1) Reference (f) assigns ETA for performance support and training to the Assistant Commandant for Human Resources. The Performance, Training and Education Manual, COMDTINST 1500.10 (series), establishes training, education, and workforce development policy and provides an overview of the Coast Guard Training System. The Assistant Commandant for Human Resources and FORCECOM maintain a multi-volume set of Standard Operating Procedures (SOPs) for the Coast Guard Training System that explains how to develop, document, and implement Coast Guard training programs. These documents provide authoritative procedures for all training program tasks, including but not limited to requirement analysis, training program development, job aids, testing, training methods, and evaluation.

(2) Training & Training Support LEMs must optimize the training and training support required to meet A_o KPPs throughout the asset life cycle at the lowest TOC.

(3) Training & Training Support requirements must be based on validated performance requirements provided by the sponsor, PM, or other Technical Authorities (Assistant Commandant for Engineering and Logistics and Assistant Commandant for C4IT) and aligned with system design, Human Systems Engineering, and the Manpower and Personnel element. All system changes throughout the asset life cycle must be evaluated for impact on Training & Training Support.

(4) Logistics support for training support equipment identified during Training & Training Support ILS element analysis must be developed and documented under the Support Equipment ILS element (Paragraph H).

(5) Technical manuals and other training technical data identified during Training & Training Support ILS element analysis must be developed and documented under the Technical Data ILS element (Paragraph F).

(6) Training facilities identified during Training & Training Support ILS element analysis must be developed and documented under the Facilities and Infrastructure ILS element (Paragraph K).

2. Inputs. Training and Training Support analysis inputs include:

a. Acquisition documents (e.g., MNS, CONOPS, ORD, etc.);

b. Maintenance Planning outputs:

(1) Asset Maintenance Plan;

(2) Asset Maintenance Schedule;

(3) MRI; and,

(4) MPCs.

3. Activities. For major systems acquisitions, training requirements analyses are planned and conducted by the Office of Human Systems Integration of Acquisitions. For non-major acquisitions, they are planned and conducted by FORCECOM Training Division (FC-T). The procedures for developing and documenting Training & Training Support programs are detailed in the Standard Operating Procedures for The Coast Guard's Training System.

4. Outputs. Training and Training Support analysis produces the Performance Support & Training System Plan.

K. Evaluate Facilities and Infrastructure Element.

1. Discussion.

Facilities and infrastructure are the permanent, semi-permanent, or temporary real property assets (buildings, runways, swimming pools, airfields, roadways, utilities, maintenance depots, ports, docks, towers, land, etc.) required to operate and maintain an asset and its supporting outfitting. Without appropriate facilities, the Coast Guard cannot fulfill its missions. Because facility construction can take several years from concept formulation to user occupancy, facilities and infrastructure analysis must be initiated as early as possible to accommodate the long-lead times associated with funding, planning, and execution.

Facilities and infrastructure must support the asset and is supporting outfitting throughout its life cycle, including but not limited to:

a. Testing the asset;

b. Training asset operators and maintainers;

c. Operating and maintaining the asset and its supporting outfitting;

d. Sustaining the deployed and home station presence of the Coast Guard;

e. Storing the asset and its supporting outfitting;

f. Providing a productive, safe, and efficient environment that offers decent quality of life for Coast Guard members and families and the civilian and contactor workforce; and,

g. Supporting disposal of the asset.

There are three main steps in a typical facilities and infrastructure analysis: first, determine the life cycle facility and infrastructure requirements for the asset and its supporting outfitting. Next, identify potentially suitable existing Coast Guard real property that may meet the facility and infrastructure requirements and conduct site surveys to validate requirements and determine site suitability. Finally, prepare a Facilities and Infrastructure Plan to satisfy the requirements at or above the target A_o

and at the lowest TOC. This may be accomplished through use of existing facilities and infrastructure (with or without modification) or through new construction.

All facilities and infrastructure planning, programming (acquiring funding and people to implement the Facilities and Infrastructure Plan), budgeting (presenting the approved construction program to Congress), and execution (designing, constructing, and activating the facility and or infrastructure) must be conducted in accordance with the requirements and procedures defined in Reference (i) and Reference (j).

2. Inputs. Facilities and Infrastructure ILS element analysis inputs include all other ILS element plans (e.g., Supply Support Plan, Manpower and Personnel Plan, Maintenance Plan, etc.) and Asset Test Plans.

3. Activities.

   a. Determine Facilities and Infrastructure Requirements. The facilities and infrastructure requirement analysis must include and incorporate the facilities and infrastructure requirements identified in the other ILS element analyses. The process for determining facilities and infrastructure requirements can vary widely depending upon the nature of the asset and accompanying outfitting being developed, but considerations should include:

      (1) What facilities and capital equipment are required (e.g.; space and volume requirements; utilities requirements; storage requirements; supporting equipment requirements; environmental system requirements such as temperature, humidity, and dust control; etc.);

      (2) Who needs them (e.g., surface units, aeronautical units, administrative units, maintenance crews, families and dependents, etc.);

      (3) Where they need to be (e.g., geographical location, access requirements, proximity to other assets, distance from locations prohibited by statutory constraints, etc.);

      (4) When they are needed and for how long (e.g., permanent facilities, temporary facilities, mobile facilities, etc.); and

      (5) How the facilities and infrastructure must operate (e.g., safety requirements, health requirements, security requirements, etc.).

   The requirements analysis must describe the rationale for each requirement.

   b. Identify Potentially Suitable Facilities and Conduct Site Surveys. Strategies for satisfying requirements may include new construction as well as modifications or renovations to existing facilities. When the need for facilities is demonstrated, the use of existing ones must be maximized. Site surveys are normally conducted to validate analysis efforts, evaluate existing versus needed facilities, and identify the shortfalls. Several areas must be considered as part of the site survey. These include:

(1) Compatibility: is the facility compatible with the system and planned support equipment? Consider power requirements, interface connections, size, weight, etc. Dockside equipment and capabilities are paramount considerations for vessels, while items such as runway length and hangar size must be considered for fixed winged aviation assets;

(2) Human Factors: ensure that personnel can operate effectively and efficiently. Consider, for example, temperature control, noise levels, space and safety;

(3) Accessibility: ensure that equipment can be moved in and out of the facility easily. Also consider handicapped access;

(4) Security: ensure that the right forms of physical and information security (Emissions Security (EMSEC) shielding/soundproofing) are available;

(5) Impacts on TOC;

(6) Funding requirements;

(7) Facility location;

(8) Improvements needed;

(9) Space requirements;

(10) Environmental impacts;

(11) Duration or frequency of use;

(12) Safety and health standards requirements; and

(13) Utility requirements.

c. Develop Facilities and Infrastructure Plan. The requirements analysis and the results of site surveys must be documented in a Facilities and Infrastructure Plan, which identifies all facilities and infrastructure requirements and implementations for the asset and its supporting outfitting. The asset Facilities and Infrastructure Plan must be developed as specified in the ILSP template and updated throughout the asset life cycle concurrent with ILSP updates. Examples of facilities and infrastructure element details to be presented include, but are not limited to:

(1) Facilities and infrastructure scheduling requirements throughout the asset life cycle;

(2) Shore and afloat (or embarked) personnel berthing area requirements summary;

(3) Hangar, ramp (including aircraft tie-down requirements), taxiway, and runway facilities;

(4) Facilities connections requirements summary (including service requirements for sewage, fuel, grey water, bilge water, potable water,

telephone, electrical, fuel dispensing, compressed air, air conditioning, heat, etc.);

(5) Mooring devices, fendering system, and deck fitting requirements summary;

(6) Shore-side support services summary (including lighting, parking, refuse removal, hazardous waste disposal, replenishment of consumable materiel, and fire protection);

(7) C4IT related assets (e.g., communications towers);

(8) Facilities and infrastructure transition criteria and site activation plan; and

(9) Work space and storage facilities requirements summary (including classified areas, archive storage, hazardous material and waste storage, etc.) and any special requirements for electrical power, compressed air, etc., within these facilities.

4. Outputs. Facilities and Infrastructure ILS element analysis produces a Facilities and Infrastructure Plan.

L. Evaluate the Computer Resources Element.

1. Discussion. The Computer Resources ILS element analyzes and identifies the requirements for sustaining computer hardware and software throughout their life cycle, such as:

a. Computer Hardware.

(1) Stand-alone computer systems;

(2) Embedded computer systems (computers within other devices);

(3) Internal, external, fixed, and mobile computer facilities; and,

(4) Ancillary equipment, networks, telecommunications systems, data storage.

b. Computer Software.

(1) Middleware;

(2) Firmware;

(3) System software (e.g., operating systems);

(4) Support software (e.g., utilities, security software, Automated Test Equipment (ATE) software; BIT software, software development tools, etc.);

(5) Commercial Off-The-Shelf (COTS) application software; and,

(6) Custom application software (object code and source code).

The results of this analysis are reported in a Computer Resources Management Plan.

c. Computer Hardware Maintenance versus Software Maintenance. While computer hardware maintenance uses a similar approach to that used for most other electronic equipment, the software maintenance approach differs. Where hardware maintenance typically replaces or repairs failed parts with identical, functioning parts (without changing the product baseline), software maintenance modifies code to correct a defect, provide a new functionality, or accommodate policy or hardware changes or new technology: it is in fact a development process that changes the product baseline. Even if the software modification is created by a COTS provider or a contractor and provided as a user-installed patch or automated upgrade, the software is no longer identical to the original version. This requires additional considerations, such as:

(1) Testing the new code to ensure intended changes work and unintended changes are not introduced (this testing typically requires establishing test environments that simulate operational environments and development and maintenance of regression test procedures or programs);

(2) Additional CM/CCB activity to update product baselines;

(3) Updates to software engineering documentation to ensure it reflects the new baseline to enable future software changes;

(4) Updates to operator and training documentation and aids; and,

(5) Additional user training.

These considerations are typically addressed by a System Support Agent (SSA): the identified individual, unit, firm, agency, or organization that has responsibility for maintenance, support, and availability of a system.

2. Inputs. Computer Resources ILS Element analysis accepts the initial functional baseline, current product baseline and AEL as inputs.

3. Activities.

a. Develop Computer Resources Support Program. Computer Resources ILS element analysis must execute the steps below.

(1) Identify asset systems/subsystems/components that are computer resources. These include those that have embedded computer software/firmware as well as more obvious data processing equipment.

(2) Review and safeguard each identified computer resource in accordance with the U.S. Coast Guard Cybersecurity Manual, COMDTINST M5500.13 (series) (FOUO).

(3) For each identified computer resource, identify the asset's hardware components. Logistics support for computer resources hardware identified during Computer Resources ILS element analysis must be developed and documented as part of the overall system hardware or under the Support Equipment ILS element (Paragraph H).

(4) For each identified computer resource, identify the asset's software components (including firmware, middleware, operating systems, COTS applications, Software as a Service (SaaS); and custom applications). For each software component, identify:

(a) The organization that will perform, or has the responsibility for, design, development, and implementation of the component. For COTS products, this is typically the manufacturer;

(b) The SSA, who will be responsible for modifications and upgrades including multi-system changes, block changes, preplanned product improvements, software defect repair, and other types of system change packages;

(c) For software that may require Coast Guard support or for which support may be contracted in the future, identify:

[1] Software development/support tools (hardware, software, test environments, facilities, etc.) required;

[2] Support documentation (e.g., software design documents, Entity Relationship Diagrams, logic diagrams, etc.) required to enable support and/or competitive support contracting;

[3] Software support personnel (engineers/developers/programmers, testers, etc.) requirements; and

[4] Interim and/or warranty software support to be provided.

(d) Data rights and licensing requirements. Identify any software component for which the Coast Guard will have less than full data rights. Specify what rights will and will not be owned and what, if any, software is proprietary. For all software for which the Coast Guard will have anything less than full data rights, specify how the software will be supported throughout the life cycle.

(5) For each identified computer resource, identify personnel requirements. Manpower and personnel requirements identified during Computer Resources ILS element analysis must be further developed and documented under the Manpower and Personnel ILS element (Paragraph I).

(6) For each identified computer resource, identify and describe the data management requirements, including but not limited to:

(a) Storage;

(b) Backup (copies of data used to restore data in case it is corrupted or destroyed);

(c) Archiving (moving data that is no longer actively used to a separate data storage device for long-term retention for future reference or regulatory compliance); and

(d) Disposal and sanitation.

(7) For each identified computer resource, identify and describe disaster recovery requirements. These are procedures necessary to ensure the capability to restore the computer resource (including restoring hardware,

operating and application software, data, networks, etc.) in the event of catastrophic failure.

b. Publish Computer Resources Management Plan. The Computer Resources Management Plan is the overall computer system management plan for the system. Computer Resources Management Plans must:

(1) Identify the computer resources (systems/subsystems and hardware and software components) within the asset;

(2) Describe the SIA review conducted for each computer resource, the conclusions and findings of the review, and the SIA plans required to mitigate findings;

(3) For each hardware component, reference its coverage in the system/support equipment maintenance and operation documentation;

(4) For each software component, identify and describe:

(a) The organization that will perform, or has the responsibility for, design, development, and implementation of the software;

(b) The SSA;

(c) For non-COTS software, the software development process to be employed and any supporting documentation needed;

(d) The maintenance strategy (e.g., warranty/COTS support, contractor support, organic support, etc.) and plan for the software, including defect/enhancement tracking, software CM, quality assurance, functional testing, and regression testing; and

(e) The data management approach and plan.

(5) For each computer system/subsystem, identify and describe the disaster recovery plan.

4. Outputs. Computer Resources ILS element analysis produces the Computer Resources Management Plan.

M. Evaluate Design Interface Element.

1. Discussion.

As the Maintenance Planning ILS element is the cornerstone of ILS, the Design Interface ILS element is its capstone. Design Interface brings together and analyzes the asset design and the overall support program defined in the plans generated by the other ILS elements to predict and measure the ability of the asset and its support program to meet its key support KPPs/KSAs (including A_O and TOC) throughout the life cycle (RAM); predict and assess the impact of the asset and its support program upon humans and the environment (Environment, Safety, and Occupational Health (ESOH)); and suggest modifications to the asset design to enhance compliance with requirements and lower TOC (Design for Supportability).

Design interface activities repeat and continue throughout the asset life cycle: during acquisition, Design Interface ILS element analyses estimate compliance with supportability requirements and suggest support program or design modifications where needed, and the analysis is repeated. During sustainment, the process continues, evaluating actual performance instead of estimated performance.

2. Inputs. Due to the inclusive nature and wide scope of Design Interface ILS element analysis, any and all supportability or design materials related to the program may be required, however key inputs include:

   a. ORD;

   b. MECL;

   c. Asset Maintenance Plan;

   d. MRI; and,

   e. LORA Report.

3. Activities.

   a. Reliability, Availability, and Maintainability (RAM) Analysis. Reliability, Availability, and Maintainability (RAM) characteristics focus upon an asset's ability to remain failure-free, ability to remain in usable condition, and maintenance resource consumption requirements. The criticality of a failure is gauged by its impact on asset status (described in Chapter 4.D.3.A(1)).

      (1) Reliability is the ability of a system or component to perform its required functions under stated conditions for a specified period of time. Basic Reliability considers all failures, while Mission Reliability considers only those that occur during a given mission type. Key Reliability measures include those described below.

         (a) Mean Time Between Maintenance (MTBM). The average length of uptime between all maintenance actions, including repairing design/manufacturing failures and maintenance-induced failures, performing preventive maintenance, and other actions (e.g., removing an item to enable other maintenance) that preclude the system from being available.

         (b) Mean Time Between Failures (MTBF). The average of the total functioning life of a population of items during a specific time interval divided by the number of failures during the interval.

      (2) Maintainability is the ease, accuracy, safety, and resource consumption required to retain an asset in (or restore an asset to) a specified condition using defined maintenance resources (procedures, tools, skills, etc.). Additional factors influencing maintainability include producibility, testability, transportability, survivability, and standardization. Key maintainability metrics include:

         (a) Mean Time To Repair (MTTR). The average time required to repair the asset; and,

(b) Mean Maintenance Time (MMT). The average time devoted to both corrective and preventive maintenance.

(3) Availability measures how often an asset is sufficiently operable and capable of being immediately committed to accomplish its designed mission. Availability is a function of the asset's Reliability and Maintainability and logistics program's efficiency. Depending upon the type of asset involved, Availability is measured using one of the two methods described below.

(a) For aircraft, the AI is the percentage of time that aircraft assigned to Air Stations are mission ready. AI is defined as follows:

AI = (100 – NMCT) *where*

NMCT = Not Mission Capable Total = NMCM + NMCS + NMCD (units).

NMCD (units) reflects the portion of Not Mission Capable Time due to Depot-level Maintenance that is performed at a unit.

(b) For all other Coast Guard assets, Operational Availability (A_o), Material Availability (A_M), and Inherent Availability (A_i) are used. These measures describe the availability of any particular asset, the overall availability of the complete class of assets, and the availability of an asset excluding operational and support environment effects, respectively.

[1] A_O is the percentage of time an operationally deployed asset is not in a planned/unplanned maintenance availability or is NOT in a NMCM or NMCS status over a given operating period. Operational Availability must be derived from asset status records using the following formula:

A_O = 100% - (NMCM + NMCS)

[2] A_M is the percentage (or decimal equivalent) of the total inventory of a system that is ready to perform an assigned mission at a given time, based on materiel condition. A_M provides a snapshot of the overall efficiency of a particular population of assets, and applies to all end items in the population regardless of their condition. Materiel Availability must be derived from asset status records using the following formula:

A_M = 100% - (NMCD + NMCM + NMCS)

[3] A_i is a measure of availability that includes only the effects of an item design and application, and does not account for effects of the operational and support environment.[5] A_i ignores standby and delay times associated with preventive maintenance as well as

[5] A_i is not interchangeable with the AI metric.

MLDT and may be calculated as the ratio or MTBF divided by the sum of MTBF and MTTR:

A_i = MTBF ÷ (MTBF + MTTR)

(4) Programs must plan, prepare, conduct, and document a RAM Analysis that verifies that the allocated subsystem and equipment RAM requirements satisfy the System RAM requirements.

(5) Programs must perform the RAM analysis using an appropriate RAM handbook as a guide, such as:

(a) Institute of Electrical and Electronics Engineers IEEE Standard Reliability Program for the Development and Production of Electronic Systems and Equipment, IEEE STD 1332-1998;

(b) SAE International JA 1000, Reliability Program Standard and SAE International JA 1000-1, Surface Vehicle/Aerospace Recommended Practice Reliability Program Standard Implementation Guide;

(c) American National Standards Institute (ANSI)/Government Electronics & Information Technology Association (GEIA) STD-0009, Reliability Program Standard for Systems Design, Development, and Manufacturing;

(d) SAE JA1010 Maintainability Program; or,

(e) DoD Guide for Achieving Reliability, Availability and Maintainability (series).

b. Environment, Safety, and Occupational Health (ESOH).

ESOH is at its core a broad risk management analysis effort intended to identify and mitigate risks associated with the asset, its use, and its support throughout its life cycle. ESOH analysis applies systems engineering principles to optimize risk mitigation within the constraints of operational effectiveness, cost, and time.

The specific considerations to be considered vary widely depending upon the nature of the asset under consideration. ESOH considerations include, but are not limited to, the following:

(1) Environmental Health Considerations. Risks caused by conditions in and around the asset and the operational context in which the system will operate or be maintained that may harm humans. Factors may include but are not limited to vibration, ventilation, temperature, etc.;

(2) Environmental Impact Considerations. Possible negative impact to the environment (pollution) that may occur during system design, development, testing, production, support, operation, maintenance, and disposal;

(3) HSI Considerations. Risks caused by the relationship between humans, their environment, and the asset. Formal HSI consists of seven domains:

(a) Manpower. Detailed under the Manpower and Personnel ILS element;

(b) Personnel Capabilities. Detailed under the Manpower and Personnel ILS element;

(c) Training. Detailed under the Training and Training Support ILS element;

(d) Human Factors Engineering (HFE). Consideration of physical, cognitive, and sensory requirements needed to maximize the ability of an individual or crew to operate and maintain a system at required levels by eliminating design-induced difficulty and error; and,

(e) Systems Safety. System characteristics that increase potential harm to personnel, property, or mission success. .

(f) Health Hazards.

[1] Occupational Health Considerations. Occupational health factors are those that increase the risk of injury, acute or chronic illness, or disability; and/or reduce job performance of personnel who operate, maintain, or support the system.

[2] Habitability. Living and working conditions necessary to sustain the morale, safety, health, and comfort of the user population. Examples include requirements for heating and air-conditioning, noise filters, lavatories, showers, dry cleaning and laundry.

[3] HAZMAT Considerations. Risks caused by use of materials that may be harmful to humans or property. HAZMAT are substances or materials which have been determined to be capable of posing an unreasonable risk to health, safety, and property or any material which has been determined to be capable of posing an unreasonable risk to health, safety, or property. Examples include biohazard material, radioactive material, toxic material, carcinogens, explosives, elevated temperature materials (e.g., hot effluents), flammable substances, etc.

[4] Personnel Survivability Considerations. The ability to resist loss/damage under operating conditions. It enables a rapid restoration of the system, sub-system, component, or equipment. Personnel Survivability is asset characteristics that can reduce fratricide, detectability, and probability of being attacked, minimize system damage, personnel injury, and cognitive and physical fatigue. For example, ensuring the system does not have an identifiable electronic or thermal signature, provides adequate ballistic protection from the crew, or does not create an unacceptable fratricide risk enhances survivability.

(g) HSI References.

Refer to the following references for additional guidance on conducting ESOH analysis:

[1] Safety and Environmental Health Manual, COMDTINST

M5100.47 (series);

[2] Acquisition Directorate Standard Operating Procedure 9-7, Project Risk Management and Mishap Risk Management;

[3] Environment, Energy and Water Efficiency, Renewable Energy Technologies, Occupational Safety, and Drug-Free Workplace, FAR Part 23;

[4] Environment, Conservation, Occupational Safety and Drug-Free Workplace, Homeland Security Acquisition Regulation (HSAR) Part 3023; and,

[5] Reference (b).

ESOH analyses must be planned and documented in a Programmatic Environment, Safety, and Occupational Health Evaluation (PESHE). The PESHE must transition from a planning document during acquisition into an ESOH risk management tool as the program matures to facilitate implementation of a closed loop hazard tracking system. The tracking system must maintain records of all identified hazards and must ensure a closed loop process of identifying and controlling risks. The minimum data elements that must be tracked are listed in Table 5-5.

Table 5-5: Programmatic Environment, Safety, and Occupational Health Evaluation (PESCHE) Data Requirements

Type	Description
Reference Number	This is a specific number assigned to a tracked safety risk.
Date	The date on which the record was initiated
Status	Record status: open, monitor, or closed
Title	A specific appropriate short title for the record
Description	The description of the specific hazardous event under study and its worst case outcome (the safety related concern.)
Causes/Contributors	The contributory events singly or in combination that can create the event under study. Indicate specific failures, malfunctions, anomalies, errors.
Risk (severity and likelihood)	The risk associated with the event, including initial risk (the risk prior to mitigation). Also include the residual risk (the worst-case risks after the controls are implemented).
Suggested/Possible Mitigations/Controls	The design and/or administrative controls, precautions, and recommendations to reduce or design-out the risk.
Evaluation	The activities and entities required to evaluate the specific event
Implemented Mitigations/Controls	The design and/or administrative controls, precautions, and recommendations that have been verified

Type	Description
Verification and validation	The verification and validation to assure that System safety is adequately demonstrated. Risk controls (mitigation) must be formally verified as being implemented. Safety verification is accomplished by the following methods: inspection, analysis, demonstration, and test. Validation is the determination as to the adequacy of the control.
Narrative History	A chronological living history of all actions taken relative to the safety risk.
References	Appropriate references associated with the specific safety risk, such as analysis reports, CIs, software CIs, procedures, tests, and documents.
Originator(s)	The person(s) originating the risk record
Concurrence	Appropriate concurrence is required to close a safety risk (or monitor). IPT/PM/PLM concurrence is required for residual risk acceptance. Other concurrence rationale must also be documented, such as IPT (or other Coast Guard entity) concurrence.

c. Design for Supportability.

When predicted/actual support measurements or ESOH issues that require mitigation arise, there are two mechanisms available to address them:

(1) Modify the asset design to eliminate the problem; or,

(2) Change the support program in some way to manage the problem.

The former eliminates the problem; the latter minimizes it. Both approaches operate under the constraints of schedule and TOC.

Programs must establish a Design for Supportability program for considering supportability and sustainment issues and exercising one or both of these mechanisms to eliminate or mitigate them. Program structure may vary widely depending upon the asset, but at minimum the PM, PLM, and cognizant LEMs must participate.

The Design for Supportability process must determine how the asset ILS program can best leverage all SELC events and data flows, including but not limited to design reviews, system testing events, maintainability demonstrations, logistics assessments, and readiness reviews, and take the steps necessary to ensure ILS attendance and/or participation.

d. Document Design Interface Plan. Design Interface is an ongoing practice and specific activities, tools, and participants may vary widely from asset to asset. A formal plan that defines the RAM, ESOH, and Design for Sustainability programs for each asset must be published as a section within or appendix to the ILSP. The following subsections must be provided within or as an attachment to the Design Interface Plan.

(1) RAM Program Plan. RAM Program Plans must be continuously updated throughout the life cycle of the asset. RAM Program Plans must:

(a) Identify the RAM handbook and any tools (e.g., software) used in the RAM program;

(b) Identify by command/office the parties responsible for program RAM analysis and documentation;

(c) Explain how RAM will be estimated, measured, and used in all phases of the asset life cycle;

(d) Identify the method to be used to identify mission critical systems and components for analysis;

(e) Provide a schedule for RAM activities;

(f) Report the program's sustainment KPPs/KSAs and threshold and objective values;

(g) Provide basic and mission reliability predictions;

(h) Provide a system-level mission A_O prediction; and

(i) Include and maintain a graphical reliability block diagram identifying components, redundancy, MTBF, and MTTR characteristics. The reliability block diagram must be prepared to show a concise visual shorthand of the various series-parallel block combinations (paths) of components required for mission success. The reliability block diagram must provide the basis for accurate mathematical representation of mission reliability and A_O.

(2) ESOH Program Plan. There is no specific format for the PESHE: the program documents ESOH analysis in whatever manner is most useful to the program, best communicates to decision makers what ESOH issues affect the program, and best affords its transition from a planning document into a closed loop hazard tracking system.

(3) Design for Supportability Plan. The Design for Supportability Plan must fully describe the Design for Supportability activities, including but not limited to:

(a) The commands/offices responsible for implementing the Design for Supportability program;

(b) The mechanisms to be used to record, track, and communicate the activities and decisions of the program;

(c) The mechanism to be used to communicate and submit ECPs;

(d) The schedule for the Design for Supportability program, including meetings, regular communications, and SELC events involving the program; and

(e) How ILS personnel will participate in all SELC events appearing on the schedule.

4. Outputs. Outputs from Design Interface include:

a. Design Interface Plan, including:

(1) RAM Program Plan;

(2) ESOH Program Plan (PESHE); and,

(3) Design for Maintainability Program Plan;

b. Closed Loop Hazard Tracking System; and,

c. ECPs.

N. Exit Criteria. Life cycle support planning ends when the asset is no longer supported by the Coast Guard.

APPENDIX A. LIST OF ACRONYMS.

3D	Three-dimensional
AA	Analysis of Alternatives
AC&I	Acquisition, Construction and Improvement
ACMS	Asset Computerized Maintenance System
ADE	Acquisition Decision Event
AEL	Allowance Equipage List
A_i	Inherent Availability
AI	Availability Index
AIDC	Automatic Identification and Data Capture
AIT	Automated Identification Technology
A_M	Materiel Availability
ANSI	American National Standards Institute
A_O	Operational Availability
APB	Acquisition Program Baseline
APL	Allowance Parts List
APO	Asset Project Office
ASSIST	Acquisition Streamlining and Standardization Information System
ATE	Automated Test Equipment
BIT	Built-In Test
BITE	Build-In Test Equipment
C4IT	Control, Communications, Computers, and Information Technology
CA	Criticality Analysis
CAD	Computer Aided Design
CAGE	Commercial and Government Entity
CANDI	Commercial and Non-Developmental Item
CAR	Corrective Action Request
CBM	Condition Based Maintenance
CBM+	Condition Based Maintenance Plus
CCB	Configuration Control Board
CDD	Capability Development Document
CDR	Critical Design Review

CDRL	Contract Data Requirements List
CDRS/MO	Container Design Retrieval System Management Office
CE	Categorically Excluded
CFR	Code of Federal Regulations
CG-LIMS	Coast Guard Logistics Information Management System
CGSD	Coast Guard Support Date
CI	Configuration Item
CIA	Critical Item Analysis
CILRU	Configuration Item Line Replaceable Unit
CM	Configuration Management
CMP	Configuration Management Plan
COI	Certificate Of Identicality
COMDTINST	Commandant Instruction
CONOPS	Concept of Operations
COTS	Commercial Off-The-Shelf
CPD	Capability Production Document
CSA	Configuration Status Accounting
CSE	Common Support Equipment
CY	Calendar Year
DCMS	Deputy Commandant for Mission Support
DHS	Department of Homeland Security
DID	Data Item Description
DMP	Diminishing Manufacturing Sources and Material Shortages Management Plan
DMSMS	Diminishing Manufacturing Sources and Material Shortages
DoD	Department of Defense
DOL	Director of Operational Logistics
DOT	Department of Transportation
EAL	Electronic Asset Logbook
ECONOP	Engineering Logistics Concept of Operations
ECP	Engineering Change Proposal
EDFP	Engineering Data for Provisioning

EMSEC	Emissions Security
ESOH	Environment, Safety, and Occupational Health
ETA	Engineering Technical Authority
FBD	Functional Block Diagram
FC-T	FORCECOM Training Division
FCA	Functional Configuration Audit
FCA	Failure Compensation Analysis
FCP	Federal Catalog Program
FFA	Functional Failure Analysis
FFF	Form, Fit, and Function
FLIS	Federal Logistics Information System
FMC	Fully Mission Capable
FMEA	Failure Mode and Effects Analysis
FMECA	Failure Modes, Effects, and Criticality Analysis
FOC	Full Operational Capability
FRACAS	Failure Reporting, Analysis, and Corrective Action System
FSC	Federal Supply Classification
FY	Fiscal Year
GEIA	Government Electronics & Information Technology Association
GIDEP	Government-Industry Data Exchange Program
GPETE	General Purpose Electronic Test Equipment
GSE	Ground Support Equipment
GUCL	General Use Consumables List
HAZMAT	Hazardous Materials
HFE	Human Factors Engineering
HSAR	Homeland Security Acquisition Regulation
HSI	Human Systems Integration
ICD	Interface Control Document
ICP	Inventory Control Point
IEEE	Institute of Electrical and Electronics Engineers
IEM	Inactive Equipment Maintenance
IETM	Interactive Electronic Technical Manual

ILA	Independent Logistics Assessment
ILS	Integrated Logistics Support
ILSM	Integrated Logistics Support Manager
ILSMT	Integrated Logistics Support Management Team
ILSP	Integrated Logistics Support Plan
IOC	Initial Operational Capability
IOT&E	Initial Operational Test and Evaluation
IPB	Illustrated Parts Breakdown
IPDE	Integrated Product Data Environment
IPT	Integrated Product Team
IRAD	Independent Research And Development
IUID	Item Unique Identification
KPP	Key Performance Parameter
KSA	Key System Attribute
LC/SC	Logistics Center/Service Center
LCC	Life Cycle Cost
LCCE	Life Cycle Cost Estimate
LEM	Logistics Element Manager
LLTI	Long Lead Time Item
LLTIL	Long Lead Time Items List
LLTIPC	Long Lead Time Item Provisioning Conference
LMS	Logistics Master Schedule
LORA	Level of Repair Analysis
LRFP	Logistics Resource Funding Plan
LRIP	Limited Rate Initial Production
LRR	Logistics Readiness Review
LRU	Line or Lowest Replaceable Unit
MAR	Mission Analysis Report
McpOH	Maintenance Cost per Operating Hour
MECL	Master Equipment Configuration List
MER	Manpower Estimate Report
MIP	Maintenance Index Page

MLDT	Mean Logistics Delay Time
MLH	Maintenance Labor Hours
MMT	Mean Maintenance Time
MNS	Mission Needs Statement
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MPC	Maintenance Procedure Card
MRA	Manpower Requirements Analysis
MRD	Manpower Requirement Determination
MRI	Maintenance Requirements Index
MRL	Maintenance Requirements List
MSAM	Major Systems Acquisition Manual
MTA	Maintenance Task Analysis
MTBF	Mean Time Between Failure
MTBM	Mean Time Between Maintenance
MTTR	Mean Time To Repair
N/A	Not Applicable
NARA	National Archives and Records Administration
NEPA	National Environmental Policy Act
NESSS	Naval & Electronics Supply Support System
NET	New Equipment Training
NIIN	National Item Identification Number
NMAP	Non-Major Acquisition Process
NMCD	Not Mission Capable Depot
NMCL	Not Mission Capable Lay-up
NMCM	Not Mission Capable Maintenance
NMCS	Not Mission Capable Supply
NSN	National Stock Number
O&M	Operations and Maintenance
OGA	Other Government Agency
OJT	On-the-Job-Training
OMB	Office of Management and Budget

OMIT	Operation, Maintenance, Installation, and Training
OORS	Official Operational Reporting System
OPTEMPO	Operational Tempo
ORD	Operational Requirements Document
OSHA	Office of Safety and Health Administration
OTS	Over-the-Shoulder
P-ORD	Preliminary Operational Requirements Document
PAFOS	Provisioning Allowance and Fitting Out Support
PBL	Performance Based Logistics
PCA	Physical Configuration Audit
PDF	Portable Document Format
PDR	Preliminary Design Review
PEO	Program Executive Officer
PESHE	Programmatic Environment, Safety, and Occupational Health Evaluation
PGC	Provisioning Guidance Conference
PHS&T	Packaging, Handling, Storage, and Transportation
PII	Personally Identifiable Information
PLM	Product Line Manager
PM	Program Manager
PMC	Partially Mission Capable
POAM	Plan of Action and Milestones
PPL	Provisioning Parts List
PRR	Production Readiness Review
PSE	Peculiar Support Equipment
PTD	Provisioning Technical Documentation
RACI	Responsible, Accountable, Consulted, Informed
RAM	Reliability, Availability, and Maintainability
RBD	Reliability Block Diagram
RBS	Readiness Based Sparing
RCM	Reliability Centered Maintenance
RDT&E	Research, Development, Test, and Evaluation
RFID	Radio Frequency Identification

RIL	Repairable Item List
RPA	Risk Priority Analysis
RPSTL	Repair Parts and Special Tools List
SaaS	Software as a Service
SAE	Society of Automotive Engineers
SBIR	Small Business Innovative Research
SBU	Sensitive But Unclassified
SC/LC	Service Center or Logistics Center
SCM	Supply Chain Management
SELC	Systems Engineering Life Cycle
SLA	Service Level Agreement
SLMR	Staffing Logic and Manpower Requirements
SM&R	Source, Maintenance and Recovery
SME	Subject Matter Expert
SOP	Standard Operating Procedure
SOW	Statement of Work
SPETE	Special Purpose Electronic Test Equipment
SPII	Sensitive Personally Identifiable Information
SPPM	Supply Policy and Procedures Manual
SPS	Statement of Prior Submission
SSA	System Support Agent
STINFO	Scientific and Technical Information
T&E	Test and Evaluation
TCP	Tool Control Program
TCTO	Time Compliance Technical Order
TDP	Technical Data Package
TDRS	Technical Data Rights Strategy
TEMP	Test and Evaluation Management Plan
TMCR	Technical Manual Contract Requirements
TMDE	Test, Measurement, and Diagnostic Equipment
TO	Technical Order
TOC	Total Ownership Cost

TRS	Technical Repair Standard
TTP	Tactics, Techniques, and Procedures
U.S.	United States
U.S.C.	United States Code
USCG	United States Coast Guard
USO	Uniform Supply Operations
WBS	Work Breakdown Structure
XML	eXtensible Markup Language

APPENDIX B. GLOSSARY.

Acquisition Life Cycle – the standard sequence of events and practices to be used when acquiring Coast Guard assets.

Affordable Readiness - the ability of facilities/equipment to deliver designed outputs without unacceptable delay, and that level of readiness that can be sustained within the proscribed budget at minimum TOC.

Asset – any definable, created item that provides a benefit to its owner. Assets may include, but are not limited to, materiel, software, business processes, information, and capabilities, regardless of size, complexity, cost, or composition.

Availability Index (AI) – A measure of the availability of aircraft to perform operational missions. It indicates the percentage of time that aircraft assigned to Air Stations are available to perform Coast Guard Missions. AI is not interchangeable with the Inherent Availability metric (A_i) used to evaluate asset designs. AI is defined as follows:

AI = [100 - NMCT] *where*

NMCT = Not Mission Capable Total = NMCM + NMCS + NMCD (units).

NMCM is Not Mission Capable due to Organizational-level Maintenance.

NMCS is Not Mission Capable due to Supply.

NMCD (units) reflects the portion of Not Mission Capable Time due to Depot-level Maintenance that is performed at a unit.

Bi-Level Maintenance Concept – a maintenance concept is the planned or envisioned methods that will be employed to sustain the system/equipment at a defined level of readiness or in a specified condition in support of the operational requirement. This includes significant system/equipment characteristics, for example, BIT, compatibility with existing or planned testing and systems engineering, and a generalization of logistics support element requirements (manpower, equipment, facilities, and workload distribution throughout the defined maintenance level). The maintenance concept is initially stated by the government for design and support planning purposes and provides the basis or point of departure for development of the plan to maintain. The maintenance concept may be influenced or modified by economic, technical, or logistics considerations as the design development of the system/equipment proceeds. Bi-Level Maintenance assigns all maintenance tasks to either the organization (operators) or depot levels.

BIT/BITE – acronyms for Built-in Test and Built-in Test Equipment. Built-in Test is testing that is built into the asset, e.g., power-on self-test on a computer. Build-in Test Equipment is test equipment that is build into an asset, e.g., a battery health checker on an electronic device.

Corrective Action Request – a formal request to implement a change to correct a variance between requirements and performance.

Coast Guard Support Date (CGSD) - that date when all planned support capabilities for sustained operation and support have been fielded and implemented.

Configuration Item Line Replaceable Unit (CILRU) – a configuration managed component or item designed to be replaced quickly in an operating environment/operating location.

Configuration Management (CM) – applies appropriate processes and tools to establish and maintain consistency between the product and the product requirements and attributes defined in product configuration information. A disciplined CM process ensures that products conform to their requirements and are identified and documented in sufficient detail to support the product life cycle. CM assures accurate product configuration information and enables product interchangeability and safe product operation and maintenance to be achieved. CM includes four basic elements: configuration identification, configuration control, CSA, and configuration audits. CM policies and definitions are in Coast Guard Configuration Management Manual, COMDTINST M4130.6 (series) and are applicable to SE.

Corrective Maintenance – maintenance to restore lost or degraded functions by correcting unsatisfactory conditions.

Depot Maintenance – the term "depot maintenance and repair" means material maintenance or repair requiring the overhaul, upgrading, or rebuilding of an asset or its components, assemblies, or subassemblies. Depot maintenance also encompasses the testing and reclamation of equipment as necessary. These activities are categorized as depot-level maintenance regardless of the source of funds for the maintenance or repair or the location at which the maintenance or repair is performed. In essence, depot maintenance is work performed in support of another entity.

Disposal – the act of getting rid of excess, surplus, scraps, or salvages property under proper authority. Disposal may be accomplished by, but not limited to, transfer, donation, sale, declaration, abandonment, or destruction.

DLA – acronym for Defense Logistics Agency, the DoD's largest combat logistics agency.

End-of-Life – the point in time at which the Coast Guard no longer uses or supports an asset.

Engineering Change Proposal (ECP) – a formal request for a change in the configuration of an asset design.

Full Operational Capability (FOC) – a life cycle milestone that is attained when all units of an acquired asset have been received and deployed as planned and all support is in place.

GIDEP – acronym for Government – Industry Data Exchange Program, a cooperative activity between government and industry participants seeking to reduce or eliminate expenditures of resources by sharing technical information essential during research, design, development, production and operational phases of the life cycle of systems, facilities and equipment.

Inherent Availability (A_i) – The percent of time that an asset is theoretically available for use. It assumes that all maintenance and supply support is performed perfectly (as statistically estimated). This metric is primarily useful during system development when data obtained through actual asset use and maintenance is not available. A_i is not interchangeable with the Availability Index (AI) used in Aviation units.

Initial Operating Capability (IOC) – a life cycle milestone that is attained when the first unit is turned over to the operational command for use; the first attainment of the capability of a platform, system, or equipment of approved specific characteristics, operated by an adequately trained and equipped Coast Guard unit, that effectively performs the required mission, and whose sustainment planning is mature and sustainment support is adequate to maintain required availability.

Life Cycle – all events related to an asset that occur during the period of time beginning when the asset is officially defined and a decision is made to create/acquire it and ending when the asset is no longer supported by the Coast Guard (typically the point at which the Coast Guard disposes of the asset).

Life Cycle Logistics – a term used by some agencies (including Department of Homeland Security) as a synonym for Integrated Logistics Support.

LRIP – Acronym for Limited Rate Initial Production. An acquisition life cycle milestone that authorizes manufacturing of an asset under development in small quantities, usually for testing purposes.

Maintenance Procedure Cards – formally developed and configuration controlled documents that specify procedures to be performed to maintain assets.

Maintainability – the ease with which maintenance of a functional unit can be performed in accordance with prescribed requirements.

Materiel Availability (A_M) - Materiel Availability (A_M) measures the aggregate availability of the population/class of assets when those assets are NOT in a planned/unplanned maintenance availability or are NOT in a NMCM, NMCD, or NMCS status. Assets in a lay-up status (NMCL) are not reported in A_M metrics and reports. Materiel Availability must be derived from asset status records using the following formula:

$$A_M = 100\% - (NMCD+NMCM+NMCS)$$

Materiel Support Date - the date when a complete supply support capability is achieved.

MSAM – acronym for the Major System Acquisition Manual, the Coast Guard's authoritative document on major acquisition practice.

NMAP – acronym for the Non-major Acquisition Process, the Coast Guard's authoritative document on practice for IT and non-IT acquisitions that do not meet threshold requirements for major acquisitions.

Operational Availability (A_O) - A_O is the percentage of time an individual operationally deployed asset is not in a planned/unplanned maintenance availability or is NOT in a NMCM or NMCS status over a given operating period.

Operational Requirements Document – a document that specifies the user community requirements, including supportability requirements, for an asset.

Organic – assigned to or forming an essential part of an organization.

Organizational Maintenance – maintenance normally performed in the field in support of operational capabilities. The organizational maintenance mission is to maintain assigned equipment in a full mission-capable status. Organizational maintenance tasks can be grouped under the categories of inspections, servicing, adjusting, and preventive and corrective maintenance. Designation of a maintenance task as an organizational or depot capability does not direct assignment of activity responsibility. Allocation of an organizational maintenance task to a unit or depot level activity is a separate decision. Conditions to be met for operational units to conduct preventive and corrective maintenance are 1) capability; authorized to perform, trained to perform, equipped to perform the maintenance task, and 2) capacity; possessing the available man hours required to perform the task.

Other Government Agency - any United States Government organization other than the Coast Guard.

Preventative Maintenance – to minimize conditions that cause unacceptable degradation of functions.

Product Line – a grouping of similar assets that are managed by a Product Line Manager. Product lines provide total logistics and engineering support for the assets that fall within the product line.

Product Line Manager- a critical player in the centralized support model. This officer is responsible for all planning, budgeting, and execution of system support across the Coast Guard enterprise. To the field this is the face of the DCMS organization for that respective capability and the ultimate touch point for service support. Additionally, the PLM is also the Coast Guard customer to work support issues with original equipment manufacturers, OGAs, and other support vendors.

Program Management - The responsibility to set policy and advocate for people, resources, and support for a specific mission set, mission support service/capability, or asset/system. Program Management involves acting on the government's behalf in matters relating to the delivery and/or sustainment of an asset, system or capability; working collaboratively with the appropriate Technical Authorities to ensure that established policies, standards, guidelines, architecture, and best practices are followed.

Quality Assurance (QA) – a planned and systematic pattern of all the actions necessary to provide adequate confidence that the item or product conforms to established technical requirements.

Reliability – the ability of a system or component to perform its required functions under stated conditions for a specified period of time.

Reliability Centered Maintenance (RCM) –a systematic approach for identifying preventative or scheduled maintenance tasks for an equipment end item and establishing necessary preventative (or scheduled) maintenance task intervals with the objective of maintaining the inherent reliability of a system or equipment, recognizing that changes in inherent reliability may be achieved only through design changes.

Systems Engineering Life Cycle (SELC) – the defined processes applied to apply systems engineering approaches to asset development and support.

Software Maintenance – those activities after Initial Operating Capability (IOC) necessary to (1) correct errors in the software, (2) add incremental capability improvements (or delete unneeded features) through software changes, and (3) adapt software to retain compatibility with hardware or with other systems with which the software interfaces. Depot-level software maintenance consists of changes made to operational software resident in materiel (e.g., systems and their components, and their associated ATE and test program sets).

Supply Support – the ILS element that focuses on maintenance parts, expendables, and consumables required by an asset.

Support Equipment – all equipment (mobile and fixed) required to support the operation and maintenance of a materiel system. This includes associated multi-use support items, ground handling and maintenance equipment, tools, metrology and calibration equipment, and manual and automatic test equipment. It includes the acquisition of logistics support for the support equipment itself.

Sustainment – the supportability of fielded systems and their subsequent life cycle product support from initial procurement to supply chain management (including maintenance) to reutilization and disposal. It includes initial provisioning, cataloging, inventory management and warehousing, and depot and field level maintenance.

System – a combination of two or more interrelated pieces of equipment (sets) arranged in a functional package to perform an operational function or to satisfy a requirement.

System Safety – the application of engineering and management principles, criteria, and techniques to achieve acceptable mishap risk, within the constraints of operational effectiveness and suitability, time, and cost, throughout all phases of the system life cycle.

Technical Authority – the authority, responsibility, and accountability to establish, monitor, and approve technical standards, tools, processes and best practices, and certify conformance with statute, policy, requirements, architectures, and standards. The Technical Authority enables the sustainability of people, platforms and assets.

Technical Data – scientific or technical information recorded in any form or medium (such as manuals and drawings) necessary to operate and maintain a system. Documentation of computer programs and related software are TD. Computer programs and related software are not TD. Also excluded are financial data or other information related to contract administration.

Test, Measurement, and Diagnostic Equipment (TMDE) – any system or device used to evaluate the operating condition of a system or equipment to identify or isolate any actual or potential malfunction. TMDE also includes Automatic Test Equipment (ATE) and Test Program Set.

Testing – subjecting an item to prescribed conditions to determine if it will function per predetermined requirements and recording and reporting the results.

Undocumented Asset – an asset currently in operational use for which no ILSP has been developed.

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APPENDIX C. INDEPENDENT LOGISTICS ASSESSMENT (ILA) CRITERIA

A. Scope.

This appendix provides assessment criteria used when conducting an ILA. The criteria are neither platform nor system specific. Rather, they are critical evaluation factors which may be further defined or modified to suit program requirements.

The Status column contains an I, IP, F, or U. Definitions for each are provided below. Since programs vary in their acquisition approach and strategy, the letters in the status column may vary and should be used as a guide and not a hard requirement.

B. Explanation of Letter Codes

I (Initiated): The strategy and approach have been defined and documented in program plans to include the IMS, and funding is identified in the appropriate funding documents. The activity/product is included in contractual documentation (Request for Proposal (RFP), contract, tasking orders, etc.).

IP (In Process): Efforts for the activity or product are in process, to include analyses, assessments, studies, surveys, etc. Predecessor activities have been completed and precursor actions have been initiated or are in process as appropriate.

F (Finalized): The activity or product has been completed and is finalized, and has resulted in approval or decision by the approving/decision authority. The activity/product may also be in a completed state but not approved if a pending decision or approval will not impact dependent decisions or activities and the effort will be finalized prior to the milestone.

U (Update): The activity or product is updated as required by statute, regulation, or to reflect new data as the product/process matures.

1 ILS Management		
	ASSESSMENT CRITERIA	**Status**
1.1	Program Staffing	
1.1.1	The program office billets are filled with sufficient personnel who have the required experience and training.	F
1.1.2	An ILS Manager (ILSM) responsible for the management of supportability during acquisition and fielding is in place and has the needed experience, training and education, and certifications. The ILSM is an equal participant in the different forums to ensure program support is considered during design, production and deployment.	F
1.1.3	Personnel have the appropriate certifications commensurate with their tasking.	F
1.2	Management Planning	
1.2.1	Processes to plan for or manage supportability have been identified or are in place to a level of maturity as appropriate to the program phase. These are documented in the program ILSP and implementing program supportability documents, and are derived from statutory, regulatory, Coast Guard directive, and other requirements documents (system specification, etc.).	F
1.2.2	Program requirements documents quantify a threshold/objective range for each support and sustainment related performance parameter, with measurement metrics for each. Each parameter is associated with its programmatic resource cost to plan and execute across the projected life cycle. Supportability/Sustainment KPPs/KSAs are defined consistently across documents (Acquisition Strategy (AS), ILSP, contractual documentation, System/Subsystem Specification (SSS), etc.).	F
1.2.3	Performance threshold values are on target or have been met for evaluation at IOT&E and thus on track for IOC. If not, a plan is in place to ensure they are met.	IP
1.2.4	A risk management program has been established. Logistics support program risks and mitigation plans have been identified and assessed.	IP
1.2.5	The Program SELC Tailoring Plan ensures that supportability is included and considered in the engineering process.	F
1.2.6	MOAs/MOUs or other formal agreements have been developed between the program office, logistics or service centers, sponsor, user, software support activities, etc., that defines supportability requirements, administrative and personnel resources, funding, physical resources, etc.	I

1 ILS Management		
ASSESSMENT CRITERIA		**Status**
1.2.7	A standardization process/program is in place (and summarized in the AS) to reduce proliferation of non-standard parts and equipment and optimize parts commonality across system designs.	IP
1.2.8	If a warranty is used, a cost-benefit analysis is conducted to determine the appropriate spares/warranty strategy.	I
1.2.9	A fielding schedule has been developed.	IP
1.2.10	A fielding plan has been developed.	I
1.2.11	Interim support planning for all required program support is in place, including rationale for any lifetime interim support strategy.	I
1.3	PBL	
1.3.1	System level performance metrics have been established for the Performance Based Agreement (PBA) between Coast Guard personnel and the PM, and directly support KPPs. Metrics are in synchronization with the scope of support provider's responsibility.	I
1.3.2	PBL strategies have been considered for all support areas (support equipment calibration requirements, training, etc.) which incentivize performance, are metrics-based, and consider legacy systems.	I
1.4	Schedule	
1.4.1	A program Integrated Master Plan (IMP) has been developed that includes logistics support as criterion or accomplishments to meet criteria to meet program milestones as specified within program requirements documents (ICD/CDD/CPD, etc.).	U
1.4.2	A program Integrated Master Schedule (IMS) has been developed that: 1) is reflective of the program IMP; 2) contains detail on program support activities for both Government and contractor, to include precursor and predecessor relationships; 3) is detailed for the current phase of the program's life cycle; 4) reflects tasks identified in the ILSP. (Assessor tip: This is not a contractor delivery/activity schedule.)	U
1.5	Contractual Package	
1.5.1	The respective contractual package reflects the supportability efforts to be completed and delivered by the contractor as identified in program and program support planning documentation. (Assessor Note: When reviewing the contract package, ensure tasks or requirements identified as options have been exercised.)	F

1 ILS Management		
ASSESSMENT CRITERIA		**Status**
1.5.2	Specifications for supportability and the current contract include verification criteria which can be met (to include test, demonstration, analyses, and verification).	F
1.5.3	Supportability requirements are flowed down to the appropriate specifications.	IP
1.5.4	Contracts include metrics for tracking and assessing contract performance.	F
1.6	CM	
1.6.1	Requirements for the configuration identification, control, status accounting, CCB processes and membership (to include logistics participation), waivers/deviations, engineering changes, and verification/audit functions are established for hardware, software, and product/technical data and reflected in an approved Government and contractor Configuration Management Plan (CMP).	F
1.6.2	Appropriate configuration audits have been conducted. Configuration audits are scheduled.	IP
1.6.3	The appropriate baselines (e.g., functional, allocated, and product) have been established by the appropriate technical review events.	IP
1.6.4	The status of configuration change activity and approvals, and the version descriptions for software CIs under development and installed in hosting locations are tracked within the CSA function within the program's CM processes per the CMP.	I
1.6.5	The CSA information is maintained in a CM database that may include such information as the as-designed, as-built, as-delivered or as-modified configuration of the product as well as of any replaceable components within the product along with the associated product/technical data	I
1.7	Diminishing Manufacturing Sources and Material Shortages (DMSMS)	
1.7.1	The program has established a proactive DMSMS program that identifies obsolescence due to DMSMS before parts are unavailable. This is reflected in a formal DMSMS program management plan.	F

1 ILS Management		
	ASSESSMENT CRITERIA	**Status**
1.7.2	DMSMS forecasting/management tools and or service providers have been researched and selected, and Bill of Material (BOM) has been loaded into the system. The program also has a strategy for obtaining: a. Design disclosed items, including sub-tier hardware indenture levels; b. Form fit function/proprietary design items, including sub-tier hardware indenture levels; and, c. BOM, with a defined periodicity and specified level of indenture, in order to conduct reviews and upload of current BOMs.	IP
1.7.3	DMSMS exit strategy requires the PBL provider to ensure there are no end-of-life issues at completion of period of performance.	I
1.8	FRACAS	
1.8.1	FRACAS process, including failure analysis, is established and failures are analyzed and trended for program support visibility. BIT indications and false alarms are analyzed and included in the FRACAS process.	I
1.8.2	A FRACAS review is performed on engineering development models, pre-production units, production, and deployed units.	IP
1.8.3	Safety/mishap reports associated with materiel and design deficiencies are linked with or provide input into the FRACAS.	IP
1.9	Logistics Management Budgeting and Funding - Cost Estimating	
1.9.1	An LCCE has been developed for the program.	F
1.10	Logistics Management Budgeting and Funding - Funding	
1.10.1	LCCEs, including cost-reduction efforts, have been developed and validated optimizing TOC.	F
1.10.2	End of life and disposal requirements are planned and funded, as appropriate.	F

2 Design Interface		
ASSESSMENT CRITERIA		Status
2.1	Parts and Materials Selection	
2.1.1	Design guidelines for the contractor are provided that optimize supportability and maintainability of the system.	F
2.1.2	A parts standardization program has been implemented.	IP
2.1.3	Interoperability between other Coast Guard, DoD, and allied systems has been considered.	IP
2.1.4	Predicted failure rates have been verified and used to estimate annual operating costs	I
2.1.5	For applicable programs, the process for establishing and managing critical items/critical safety items list has been developed.	IP
2.1.6	For applicable programs, provisions for identifying Critical Safety Items (CSI), Critical Application Items (CAIs), and non-critical items have been identified.	F
2.1.7	For applicable programs, CSIs, CAIs, and non-critical items are incorporated in the Contract Statement of Work and program office tasking.	F
2.1.8	For applicable programs, a preliminary list of CSIs, CAIs, and non-critical items has been reconciled with latest ILS data and submitted.	I
2.1.9	For applicable programs, the CSI/CAI list and associated technical and management information has been approved by appropriate Government technical authorities and the final list has been submitted to the appropriate logistics databases.	I
2.1.10	Reliability verification testing has been planned or conducted for Commercial- Off-the-Shelf (COTS) components to ensure they meet or exceed overall system reliability requirements.	I
2.2	Testability and Diagnostics	
2.2.1	Preliminary Built-In-Test (BIT) and testability analysis is completed by Preliminary Design Review (PDR).	F
2.2.2	The BIT and testability concept is defined with the operation concept and the maintenance concept for all levels of maintenance.	IP
2.2.3	Design analyses (e.g., fault tree, FMECA) have been used to determine test point requirements and fault ambiguity group sizes.	IP
2.2.4	The level of repair and testability analysis is completed for each CI for each maintenance level to identify the optimum mix of BIT, semi-automatic test equipment, calibration standards, Maintenance Assist Modules (MAMs), and special purpose test equipment and general purpose test equipment.	I

2 Design Interface		
ASSESSMENT CRITERIA		**Status**
2.3	Reliability, Availability, Maintainability (RAM)	
2.3.1	Metrics for System Sustainment (Availability KPP (A_o and A_m), Reliability KSA R_m, and Ownership Cost KSA) objectives have been defined. Additional sustainment metrics, such as mean down time, customer wait time, and footprint reduction as appropriate have been assessed and defined.	F
2.3.2	RAM requirements are applied to all systems, including those that rely on or are developed with COTS/Non-Developmental Items (NDIs).	IP
2.3.3	RAM measures (e.g., A_o, MTBF, MTTR and MLDT, Fault Detection, Fault Isolation, and False Alarm) are defined in quantifiable and measurable.	F
2.3.4	RAM performance capability parameters are defined consistent with the ORD and flowed down to the Test and Evaluation Management Plan (TEMP), other programmatic documents, and RFP/contract as appropriate.	F
2.3.5	A process has been implemented to assess achieved RAM performance by collection and analysis of user data for factory and fielded units.	I
2.3.6	Predictions, analyses, and tests are conducted to verify if RAM requirements and KPPs will be met.	IP
2.3.7	Reliability growth program or other analyses/data indicate that system and subsystem reliability is appropriate to meet the stated requirement. A reliability growth plan has been implemented as appropriate.	F
2.3.8	Contracts include the requirement for supplier to implement RAM programs and provide updated analyses towards the achievement of those requirements (GEIA STD-0009 should be used as a reference for RAM contracting practices).	I
2.3.9	Contingencies for system selection or RAM/supportability design changes are considered when preliminary RAM thresholds are deemed unachievable.	I

2 Design Interface	
ASSESSMENT CRITERIA	**Status**
2.4 – ESOH - Environment	
2.4.1 A Program Environmental, Safety, and Health Evaluation (PESHE) has been developed that describes as a minimum: a. The strategy for integrating ESOH considerations into the systems engineering process; b. Identification of responsibilities for implementing the ESOH strategy; c. An approach to identify, and then eliminate or reduce ESOH hazards; d. Strategies for managing/mitigating ESOH risk/hazards where they cannot be avoided; e. Identification and status of ESOH risks including approval by proper authority for residual ESOH risks; f. The method for tracking progress; g. A schedule for completing NEPA/EO 12114 documentation including the approval authority of the documents; and, h. The Engineering and Logistics efforts being implemented to identify HAZMAT, wastes, and pollutants (discharges/emissions/noise) associated with the system and plans for their minimization and/or safe disposal. (Assessor Note: This should consider components with HAZMAT, such as hull structures painted with coatings containing heavy metals and manufactured items which are not hazardous during use, may require special handling disposal due to components containing HAZMAT (e.g., lead-containing microelectronics).	F
2.4.2 Environmental considerations (i.e., existing or lack of NEPA/EO 12114 coverage) that directly affect testing have been addressed in the TEMP as limitations or conditions of the testing.	F
2.4.3 All known ESOH risks have been accepted by the appropriate approval authority prior to release of the system to the user, and the residual ESOH hazard risk has been communicated to the user. The user representative has provided formal concurrence prior to all serious and high-risk acceptance decisions.	IP

2 Design Interface		
	ASSESSMENT CRITERIA	**Status**
2.4.4	Significant program events that could trigger NEPA/EP 12114 are included in the NEPA/EO 12114 Compliance Schedule. Significant program events include, as appropriate; a. Conducting test and evaluation of the system and/or subsystem; b. Contracting for production; c. Planning basing, training, and home porting locations; d. Planning new or major upgrades to facilities or supporting infrastructure to support the system; and; e. Demilitarization/disposal of the system.	F
2.4.5	The program has a plan for end of life cycle demilitarization and disposal, including munitions disposition.	I
2.4.6	For munitions developments, identify INSENSITIVE Munitions compliance level and plan.	I
2.5	ESOH - Safety and Occupational Health	
2.5.1	Noise sources are identified and evaluated during the system's design and control measures are implemented to minimize personal exposure.	F
2.5.2	Personnel protective equipment is specified in maintenance instructions and training manuals for relevant operations, and specified products are compliant with all Federal and consensus ANSI standards.	I
2.5.3	A system safety program to include interaction with systems engineering has been established per MIL-STD 882 (series) and Coast Guard requirements.	F
2.5.4	System safety design requirements are specified and legacy systems/subsystems/components have been analyzed and incorporated into the design requirements as appropriate.	IP
2.5.5	A closed-loop hazard tracking system is implemented. Hazard analysis is performed during the design process to identify and categorize hazards, including HAZMAT and associated processes. Corrective action is taken to eliminate or control the hazards, or to reduce the hazard to an acceptable level.	IP
2.5.6	All systems containing energetic materials comply with insensitive munitions criteria.	IP
2.5.7	The ESOH risk-management strategy has been incorporated into the SEP.	F
2.6	ESOH - Hazardous Material Management	

2 Design Interface		
ASSESSMENT CRITERIA		Status
2.6.1	HAZMAT prohibited (or limited/requiring waiver for use) in the weapon system design due to operation, maintenance, and disposal costs associated with the use of such materials have been identified and communicated via contracts to include sub-contractors.	F
2.6.2	HAZMAT and associated processes whose use cannot be avoided have been documented in supportability planning documents and communicated to the user and support installations for inclusion in their authorized use lists. This includes an inventory of materials incorporated into the weapon system (to include COTS/NDI) during production, materials required for maintenance, and hazardous wastes generated from maintenance processes.	IP
2.6.3	There is a plan for tracking, storing, handling and disposing of HAZMAT and hazardous waste consistent with HAZMAT Control and Management requirements.	IP
2.7	ESOH - Analysis	
2.7.1	Reliability growth data and curves show that reliability is improving.	I
2.7.2	A corrosion prevention control plan has been developed which identifies corrosion prevention, monitoring, maintenance during operation, and long term storage. The corrosion control process has been incorporated into maintenance planning.	F
2.7.3	HAZMAT findings and determinations are incorporated into the training program for all system-related personnel as applicable.	IP
2.7.4	The program has a plan to recycle or dispose of system replaceable and disposable components such as metals, plastics, electronic components, oils, coolants, and refrigerants during system life and end of service life.	F

2 Design Interface		
ASSESSMENT CRITERIA		Status
2.8	HSI	
2.8.1	HSI analysis has been performed addressing operator, maintainer and support personnel: a. Accessibility; b. Visibility; c. Human factors/ergonomics; d. Testability Complexity; e. Standardization and interchangeability; f. Use of mock-ups, modeling, and simulation; g. Operational experience; h. Workspace environment (e.g., heating, cooling, ventilation, illumination, noise, vibration); i. Design for effective handling and carrying; j. Controls and displays; k. User computer interface; l. ESOH; m. Usability; n. Habitability; o. Personnel survivability; and, p. Workload.	IP
2.8.2	Broad cognitive, physical, and sensory requirements for the operators, maintainers, and support personnel that contribute to /constrain total system performance have been analyzed.	IP
2.8.3	An HSI plan has been developed, executed, and maintained, and has been coordinated with subsystem HSI plans and the overall SEP.	IP

3 Sustaining Engineering		
	ASSESSMENT CRITERIA	**Status**
3.1	Analysis	
3.1.1	Reliability growth data and curves show that reliability is improving.	I
3.1.2	A corrosion prevention control plan has been developed which identifies corrosion prevention, monitoring, maintenance during operation, and long term storage. The corrosion control process has been incorporated into maintenance planning.	F
3.1.3	A methodology has been established to collect supportability performance metrics. These metrics are defined and are measureable. Metrics should: a. Be linked to system KPPs; b. Address system reliability and incentivize use of common DoD components; c. Motivate desired long-term behavior; d. Be understood and accepted by all stakeholders; and, e. Be assessable and verifiable by system stakeholders.	I
3.1.4	Supportability performance metrics are collected and assessed.	I
3.1.5	A support performance data collection system is planned/in place and operating; trends are monitored and fed back for appropriate corrective actions. A corrective action process is defined if PBL performance does not meet PBA agreement thresholds.	I

4 Supply Support		
ASSESSMENT CRITERIA		**Status**
4.1	Supply Chain Management	
4.1.1	Sparing analyses and levels: a. Are based on the use of an accepted Coast Guard-approved Readiness Based Sparing (RBS) methodology; b. Demand-based approved models are used when data is inadequate or the RBS approach is not cost effective; and, c. Repair parts reduction initiatives have been considered.	I
4.1.2	In instances where the provider is responsible for turnaround times and fillrate metrics, but the operating unit will own materiel at the consumer level, RBS is used to determine the consumer level based on the operational scenario of the platform. Definition of success is determined by meeting contracted supply chain management metrics.	I
4.1.3	Support strategies have been considered that are consistent with the end-to-end materiel flow process, from factory to the ultimate customer. It also identifies turnaround times for spares, replacement parts, refurbished and reworked items, fleet and field returns, etc.	IP
4.1.4	Based on process capabilities, processes have been mapped, capabilities determined, and process improvement initiatives identified.	IP
4.1.5	End-to-end logistics chain sustainment solutions have the flexibility to meet the full spectrum of contingencies with no loss of operational capability or tempo.	IP
4.1.6	Enterprise integration enables a single view of the supply chain of both organic and commercial provider asset inventories and asset tracking.	IP
4.1.7	Provisions for surge requirements are identified and reflected in the contract as applicable.	IP
4.1.8	Provisioning conferences are conducted, as necessary, to determine if the contractor's provisioning preparation, documentation, and facilities are adequate.	IP
4.1.9	Provisioning screening has been conducted to: a. Prevent duplicate entries in the supply data system; and, b. Obtain most cost-effective support, including consideration of using existing supply items.	IP
4.1.10	Item management codes are assigned, including Source, Maintainability, and Recoverability (SM&R) codes and those for HAZMAT.	IP

4 Supply Support		
ASSESSMENT CRITERIA		**Status**
4.1.11	Provisioning data reports have been generated. For example: a. Recommended repair parts list provided for pre-operational repair parts and training equipment; and, b. Provisioning Parts List (PPL) identifying the system components that will require NSNs and determining the range and depth of support items for an initial period of service. (i.e., spares in support of the test program). (See the Support Equipment element for associated provisioning requirements.)	IP
4.2	Interim Support	
4.2.1	An interim support plan is in place that details the interim support requirements that the provider will be required to execute.	IP
4.2.2	The interim support item list identifies support requirements for a transitional operating period.	IP

5 Maintenance Planning and Management		
	ASSESSMENT CRITERIA	**Status**
5.1	Maintenance Concept, Design & Analysis	
5.1.1	Accessibility, HFE, diagnostics, repair and sparing concepts for all maintenance levels are established.	F
5.1.2	Requirements for manpower factors that impact system design utilization rates (e.g., maintenance ratios) are identified.	F
5.1.3	Maintenance task times, maintenance skill levels and number of maintenance and support provider personnel required have been derived from but not limited to the following (see above references): a. Reliability (e.g., Mean MTBF); b. Maintainability (e.g., MTTR, and maintenance task analyses); c. Availability (e.g., task-time limits); d. Reliability and maintainability tests and demonstrations; e. Performance monitoring/fault detection/fault isolation and diagnostics; f. Fault Tree Analysis; g. Tasks and Function Analysis; and, h. Top down requirements analysis identify PMCS requirements/goals.	IP
5.1.4	Life-cycle supportability design, installation, maintenance, support equipment, calibration, and operating constraints (including safety and health compliance requirements) and guidelines are identified.	IP
5.1.5	Economic and non-economic Level of Repair Analysis (LORA) is planned to help identify the least-cost feasible repair level or discard alternative.	IP
5.2	Maintenance Planning and Plan	IP
5.2.1	CBM strategy or CBM+ strategy is used to determine maintenance decisions to reduce scheduled maintenance and manpower requirements, while reducing operation and sustainment costs and ensuring the appropriate maintenance is performed.	IP
5.2.2	The plan defines specific criteria for repair and maintenance for both maintenance levels in terms of time, accuracy, repair levels, built-in-test, testability, reliability, maintainability, nuclear hardening, support equipment requirements (including automatic test equipment), manpower skills, knowledge, and abilities and facility requirements.	IP

5 Maintenance Planning and Management		
ASSESSMENT CRITERIA		Status
5.2.3	The plan defines the maintenance approach including level of repair and includes the results of the analysis to determine logical maintenance task intervals, grouping, and packaging.	IP
5.2.4	The plan defines the actions and support necessary to ensure that the system attains the specified A_o that is optimized considering Reliability Centered Maintenance (RCM), CBM, and time-based maintenance.	IP
5.2.5	System anomalies and intermittent failures are analyzed for possible changes to the BIT design, thresholds/tolerances, and/or filtering.	IP
5.2.6	The plan states specific maintenance tasks to be performed on the materiel system.	IP
5.2.7	The plan identifies hosting and requirements (e.g., interfaces) for the maintenance data reporting system if it will be used/deployed on a platform.	I
5.2.8	Maintenance planning documentation identifies: a. Tools and test equipment by task function and maintenance level; b. Category codes (e.g., SM&R codes, etc.); and, c. Manufacturer's part numbers, CAGE codes, nomenclatures, descriptions, estimated prices, and recommended support equipment quantities, including logistics (e.g., technical data, spares, test equipment) for support equipment.	I
5.2.9	RCM methods conducted in accordance with MIL-P-24534A and FMECA are used to determine the evidence to select the appropriate type of maintenance (e.g., inspect/repair as necessary, disposal, or overhaul).	IP

6 Packaging, Handling, Storage, and Transportation (PHS&T)		
ASSESSMENT CRITERIA		Status
6.1	General Requirements	
6.1.1	PHS&T requirements such as weight and dimension data are adequately specified in the required provisioning technical data.	I
6.1.2	DoD's computerized Container Design Retrieval System database has been searched to preclude the design of new specialized containers when a suitable one exists in the system.	I
6.1.3	If a new specialized reusable container is needed, requirements have been coordinated with the cognizant field activity.	
6.2	Packaging	
6.2.1	MIL-STD-2073 is used as necessary for: a. Items that cannot be protected and preserved in a cost-effective manner using commercial packaging; b. Items delivered for deployment with operational units; c. Items requiring reusable containers; d. Items intended for delivery-at-sea; e. An item where the Government has determined military packaging is the optimal solution; and, f. Items intended for or that may be in long-term storage.	I
6.2.2	Department of Agriculture requirements for packaging intended for international use have been met as required, i.e., Wood Packaging Material (WPM).	I
6.2.3	MIL-STD-129 (series) marking requirements for all unit and shipping containers have been met.	I
6.2.4	PHS&T requirements for associated HAZMAT and wastes have been identified.	I
6.2.5	Corrosion prevention safeguards are in place to ensure effects of corrosion are minimized during storage and transportation afloat and ashore.	I
6.3	Handling	
6.3.1	Requirements for materiel handling devices for loading and unloading have been defined.	IP
6.3.2	Materiel handling devices for loading and unloading have been certified.	I
6.3.3	For systems going onboard surface vessels, packaging is designed to be compatible with shipboard handling equipment.	I

6 Packaging, Handling, Storage, and Transportation (PHS&T)		
	ASSESSMENT CRITERIA	Status
6.4	Storage	
6.4.1	Storage monitoring requirements are incorporated into technical publications.	I
6.4.2	Long-term storage requirements for systems, such as ground and air vehicles, have been identified to ensure lubrication, batteries, seals, etc. will not degrade. Accessibility for maintenance during long-term storage has been considered.	I
6.4.3	Items requiring special storage requirements (e.g., freezers for storage of composites, HAZMAT, etc.) and/or shelf life requirements have been identified and documented in the appropriate program supportability documentation.	I
6.5	Transportability/Transportation	
6.5.1	Transportability issues are addressed, including: a. Modes of transportation; b. Oversized/overweight items; c. Items requiring special transportation modes; d. Items that are classified; and, e. Special transportation environments/anticipated conditions requirements (e.g., sea states, tunnel limitations for rail, desired sorties for complete systems, etc.).	IP
6.5.2	Anti-tamper requirements (and security processes while in storage and transit) have been identified for both hardware and software and factored into the maintenance planning for deployed systems.	IP
6.5.3	Rail, air, and ship certifications have been obtained or are scheduled and coordinated with the appropriate platform manager or agency. This includes tie down patterns, rail impact tests, load modeling or load demonstration, and interfaces between the system being transported and the transporting platform.	IP
6.5.4	Time delivery requirements for all shipments of spares have been identified.	I
6.5.5	Transportation requirements with Federal and State agencies have been identified (such as height, weight, etc.) and any necessary waivers obtained for highway or rail transport.	IP
6.5.6	Transportation processes, hardware, and procedures for disabled systems (e.g., aircraft, ground systems) have been developed and tests have been scheduled or conducted.	I
6.6	Testing	

6 Packaging, Handling, Storage, and Transportation (PHS&T)		
ASSESSMENT CRITERIA		Status
6.6.1	Design validation testing has been conducted on special packaging identified in MIL-PRF-49506 and Appendix F, MIL-STD-2073-1.	I
6.6.2	Ammunition tests have been conducted to ensure compatibility with host platform/facility requirements.	I
6.6.3	HAZMAT packages have been tested per the applicable requirements for performance packaging contained in the International Air Transport Association Dangerous Goods Regulations or the International Maritime Dangerous Goods Code and with the Code of Federal Regulation, Titles 29, 40, and 49.	I

7 Technical Data		
	ASSESSMENT CRITERIA	**Status**
7.1	Technical Data Management Strategy	
7.1.1	A BCA has been conducted to assess the cost and merit for purchasing Technical Data	IP
7.1.2	A technical data management strategy has been developed that a. Is documented in the ILSP and AS; b. Supports re-competition for production, sustainment, or upgrade; and, c. Addresses the merits of including priced contract options for future delivery of technical data and intellectual property rights and addresses restricted use and data release.	F
7.1.3	Authoritative Data Sources (ADS) and the associated change authority have been identified, described, and designated as the authorized data production source to create, manage, use, distribute, archive, and publish complete and accurate data for use by the end users.	IP
7.2	Integrated Digital Environment	
7.2.1	If applicable, all network compatibility issues are addressed, and mitigation steps identified.	IP
7.2.2	A logistics data enterprise architecture has been generated which identifies electronic data repositories, information exchange requirements, and usage.	I
7.3	Product/Technical Data Package and Publication	
7.3.1	A product/technical data management plan that includes change control processes and in-process review/validation/verification schedules as appropriate, has been developed.	I
7.3.2	Computer Aided Design, modeling, and engineering product source data is acquired in an acceptable digital format such as XML in accordance with Coast Guard policy and managed according to the Integrated Data Environment (IDE).	IP

7 Technical Data		
	ASSESSMENT CRITERIA	**Status**
7.3.3	The product/technical data package is administered under a formal CM process and is consistent with the requirements contained in the CMP, the maintenance plan, calibration support plan, and the Information Support Plan (ISP) and provides a sufficient level of detail for re-procurement, upgrade, maintenance, and repair of hardware. The product/technical data package normally includes (ref MIL-STD-31000): a. Specifications, technical manuals, publications, engineering drawings/product data models, calibration procedures, and special instructions such as for unique manufacturing and test processes; b. Interchangeability and FFF information; c. ESOH constraints or requirements; d. Preservation and packaging requirements; e. Test requirements data and quality provisions; f. Preventative maintenance system/maintenance requirements card; and g. Environmental stress screening requirements.	I
7.4	Technical Publications	
7.4.1	Verification and validation of software applications and other tools used to create, manage, update, present, and view technical manuals has been completed.	I
7.4.2	A process for distribution of technical manuals has been established.	I
7.4.3	Approved technical manuals will be available to support the end item and peculiar support equipment and in the quantities required.	I
7.4.4	An approved calibration requirements list is available to support the end item and all peculiar installed instrumentation.	I
7.4.5	Operator, maintainer, and calibration training, along with job performance aids, are included in the appropriate manuals or embedded in the Interactive Electronic Technical Manual (IETM), where applicable.	I

8 Support Equipment		
	ASSESSMENT CRITERIA	**Status**
8.1	General Requirements	
8.1.1	The environmental and physical constraints, such as size, weight, power, temperatures, and interfaces have been factored into support equipment designs.	F
8.1.2	Analyses to identify the optimum mix of automatic and manual fault detection and isolation equipment at each applicable maintenance level has been conducted.	IP
8.1.3	The decision between CSE and peculiar support equipment (new development) has been considered in an effort to minimize support equipment footprint.	IP
8.1.4	Overall support strategy for support equipment has been defined, and includes identification of the following: a. Support equipment requirement documents; b. Supply support interim spares; c. Manpower; d. Training; e. Technical data; f. Maintenance levels and maintenance task requirements; g. Computer resources support; h. Calibration; i. Facility requirements; and, j. Support equipment for support equipment.	IP
8.1.5	Required technical documentation to support the support equipment is identified and includes: a. Procedures to perform the required tests and diagnostics; b. Test measurement and diagnostic equipment, calibration requirements, procedures, and associated technical parameters; c. All product/technical data required to support and operate required support equipment throughout the life cycle of that product; and, d. Test fixtures and/or interfaces to connect the system to the test equipment.	IP
8.1.6	Requirements for the testing of support equipment have been identified.	F

9 Training and Training Support		
	ASSESSMENT CRITERIA	**Status**
9.1	Training Analysis and Planning	
9.1.1	A Training Planning Process Methodology and Front End Analysis is conducted.	IP
9.1.2	The Training Plan is approved.	IP
9.1.3	Resource requirements are specified for training equipment, services, calibration standards, test equipment, materiel, facilities, and personnel. Training facilities, trainers, and units dedicated for training can handle throughput for both personnel and hardware to include consideration of footprint, maintenance environmental constraints, etc. Requirements to bring training onboard a host platform, including local-area-network-based computer training, have been coordinated.	IP
9.1.4	The course curriculum and instruction is developed and provided in accordance with Training Systems Plan and SOW/CDRLs. Ensure a Ready For Training (RFT) date is established and met. Ensure the course curriculum and instruction is delivered as required to achieve: a. Terminal training objectives; b. Initial training; c. Formal schools, OJT, and follow-on training; d. Computer-based training, ADL, JPA, either standalone or embedded training; e. Individual and team training; f. Instructor training (train the trainer); g. Trial teach/pilot course/RFT; and, h. Information assurance compliance.	I
9.1.5	Terminal and enabling learning objectives are derived through appropriate learning analysis and formatted per Coast Guard training development guidance.	IP
9.1.6	Initial production equipment and technical manuals for the new system's delivery and installation schedule must be planned so the system is supportable by the first operational unit.	I
9.2	Training Materials	
9.2.1	Technical publications are developed prior to the development of training materials.	I

9 Training and Training Support	
ASSESSMENT CRITERIA	**Status**
9.2.2 Instructor guides, course curriculum, other training aids, support equipment and student guides are planned or developed for classroom training.	I
9.3 Training Product and Support	
9.3.1 Training devices and simulators to support operator, maintainer, or calibration training are identified if needed.	IP
9.3.2 Logistics support (spares, support equipment, etc.) for the training schools is planned.	IP
9.3.3 If applicable, inter-service training agreements have been established or updated.	IP
9.3.4 If applicable, requirements for training system integration into live, virtual, and constructive training environments have been planned for or met.	IP

10 Manpower and Personnel		
ASSESSMENT CRITERIA		**Status**
10.1	Manpower and Personnel	
10.1.1	A Manpower Estimate (ME) for the operation and maintenance of the program has been developed for all programs.	F
10.1.2	Manpower and personnel requirements have been identified for both organic and contractor support including: a. Knowledge, skills, and abilities; b. Maintenance, calibration, operator, and support provider labor hours by rate or skill area/level by year; c. Number of personnel by rate, maintenance level, and year; and, d. Operator, maintainer, and support provider organizational-level assignments defined.	IP
10.1.3	Maintenance and calibration task times, maintenance and calibration skill levels, and number of maintenance and support provider personnel required have been derived from task and workload‖ analyses.	IP
10.1.4	Requirements for both organic and contractor manpower requirements are validated under representative operating conditions.	
10.1.5	Changes (increases and/or decreases) in manpower and personnel requirements have been identified for any transition period between systems.	IP

11 Facilities and Infrastructure (and Platform Integration)		
ASSESSMENT CRITERIA		**Status**
11.1	Facility Requirements	
11.1.1	The types of facilities/infrastructure (Research, Development, Test, and Evaluation (RDT&E), operations, calibration, maintenance, and training) required to support and sustain the new or modified system have been identified, such as: a. Berthing space for ships (including utilities, dredging, special deck structural requirements for crane loads, and fendering systems); b. Parking aprons and hangar space for aircraft; c. Maintenance/hi-bays for ground vehicle systems; d. Support facilities, supply warehouses, transit sheds, maintenance facilities, calibration laboratories, dry-dock capability, training facilities, and ordnance handling and storage (for both classrooms and trainers for operational training and maintenance training, including required product/technical data to ensure efficient/effective support of facilities); e. Facilities to support RDT&E and in-service engineering requirements (e.g., prototypes, mock-ups, etc.); and, f. Maneuver and live fire facilities requirements.	IP
11.1.2	The facilities/infrastructure support requirements are documented in the program's Facilities Requirements Document and platform Basic Facilities Requirements (BFR) or equivalent documentation and coordinated with base or installation planners.	F
11.1.3	The facilities/infrastructure support requirements are documented in the Facilities Requirements Plan or equivalent documentation.	IP
11.1.4	BFRs have been developed per the appropriate documents using the system's logistics support requirements.	IP
11.1.5	All host tenant agreements are in place.	IP
11.1.6	A site activation plan has been developed.	IP
11.2	Evaluation of Existing Facilities/Capabilities	
11.2.1	All necessary changes to facility or platform spaces have been made to accommodate the installation and/or storage of hosted systems, support equipment, and related supplies.	IP
11.2.2	Site surveys are scheduled and criteria developed. Surveys have been coordinated through a user introduction team or appropriate user representative.	IP

11 Facilities and Infrastructure (and Platform Integration)		
	ASSESSMENT CRITERIA	**Status**
11.2.3	Site surveys have been conducted. The results have been documented in a Site Evaluation Report which will be used to inform a Site Activation Plan and other facility program documentation. Assessor Note: If repair/support facilities cannot be completed in time to meet mission requirements and satisfy the basic facilities requirements, a designated source of repair/support or work-around has been identified and received user concurrence.	IP
11.3	New Construction	
11.3.1	The program has assessed (e.g., site surveys and trade studies) all means of satisfying a facility requirement prior to initiating new construction.	IP
11.3.2	Estimates of facility requirement and associated costs have been refined and a detailed program documentation with cost estimates has been developed. The appropriate resource sponsor has been briefed and aware of costs and schedule associated with the needed construction programs(s).	IP
11.3.3	Equipment (e.g., simulators, air traffic control, magnetic silencing equipment, etc.) has been identified and budgeted in the appropriate fiscal year. Its procurement is on track to support program completion schedules.	IP
11.4	Integration (Ship/Air/Ground Systems/Space & Command, Control, Communications, Computer, and Intelligence (C4I))	
11.4.1	An integration Integrated IPT has been formed between the host platform, weapon system/Space, and C4I PM/integration facility etc. to ensure all supportability planning is conducted upfront. The IPT has been formally chartered.	F
11.4.2	For Ships, a ship system design specification has been developed that addresses integration of all embarked systems and subsystems (including aviation) that ensures performance and support requirements will be met.	F
11.4.3	Facility and/or shipboard storage requirements (e.g., workspaces, storage, spaces storage for ordnance, etc.) have been identified and spaces allocated (see also criteria in PHS&T).	F
11.4.4	A site survey has been conducted for receiving the system. Access to allocated spaces has been modeled and/or verified to ensure height, length, turning radius, support equipment, etc. for movement of the system, spares, etc. can be met to ensure proper access to allocated spaces.	IP
11.4.5	Flight surface (e.g., runway/deck) certifications have been obtained or are in the process of being obtained with no pending issues.	IP

11 Facilities and Infrastructure (and Platform Integration)	
ASSESSMENT CRITERIA	**Status**
11.4.6 Power, water, chillers, overhead cranes, high pressure service air, etc. requirements have been coordinated with the host platform to ensure maintenance actions can be conducted as planned.	IP
11.4.7 The program has identified the requirements, bandwidth, and interfaces with the host platform's local area network.	IP
11.4.8 Proper amount of bandwidth is available to support communications and required data flow between the user and host platform, and host platform and base or shore activity.	IP

12 Computer Resources		
ASSESSMENT CRITERIA		Status
12.1	Computer Resources	
12.1.1	A computer and software security plan, including safety, has been developed. Program is following information assurance and certification and accreditation process and developed a System Security Authorization Agreement.	IP
12.1.2	Software functional requirements and associated interfaces have been defined.	IP
12.1.3	Gap analysis has been performed on candidate commercial-off-the-shelf (COTS) software to identify functionality shortfalls, as applicable.	IP
12.1.4	Requirements for system firmware and software documentation have been identified and integrated into the overall system test program.	IP
12.1.5	Software testing requirements have been identified and integrated into the overall system test program.	IP
12.1.6	Measures of effectiveness have been established for software.	IP
12.1.7	A software development plan has been developed and reflects program milestones.	IP
12.1.8	Software maturity has been measured.	IP
12.1.9	Software data rights have been addressed. Required software data rights have been obtained.	F
12.1.10	CBM+ software is developed for the operating and maintenance system for diagnostics and prognostics, as applicable.	I
12.1.11	Software routines for planned maintenance procedures are addressed in Planned Maintenance System (PMS) planning.	I
12.1.12	The Software Support Activity (SSA) has been designated or established for all software support (budget, personnel, tools, facilities, hardware, documentation, and support and test equipment).	I
12.1.13	The software documentation support matches the software in use.	IP
12.1.14	Software support is described in the ILSP and implementing documentation.	IP
12.1.15	A process has been defined to manage (create/discard/track/close) software trouble reports that will be levied against the software product.	I
12.1.16	A mechanism for getting contractor support specific to support software/equipment, if needed, at the SSA's (e.g., resident expert help) has been established.	I

12 Computer Resources		
	ASSESSMENT CRITERIA	**Status**
12.1.17	A process has been established for distributing corrections and revisions of the software to the users.	F
12.1.18	There is adequate reserve capacity (Central Processing Unit, memory, disk space, bus capacity, etc.) for the life of the system to accommodate changes, expansion, and growth of the software. The hardware is easily upgraded without impacting the software.	I
12.1.19	There are plans for processor upgrades such that technology refresh can be accomplished with minimal software modifications.	F
12.1.20	HSI considerations have been incorporated into the software development, integration, and test phases. This includes graphical user interface, usability testing, control and display layout, human error/reliability analysis, and on-line user guides and documentation.	I
12.1.21	Software integrator and development contractors for software systems have well-documented, standardized software processes as well as continuous software process improvement practices, equivalent to that articulated by Capability Maturity Model Integration capability level 3.	F
12.1.22	A process to proactively project vendor discontinuance of software support, software revisions, upgrades, etc. has been developed and documented to ensure both program software and software support tools can be sustained and software refresh can adequately be planned.	F
12.1.23	Software support planning requirements/data (e.g., these criteria) are presented in the ILSP.	F
12.2	AIS Specific Criteria – General Requirements	
12.2.1	A Governance Board for the system to control business processes has been established.	F
12.2.2	A fit/gap analysis has been conducted to determine if there are any functional requirements gaps not covered by COTS software and require custom code to be developed.	I

APPENDIX D. LOGISTICS READINESS REVIEW (LRR) CRITERIA

LRR Assessment criteria are listed by ILS element in the tables below.

1 ILS Management	
ASSESSMENT CRITERIA	
1.1	Program Management
1.1.1	Supportability management processes are mature. These are identified in the ILSP.
1.1.2	The program office billets are filled with sufficient personnel who have the required experience and training.
1.1.3	Logistics risks and mitigations are tracked and reported in the risk management process.
1.1.4	Deficiencies identified by the user (e.g., Failure Reports, deficiency reports, technical publication deficiency reports, help desk tickets, etc.) are processed within the stated time frame and to the metrics identified in program documentation.
1.1.5	MOAs or other formal agreements are in place between the program office, logistics or service centers, sponsor, user, software support activities, etc., that define supportability requirements, administrative and personnel resources, funding, physical resources, etc. The work is being executed as tasked.
1.1.6	All Operational Test findings of deficiency are resolved or are in the process of being mitigated.
1.1.7	Ensure program milestones and initial program baseline deliveries in support of FOC, and ensure product improvement solutions are tracking against the Integrated Master Schedule (IMS).
1.1.8	The program office is staffed for all core and sub-product functions. These positions are fully funded.
1.1.9	Sustainment metrics are defined and are measureable. Metrics: a. Are linked to system KPPs/KSAs and other supportability performance indicators; b. Are used to substantiate in-service issues and budget priorities; c. Address system reliability; d. Are understood and accepted by all stakeholders; and, e. Are assessable and verifiable.
1.1.10	The process to collect sustainment performance metrics is in place and metrics are reported, collected, tracked, and assessed to measure performance. Trends are monitored and fed back for appropriate corrective actions.
1.1.11	Corrective actions are taken to correct performance that is not meeting required metrics.
1.1.12	Exit criteria have been established in the performance-based agreements to ensure the orderly and efficient transfer of performance responsibility back to

1 ILS Management	
ASSESSMENT CRITERIA	
	the Government upon completion or termination of the product support contracts. The PBL agreement contains provisions for the acquisition, transfer, or use of necessary technical data, support tooling, support and test equipment, calibration requirements, and training required to reconstitute or re-compete the support workload.
1.1.13	The contractual package clearly identifies the functions, responsibilities, and authorities. The contract is adequately funded.
1.2	CM
1.2.1	A process for configuration identification, control, status accounting, CCB processes and membership (to include logistics participation), deviations, engineering changes, and verification/audit functions is established for hardware, software, and product/technical data, and is being executed per the approved Government and contractor Configuration Management Plan (CMP).
1.2.2	All nomenclature has been established where appropriate.
1.2.3	The Configuration Status Accounting (CSA) information is maintained in a CM database that may include such information as the as-designed, as-built, as-delivered, or as-modified configuration of the product, as well as information regarding any replaceable components within the product and the associated product/technical data.
1.2.4	An effective process is in place for processing ECPs, deviations, etc. ECPs, deviations, etc. are tracked and managed per the program's CMP and process.
1.3	Budgeting and Funding
1.3.1	Total Ownership Cost (TOC) analysis is being performed, including fielding and Operational and Support costs to date.
1.3.2	LCCEs, including cost-reduction efforts, have been developed and validated optimizing TOCs.
1.3.3	TOC drivers such as reliability and maintainability are tracked and corrective measures funded, as appropriate.
1.3.4	End of life phase out and disposal requirements are planned and funded as, appropriate.

2 Design Interface	
ASSESSMENT CRITERIA	
2.1	General
2.1.1	Built-In-Test (BIT) metrics are collected to validate BIT effectiveness and performance against requirements.
2.1.2	BIT and diagnostics are meeting performance requirements (e.g., false alarm rates, percent fault isolation, etc.).
2.2	Reliability, Maintainability, & Availability(RM&A)
2.2.1	RM&A measures (e.g., A_o, A_m, MTBF, MTTR and MLDT, Fault Detection, Fault Isolation, and False Alarm) are defined in quantifiable terms and are being measured.
2.2.2	RM&A parameters defined in the requirement documents (e.g., MTBF, MTTR, and BIT effectiveness) are achieved.
2.2.3	Field data is collected from systems in production and fielded units to verify if RM&A requirements and KPPs are being met.
2.2.4	Reliability growth program indicates that system and subsystem reliability is appropriate to meet the stated requirement. A reliability growth plan has been implemented as appropriate.
2.2.5	The Life Cycle Sustainment KPPs (A_o, A_m, Reliability KSA R_m and Ownership Cost KSA) objectives are being tracked and achieved as defined.
2.2.6	A process has been implemented to assess achieved RM&A performance by collection and analysis of user data, for factory and fleet.
2.3	ESOH
2.3.1	A process is in place to manage ESOH risks/hazards.
2.3.2	The user representative has provided formal concurrence prior to all serious and high-risk acceptance decisions.
2.3.3	Noise sources are identified and evaluated during system's design and control measures implemented to minimize personal exposure.
2.3.4	Personnel protective equipment is in place as specified in maintenance instructions and training manuals for relevant operations. Specified products are compliant with all Federal and consensus ANSI standards.
2.3.5	A closed-loop hazard tracking system is implemented.
2.3.6	HAZMAT and associated processes whose use cannot be avoided have been documented in planning documents and communicated to the user and support installations for inclusion in their authorized use lists. This includes an inventory of materials incorporated into the asset (to include COTS and Non Developmental Items (NDI) during production, materials required for maintenance, and hazardous wastes generated from maintenance processes).

2.3.7	There is a plan for tracking, storing, handling, and disposing of HAZMAT and hazardous waste.
2.3.8	HAZMAT findings and determinations are incorporated into the training program for all system- related personnel as applicable.
2.3.9	The user installation has the capability in place to recycle or dispose of system replaceable and disposable components such as metals, plastics, electronic components, oils, coolants, and refrigerants.

3 Sustaining Engineering	
ASSESSMENT CRITERIA	
3.1	Analysis
3.1.1	Reliability Growth data and curves show that reliability is improving.
3.1.2	Reliability verification testing has been planned/conducted for all components as applicable, including COTS components, to ensure they meet or exceed overall system reliability requirements.
3.1.3	Information from Warranty Deficiency Reports (WDRs) is tracked for trends and product improvement.
3.1.4	The corrosion prevention control program is effective in preventing corrosion or minimizing its effects on availability. Maintenance actions during operation and long-term storage to correct issues from corrosion are declining.
3.1.5	Support posture is still valid to meet mission requirements as currently defined in CONOPS/Mission Profiles.
3.2	Diminishing Manufacturing Sources and Material Shortages (DMSMS)
3.2.1	The DMSMS program is being executed per the formal DMSMS program and management plan that has been established and documented consistent with policy
3.2.2	The program has defined DMSMS metrics and tracks DMSMS cases, trends, and associated solutions and costs, and has established a plan to report these findings in accordance with policy.
3.2.3	There are no unresolved DMSMS cases or unresolved end-of-life issues. Any issues that are identified have solutions that will not include redesign.
3.3	FRACAS
3.3.1	Failures are analyzed and trended via FRACAS. BIT indications and false alarms are analyzed and included in the FRACAS process.
3.3.2	A FRACAS review is performed on production and deployed units.
3.3.3	Safety/mishap reports associated with material and design deficiencies are linked with or provide input into the FRACAS.

4	**Supply Support**
	ASSESSMENT CRITERIA
4.1	Supply Chain Management
4.1.1	Sparing analyses and levels are being continuously conducted based on consumption levels and failure data. On-Board Repair Parts reduction initiatives are continuously being assessed.
4.1.2	Supply chain metrics are being used to identify and prioritize opportunities for improvement (e.g., turnaround times, repair times, delivery times, etc.).
4.1.3	Operation and support-cost estimates are compared with TOC standards defined in the sustainment KPP/KSA.
4.1.4	End-to-end logistics chain sustainment solutions have the flexibility to meet the full spectrum of contingencies, to include surge capacity, with no loss of operational capability or tempo.
4.1.5	Support strategies are supporting ―last tactical mile (e.g., base, port or stock point to deployed user)‖ and deployed systems in austere environments.
4.1.6	A supply chain management process has been established to address and eliminate the introduction of counterfeit components into the asset during repair.
4.1.7	Enterprise integration enables a single view of the supply chain of both organic and commercial provider asset inventories and asset tracking (i.e., Total Asset Visibility).
4.1.8	The inventory of spares and critical spares is procured and spares records are maintained.
4.1.9	Allowances are determined.
4.1.10	Provisions for surge requirements are identified and planned for.
4.1.11	Item management codes are assigned, including SM&R codes for HAZMAT.
4.1.12	Provisioning data reports have been generated and are updated based on usage/failure data. Examples include: a. Recommended repair parts list provided for pre-operational repair parts and training equipment; and, b. Provisioning parts list determining the range and quantity of support items for an initial period.
4.1.13	The supply support provider has the capability to accept demand requisitions and provide status reports by electronic data interchange.
4.1.14	Transition planning to CGSD is conducted to ensure attainment of full operational support beyond the interim support period for all applicable logistics factors.
4.1.15	Interim supply support requirements are in place and effective.

5 Maintenance Planning and Management	
ASSESSMENT CRITERIA	
5.1	Maintenance task times (e.g., MTTR) metrics are met for all maintenance and repair actions.
5.2	Maintenance skill levels and number of maintenance and support provider personnel do not exceed documented requirements.
5.3	Performance monitoring, fault detection, fault isolation, and diagnostics (e.g., BIT) are performing to specified requirements and optimized to meet maintenance and manning requirements.
5.4	Economic and non-economic Level of Repair Analysis (LORA) is conducted as part of the decision process to determine what items are repairable or should be discarded.
5.5	Metrics are collected on maintenance programs (e.g., CBM program/Reliability Centered Maintenance (RCM) program) to determine where adjustments can be made to reduce scheduled maintenance and manpower requirements, while reducing operation and support costs and ensuring the appropriate maintenance is performed.
5.6	Specific criteria for repair and maintenance for all applicable maintenance levels in terms of time, accuracy, repair levels, built-in-test, testability, reliability, maintainability, nuclear hardening, support equipment requirements (including automatic test equipment), manpower skills, knowledge and abilities, and facility requirements for peacetime and wartime environments are defined and are being met.
5.7	Maintenance and repair manuals state specific maintenance tasks to be performed on the materiel system.
5.8	Maintenance manuals and IETMs have been delivered and are in adequate quantities to support maintenance and repair actions.
5.9	Hosting requirements (e.g., interfaces) for the maintenance data reporting system are adequate when used/deployed on a platform.
5.10	Maintenance planning documentation identifies: a. Tools and test equipment by task function and maintenance level; b. Category codes (e.g., Source, Maintenance and Recoverability (SM&R) codes, etc.); and, c. Manufacturer's part numbers; nomenclatures; descriptions; estimated prices and recommended Support & Test Equipment (S&TE) quantities, including S&TE for S&TE.
5.11	System anomalies and intermittent failures are analyzed for possible changes to the BIT design, thresholds/tolerances, and/or filtering.
5.12	A corrosion prevention control program is in place and has been incorporated into maintenance planning and all programs that are susceptible to degradation from corrosion.
5.13	Final preventive maintenance system products have been certified, are resident in the authoritative database, and have been delivered to the users.

5 Maintenance Planning and Management	
ASSESSMENT CRITERIA	
5.14	If a commercial depot is used, the contract has been awarded.
5.15	Required organic depot personnel have been trained and all required equipment, tools, etc. are in place to perform depot maintenance.

6 Packaging, Handling, Storage, and Transportation (PHS&T)	
ASSESSMENT CRITERIA	
6.1	Materiel handling devices for loading, unloading, etc., are in place and certified.
6.2	There are no accessibility issues for maintenance during long-term storage or storage during transport/forward staging (e.g., equipment on ships that require running time to ensure that lubrication, batteries, seals, etc., will not degrade).
6.3	Items requiring special storage requirements (e.g., freezers for storage of composites, HAZMAT, etc.) and/or shelf life requirements have been identified in the appropriate manuals/publications.
6.4	There are no transportability issues, such as: a. Oversized/overweight items; b. Items requiring special transportation modes; c. Items that are classified; d. Certification (air, rail, DOT, etc.); e. Necessary waivers have been obtained; and, f. Packaging intended for international use.
6.5	Anti-tamper requirements (and security processes while in storage and transit) are in place for both hardware and software.
6.6	There are no interface issues between the system being transported and the transporting platform (e.g., height, turning radius, etc.).
6.7	Time delivery requirements for all shipments of spares to the user are being met.
6.8	Transportation processes, hardware, and procedures for disabled systems (e.g., aircraft, ground systems) are in place.
6.9	PHS&T issues (retrograde packaging, reusable containers, retrograde transportation, shipboard storage, damage in transit, etc.) raised by the user have been addressed by the program.

7 Technical Data	
ASSESSMENT CRITERIA	
7.1	If applicable, all network compatibility issues are addressed and mitigation steps identified.
7.2	Authoritative data sources and the associated change authority have been identified.
7.3	A process for distribution of technical manuals is in place.
7.4	Approved technical manuals in support of the end item and peculiar SE are available and in the quantities required, and have been registered in the authoritative database.
7.5	An approved calibration requirements list exists to support the end item and all peculiar installed instrumentation.
7.6	Technical manuals and IETMs include notes, aids, and procedures to minimize environmental risks and personnel exposure during maintenance activities such as warnings, cautions, etc.
7.7	Technical manuals should be specifically identified and documented in the Disposal Plan. At the end of service life, all technical manuals (to include IETMs) should be removed from the national stock and disposed of.
7.7.1	A process is in place to expeditiously handle technical publication deficiency reports submitting post-IOC.

8 Support Equipment
ASSESSMENT CRITERIA
8.1 There are no environmental and physical constraint issues (e.g., size, weight, power, temperatures, and interfaces) between the support equipment and hosting platform.
8.2 Types and quantity of support equipment for each location have been identified and available to support test of fielded systems.
8.3 Support for SE is in place, to include: a. Support Equipment Requirement Documents; b. Supply Support; c. Spares; d. Manpower; e. Training; f. Technical Data; g. Maintenance levels and maintenance task requirements; h. Computer Resources Support; i. Calibration; j. Facility Requirements; and, k. Support equipment for SE.
8.4 Technical documentation to support the support equipment is accurate and provided in required quantities: a. Procedures to perform the required tests and diagnostics; b. Test measurement and diagnostic equipment, calibration requirements, procedures, and associated technical parameters; c. All product/technical data required to support and operate required SE throughout the life cycle of that product; and, d. Test fixtures and/or interfaces to connect the system to the test equipment.
8.5 Support equipment are identified in the appropriate allowance/equipage lists as appropriate.
8.6 Support equipment have been certified for use on the host platform or facility, as applicable.

9 Training and Training Support
ASSESSMENT CRITERIA
9.1 Training is being executed per the training plan.
9.2 Training equipment, services, calibration standards, test equipment, materiel, facilities, and personnel are in place and adequate to support the system. Training facilities and the host platform, trainers, and units dedicated for training are adequate to handle throughput for both personnel and hardware.
9.3 The effectiveness of training, using measures such as MTTR, is measured and corrective action implemented when required.
9.4 Safety procedures, warnings, cautions and advisory labels have been incorporated into training materials and curriculum.
9.5 Instructor guides, course curriculum, and other training aids and SE and student guides are in place for classroom training.
9.6 Training courses are adequate, accurate, and complete, and trained on the fielded configuration(s). This includes pre-faulted modules or software to simulate faults for diagnostics training.
9.7 Training simulators and devices are in place and instructor and support personnel have been trained on their use and maintenance.
9.8 Logistics support (spares, SE, etc.) for the user training schools is in place.
9.9 Feedback loops exist that allow operating forces to inform the training command and PM of training shortfalls or changes needed to resulting from experience(s) obtained in an operating environment.

10 Manpower and Personnel	
ASSESSMENT CRITERIA	
10.1	Actual manpower requirements are in accordance with the ME for operation and maintenance of the program.
10.2	Manpower and personnel requirements are adequate for both organic and contractor support, including: a. Knowledge, skills, and abilities; b. Maintenance, calibration, operator, and support provider labor hours by rate or skill area/level by year; c. Number of personnel by rate, maintenance level, and year; and, d. Operator, maintainer, and support provider organizational level assignments defined.
10.3	Changes (increases and/or decreases) in manpower and personnel requirements have been identified for any transition period between systems.
10.4	Manpower and personnel requirements include affected duties beyond operational, maintenance, and support (e.g., watch standing, collateral duties).
10.5	There are no HSI issues, such as issues with: a. Accessibility; b. Visibility; c. Human factors/ergonomics; d. Testability Complexity; e. Standardization and interchangeability; f. Use of mock-ups, modeling and simulation; g. Operational experience; h. Workspace Environment (e.g., heating, cooling, ventilation, illumination, noise, vibration); i. Design for effective handling and carrying; j. Controls and displays; k. User computer interface; l. Habitability; and, m. Safety and personnel survivability.
10.6	An HSI plan has been developed, resourced, executed, and maintained, and has been coordinated with subsystem HSI plans.

11 Facilities and Infrastructure (and Platform Integration)	
ASSESSMENT CRITERIA	
11.1	Facility Requirements
11.1.1	The types of facilities and infrastructure (Research, Development, Test, and Evaluation (RDT&E), operations, calibration, maintenance, and training) required to support and sustain the new or modified system are in place to include, as necessary: a. Berthing space for ships (including utilities, dredging, special deck structural requirements for crane loads, and fendering systems); b. Parking aprons and hangar space for aircraft; and, c. Support facilities, supply warehouses, transit sheds, maintenance facilities, calibration laboratories, dry-dock capability, training facilities (for both classrooms and trainers for operational training and maintenance training, including required product or technical data to ensure efficient and effective support of facilities) and ordnance handling and storage, and associated administrative spaces.
11.1.2	The facilities and infrastructure support requirements are documented in the program's Facilities Requirements Document or equivalent documentation.
11.1.3	All host-tenant agreements are in place.
11.1.4	All site activation plans have been developed and implemented.
11.1.5	All necessary changes to host platform or facility spaces have been made to accommodate the installation and storage of systems, SE, and related supplies.
11.1.6	Site Activation Plans and other appropriate facility program documents) have been completed. Assessor Note: If repair/support facilities cannot be completed in time to meet mission requirements and satisfy the basic facilities requirements, a designated source of repair/support or work-around has been identified and received User concurrence.
11.2	Integration
11.2.1	Facility or on-board storage requirements (e.g., workspaces, storage, spaces storage for ordnance, etc.) are adequate.
11.2.2	Bandwidth and interfaces with the host platform's local area network are capable of handling required throughput.
11.2.3	Proper amount of bandwidth is available on the host platform to support communications and required data flow between the user and host platform, and host platform and base or shore activity.

12 Computer Resources	
ASSESSMENT CRITERIA	
12.1	General Requirements
12.1.1	Program is following Information Assurance and Certification and Accreditation Process to include budgeting for annual verification testing of information assurance controls required to support recertification efforts every three years throughout the life of the system) and developed a System Security Authorization Agreement.
12.1.2	The SSA has been designated or established for all software support (budget, personnel, applications, data, documentation, tools, SE, test equipment, hardware, network interconnectivity, and facilities).
12.1.3	The software documentation support matches the software in use.
12.1.4	Software support is described in the ILSP and implementing documentation.
12.1.5	A process has been defined to manage (create, discard, track, and close) software trouble reports that will be levied against the software product.
12.1.6	A mechanism for getting prime contractor (and subcontractor) support specific to support software and equipment, if needed, at the SSA's (e.g., resident expert help).
12.1.7	A process is in place for distributing corrections and revisions of the software and firmware to the users.
12.1.8	There is adequate reserve capacity (central processing unit, memory, disk space, bus capacity, etc.) for the life of the system to accommodate changes, expansion, and growth of the software. The hardware can be easily upgraded without impacting the software.
12.1.9	There are plans for processor upgrades so that tech refresh be accomplished with minimal software modifications.
12.1.10	A process to proactively project vendor discontinuance of software support, software revisions, upgrades, etc., has been developed and documented to ensure both program software and software support tools can be sustained and software refresh can adequately be planned.

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