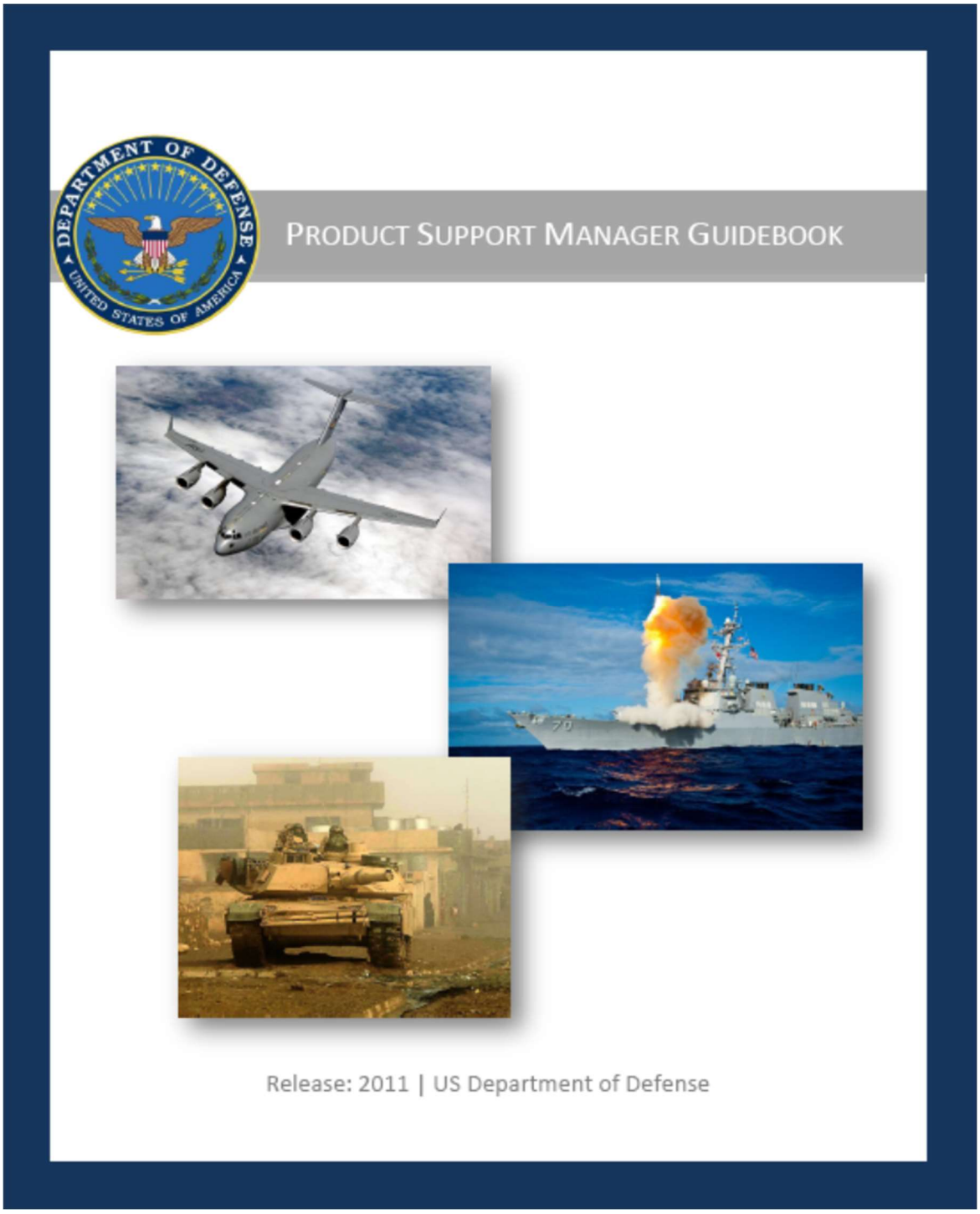


Update: May 2022 | U.S. Department of Defense

Foreword

As DoD moves forward in an increasingly challenging environment with constrained budgets, aging weapon systems, and a growing proliferation of threats around the globe, attention to product support (PS) is paramount and life cycle management needs to focus on designing for supportability and sustainment. Product Support is a key component of weapon system development, implementation, and management. Success depends on balancing the competing priorities of capability, flexibility, and affordability. The Product Support Manager (PSM) is the key leader in whom the Department has entrusted the task of developing and managing effective and affordable PS solutions to achieve outcomes supporting the Warfighter's needs.

Since its initial release in 2011, the PSM guidebook has been instrumental in assisting the PSM with delivering the needed product support solutions. The Product Support Business Model tenets are even more important today than when originally published. Warfighter outcomes, life cycle focus, enterprise solutions, a strong industrial base with mutually beneficial partnerships, and accountability for performance are key to effective and affordable PS. The guidebook has evolved to reflect changes in PS since its original release. This current revision incorporates changes associated with the Adaptive Acquisition Framework (AAF) and complements DoDI 5000.91, "Product Support Management for the Adaptive Acquisition Framework." Readiness, affordability, cost consciousness, and innovation permeate all areas of acquisition and sustainment. Heightened emphasis on sustainment and a streamlined, tailored approach to effective use of performance-based PS solutions promises to improve sustainment performance and cost control. Updates to this guidebook help PSMs, Program Managers (PMs), and life cycle logisticians in achieving this goal. Finally, this version continues to provide PMs and PSMs an easy reference for managing product support across the life cycle of weapon systems, subsystems, and components.

Lisa P. Smith
Deputy Assistant Secretary of Defense for Product Support
Office of the Under Secretary of Defense for Acquisition and Sustainment
May 2022

Approved By

SMITH.LISA.P.[redacted] Digitally signed by SMITH LISA.P[redacted] Date: 2022.05 24 01:57:12 -04'00'

Signature

24 May 22

Date

For questions regarding this guidebook, please consult your Component or Agency product support functional office. Recommendations for updates to this guidebook may be sent to:

The Office of the Deputy Assistant Secretary of Defense for Product Support
3500 Defense Pentagon
Room 5E621
Washington, D.C. 20301-3500
Office Phone: (703) 614-6082
E-mail: osd.pentagon.ousd-a-s.mbx.dasd-product-support@mail.mil

Table of Contents

Tables

Figures

Record of Changes

This document replaces Chapter 4 of the Defense Acquisition Guidebook (Life Cycle Sustainment) and supersedes the 2019 PSM Guidebook.

Table 1: Record of Changes

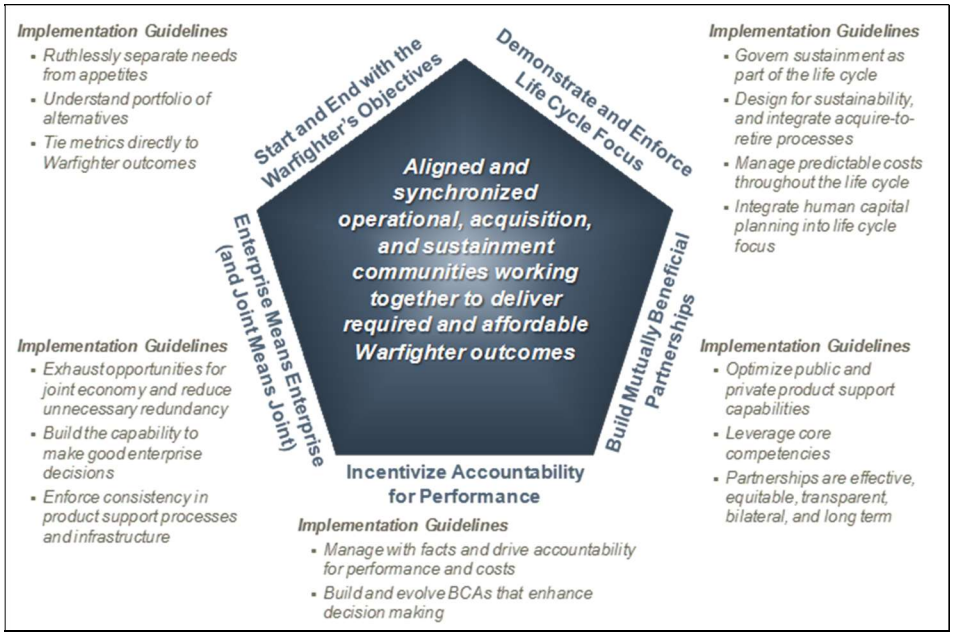
List of Changes	Reason
Updated Policy References	Incorporated DoDI 5000.91, Product Support Management for the Adaptive Acquisition Framework (AAF), and other fact-of-life policy changes.
AAF Pathway Specific Information	Redesignated Section 5 as the Major Capability Acquisition (MCA) pathway section and added new Sections 6-10 for the other five pathways in the AAF with pathway specific information.
Appendices	Added Appendix J to address key Product Support Questions for the MCA Pathway. Added Appendix L to address renumbering of Title 10 product support sections.
Hyperlinks	Updated broken hyperlinks and incorporated new hyperlinks pertaining to the AAF.

Section 1: Introduction & Tasks of the Product Support Manager

1.1 Introduction

This guide is a tool for Program Managers (PMs), Product Support Managers (PSMs), and Lead Life Cycle Logisticians (LCLs) serving in the role of PSM for any ACAT and non ACAT level program, their support staffs, and others in acquisition and sustainment organizations as they develop and implement product support strategies for new programs and major modifications to legacy programs. This guide focuses on identifying, developing, implementing, incentivizing, and measuring quantifiable best value[1] outcome-based product support solutions that optimize Life Cycle Cost (LCC) and readiness. It delineates processes for achieving performance outcome goals, ensures that responsibilities are appropriately assigned, provides incentives for attaining these goals, and facilitates the overall Life Cycle management (LCM) of system reliability, availability, maintainability, supportability, and LCC. It seeks to provide an integrated acquisition and sustainment framework for achieving Warfighter performance requirements throughout a program's Life Cycle. This guidebook advocates the product support guiding principles in **Figure 1** and comprises the efforts and expertise of representatives from the Department of Defense (DoD), Components, Services, Agencies, the Joint Staff, the Office of the Secretary of Defense (OSD), industry, and academia.

Figure 1: Product Support Guiding Principles



1.2 Background

"The PM is accountable for achieving program Life Cycle management objectives throughout the program life cycle. Planning for operations and support begins at program inception, and supportability requirements balance with other requirements that impact program cost, schedule,

[1] Best value is defined as the tradeoff between cost and performance that provides the greatest overall benefit to the warfighter and the taxpayer.

and performance. Performance based Life Cycle product support implements Life Cycle system management."[2]

"The tenets of lifecycle management emphasize sustainment planning early in the system's lifecycle, including requirement generation activities. Lifecycle management is the implementation, management, and oversight by the PM of all activities associated with the acquisition, development, production, training, fielding, sustaining, and disposal of a DoD system. This guide emphasizes those sustainment analyses, activities, and documents necessary to ensure the design, development, testing, production, and fielding of reliable, affordable, and maintainable systems." [3]

In Life Cycle management (LCM), the PM, with responsibility delegated to the PSM for product support activities, is responsible for the development and documentation of an Acquisition Strategy to guide program execution from program inception through re-procurement of systems, subsystems, components, spares, and services beyond the initial production contract award, post-production support, and through retirement or disposal.

PMs pursue two primary support objectives. First, the weapon systems be designed to affordably deliver the required warfighting capability. Second, the product support solution is efficient and effective, and it reduces the demand for product support while meeting Warfighter requirements. When developing and implementing a product support strategy (PSS), which is defined as the overarching approach to meet sustainment requirements, the goal of the PSS is to balance and integrate the support activities necessary to meet these two objectives. LCM bases major system development decisions on their effects on Life Cycle operational effectiveness and affordability. LCM therefore encompasses, but is not limited to, the following:

- Single point accountability (the PM, with direct support from the PSM) for developing and delivering program product support objectives including sustainment
- Development and implementation of product support strategies and arrangements
- Documentation of product support strategies in the Life Cycle Sustainment Plan (LCSP) that tie together requirements and affordability
- Continuing and regular reviews, revalidation, and update of product support and sustainment strategies, including the LCSP and the Product Support Business Case Analysis (PSBCA). Implementation of the LCM approach requires that all major materiel considerations and functional decisions consider their impacts on sustainment effectiveness and affordability. In addition, LCM assigns the PM responsibility for effective and timely acquisition and product support of a weapon system throughout its Life Cycle

Product support, a key LCM enabler, is the package of support functions required to field and maintain the readiness and operational capability of all systems, (covered or non-covered) subsystems, and components, including all functions related to covered system[4] readiness. The package of product support functions related to weapon system readiness (and which can be

[2] DoDD 5000.01 The Defense Acquisition System (9 Sep 2020), para 1.2m
[3] JCIDS Manual (30 Oct 21), Annex D, Appendix G, Enclosure B, para 2.2.1
[4] A covered system is a Major Defense Acquisition Program (MDAP) or Middle Tier of Acquisition Rapid Prototyping or Rapid Fielding program meeting the MDAP funding threshold (10 U.S.C. 4324, previously 2337).

performed by both public and private entities) includes the tasks that are associated with the Integrated Product Support (IPS) Elements.[5] These elements, as well as the IPS elements interrelationship with the others, should be considered during the development, implementation, and subsequent revalidation of the product support strategy. The PM is responsible for integrating PS and SE activities to deliver an effective and affordable product support package.[6] As with effective SE, PSM involvement early in design is a critical part of ensuring a supportable and affordable system.

In support of the DoD Digital Engineering Strategy, DoDI 5000.88, and DoDI 5000.91, PSMs should collaborate with Systems Engineering (SE) in developing and implementing the program's Digital Engineering Implementation Plan (Appendix E to the Systems Engineering Plan), including identifying product support activities enabled by digital engineering (i.e., digital product support) and documenting those activities in the LCSP. Digital product support uses digital engineering methods and digital data and system models to implement the PSS, enable data-driven decision-making, and deliver effective and efficient product support outcomes throughout the system lifecycle. This applies to both systems which are “born digital” (e.g., designed using modern digital engineering tools) and digitally engineered modifications to legacy systems. In execution of a digital product support approach, digital engineering and product support activities and teams are tightly integrated and mutually reinforcing in delivering affordable readiness to the warfighter. The twelve Integrated Product Support (IPS) Elements which comprise the PSS, can each benefit, in many cases substantially, from utilization of system models, particularly 3-dimensional computer-aided design (3D CAD) models.

Product support is scoped by the IPS Elements, which provide a structured and integrated framework for managing product support. The IPS Elements are: Product Support Management, Design Interface, Sustaining Engineering, Supply Support, Maintenance Planning and Management, Packaging, Handling, Storage, and Transportation (PHS&T), Technical Data, Support Equipment, Training and Training Support, Manpower and Personnel, Facilities and Infrastructure, and Information Technology (IT) Systems Continuous Support. Further discussion on the IPS Elements is contained in Appendix A.

The DoD Data Strategy, as a key component of the Department’s Digital Modernization program, supports the National Defense Strategy (NDS) by enhancing military effectiveness through access to accurate, timely, and secure data.[7] DoDI 5000.91 refers that pursuant to DoDI 5000.88, supportability analyses will be included in the evolution of the digital authoritative source of truth which is managed and maintained through the life of the program. Digital Product Support, also known as model-based product support, [8] is an approach that uses modeling and simulation to manage the technical baseline digitally amongst the stakeholders (thus supporting the digital engineering strategy of the program into sustainment) and to optimize and implement data-driven

[5] See Appendix A – IPS Elements.

[6] The term "product support" means the package of support functions required to field and maintain the readiness and operational capability of covered systems, subsystems, and components, including all functions related to covered system readiness (10 U.S.C 4324 previously 10 U.S.C 2337). For the purposes of this guidebook, the definition applies to all DoD systems. More detail on the PS Package can be found in https://www.dau.edu/acquipedia/pages/articledetails.aspx#!386

[7] DOD Data Strategy, 30 Sep 2020

[8] OPNAVINST 1500.76D 29 Jul 2021

decision-making through the system lifecycle achieving both PS and Human Systems Integration (HSI) performance outcomes.

Product support considerations begin prior to program initiation with early requirements determination, and continue through system design, development, operational use, retirement, and disposal. Recognizing that 60–70 percent of system LCC frequently resides in the Operation and Support (O&S) phase, efforts to improve product support management have been an ongoing point of emphasis for DoD to address the following recurring deficiencies:

- Sub-optimization of the overall IPS strategy, despite optimization of discrete IPS Elements, because product support decisions are often accomplished within IPS Element stovepipes
- Inconsistent achievement or balancing of Product Support Business Model (PSBM) requirements (such as enterprise objectives, funding stability, supply chain operational strategy, and cost and performance measurement and incentives)

This guidebook provides the PSM with the tools[9] and a PSBM framework needed to develop and implement a comprehensive PSS, as well as procedures for PMs, PSMs, and life cycle logisticians (LCLs) to implement the adaptive acquisition framework (AAF) tenets to:

- Emphasize Sustainment
- Make Data Driven Decisions
- Tailor Product Support

1.3 Purpose

The PM is charged with delivering Warfighter-required capabilities while the PSM, working for the PM, is responsible for developing and implementing a comprehensive PSS early in the acquisition cycle. During and after fielding, the PSM adjusts performance requirements and resource allocations across Product Support Integrators (PSIs) and Product Support Providers (PSPs). Furthermore, the PSM's responsibility carries across the Life Cycle of the weapon system, requiring the revalidation of the business case prior to any change in the PSS or every five years, whichever occurs first. The PSM must be a properly qualified member of the Armed Forces or full-time employee of the DoD.[10]

This guidebook expands the set of solutions the PSM can use in fulfilling Warfighter requirements. It expands the range of product support strategies from the binary labels of "Performance Based Logistics (PBL)" or "traditional transactional" to a more accurate description of the range of alternatives via the PSBM explained later in this guide, which recognizes two fundamental axioms of product support:

1) With few exceptions, every PSS depends on both organic and commercial industry support. The PSM determines the appropriate type and level of analysis for the best blend of public and private resources, and the partnering relationship between those entities, to achieve an effective PSS that delivers Warfighter operational readiness.
2) The objective of the PSS is to achieve cost-effective Warfighter operational readiness outcomes. Achieving these outcomes depends upon optimizing the IPS Elements that comprise the PSS. The PSM should determine the appropriate performance metrics for

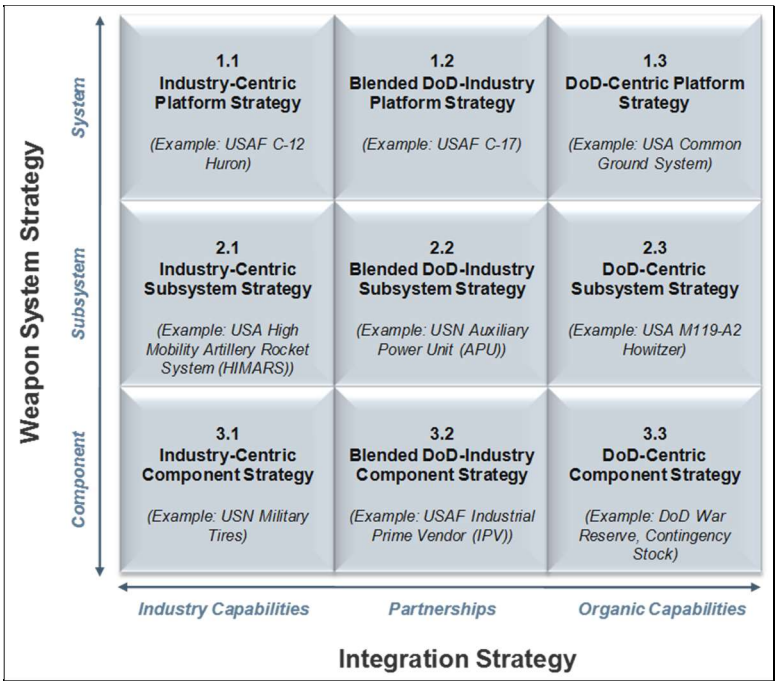
[9] See the DAU Product Support Analytical Tools Database website for a list of available tools (https://www.dau.edu/tools/t/Product-Support-Analytical-Tools-Database).
[10] 10 U.S.C. 1706(a)(7)

the IPS Elements that in aggregate achieve the top-level Warfighter operational outcomes and reduce O&S cost. These performance metrics ensure achievement of the outcomes required for the objective weapon system, subsystem, and components.

Finally, this guidebook helps PSMs objectively decide on the appropriate blend of public and private resources[11] in the PSS, based on the available data, consideration of total costs, identification of implementation metrics and incentives, and achievement of measurable outcomes consistent with statute, policy, and Warfighter requirements. The ultimate strategy strikes the proper balance between operational suitability and affordability.

The matrix in **Figure 2** shows the continuum between component and system-centric strategies, and partnerships using predominately commercial or industry capabilities to Government or organic capabilities. (See Sec. 2.3 for additional details.) The PSM's efforts result in a product support solution that resides within the Product Support Decision Matrix (PSDM) framework.

Figure 2: Product Support Decision Matrix



Product support strategies can take many forms at many levels, leveraging the capabilities of a variety of PSPs. They can be established and implemented at the system, subsystem, or component levels; they can more heavily leverage the industry capabilities of the commercial sector, organic Government capabilities, or an integrated best-value mix of commercial and organic sector competencies, capabilities, and expertise. There are a variety of options represented on the matrix shown in **Figure 2**. Each of the nine blocks could be distilled into further subcategories for specific PSS solutions. The optimum PSS is be identified along a continuum of support alternatives between commercial and organic, and system to component. Often, it leverages the capabilities of both sectors using Public-Private Partnerships (PPP).[12]

[11] See the *DoD Public-Private Partnering (PPP) for Product Support Guidebook* (https://www.dau.edu/tools/t/DoD-Public-Private-Partnering-(PPP)-for-Product-Support-Guidebook).

[12] Title 10 U.S.C. § 2474, 2770, 2563, 2208j, and 2667

Ultimately, the PSS depends on the unique requirements, factors, and boundary conditions associated with a specific program. These factors include statutes (e.g., Core, 50/50), policy (e.g., Contractors Accompanying the Force), Service policy and preferences (e.g., Organic Operation of Forward Theater Functions), funding, and the organizations where core competencies reside.

The PSS requires flexibility to adjust to changing requirements and constraints throughout the program's life cycle. Decisions made early in the program's life cycle can affect the ability to evolve the PSS later in the life of the program. For example, securing the proper level of data and associated license rights enables flexibility for competition of sustainment across organic and industry providers. The PM, along with the PSM, may delegate levels of responsibility for system support implementation and oversight to PSIs at the system, subsystem, or component level, in order to manage public and private sources of support in meeting agreed-to performance outcomes. Source of support decisions should not have a predisposition to favor either organic (Government) or commercial providers, unless mandated by statute or policy. The decision should be based upon a best-value determination through an analytical process that assesses the best mix of public and private capabilities, infrastructure, skills, past performance, and proven capabilities to meet performance objectives. Although this can include transaction-based purchases of specified levels of spares, repairs, tools, and data, the more effective approach is to obtain specified levels of performance of system availability and reliability within LCC constraints. Thus, implementation responsibility and corresponding level of risk for making support decisions are delegated to the PSI by identifying desired outcomes, without specifying how to do it.

It is important to note the PSS for any specific program or component be tailored to the operational and support requirements of the end item, and in some cases to Service- or DoD-level goals and objectives. However, readiness and availability need to be balanced with affordability, taking budget realities into account. There is no "one size fits all" approach to PSS development and implementation. Similarly, there is no single agreed-to template regarding sources of support when implementing these strategies.

1.4 Major Tasks of the Product Support Manager

The PSM for a covered or major weapon system needs to provide the best possible product support outcomes to maximize competition while making use of public and private resources at the system, subsystem, and component levels to meet requirements at the lowest O&S cost. PSMs have thirteen major tasks:

1) Develop, update and implement a comprehensive product support strategy (PSS) within the associated Life Cycle Sustainment Plan (LCSP) in accordance with Title 10 U.S.C. 4324, previously 2337 and DoDI 5000.91.
2) Ensure the LCSP is informed by appropriate product support analysis planning that includes predictive analysis and modeling tools to improve material availability and reliability, increase operational availability rates, and reduce operation and sustainment costs. (ref. MIL-HDBK-502 current revision).
3) Conduct appropriate cost analyses to validate the PSS and LCSP, including cost-benefit analyses, as outlined in OMB Circular A-94.
4) Ensure achievement of desired product support outcomes through development and implementation of appropriate Product Support Arrangements (PSAs).

5) Adjust performance requirements and resource allocations across product support integrators (PSIs) and product support providers (PSPs) as necessary to optimize implementation of the PSS.
6) Periodically review PSAs between the PSIs and PSPs to ensure the arrangements are consistent with the overall PSS.
7) Prior to each change in the PSS, or every five years, whichever occurs first, revalidate any business-case analysis performed in support of the PSS.
8) Ensure the PSS maximizes small business participation at the appropriate tiers.
9) Ensure that PSAs for covered systems[13] describe how such arrangements ensure efficient procurement, management, and allocation of Government-owned parts inventories to prevent unnecessary procurements of such parts.
10) In coordination with the PM, determine the applicability of preservation and storage of unique tooling associated with the production of program specific components; if relevant, include a plan for the preservation, storage, or disposal of all production tooling."[14]
11) Identify obsolete electronic parts that are included in the specifications for an acquisition program of the DoD and approve suitable replacements for electronic parts [15]
12) Seek to use additive manufacturing (AM) to support joint force commanders and combatant command theater requirements, transform operations and supply chains, increase logistics resiliency, and improve self-sustainment and readiness in accordance with DoDI 5000.93.
13) Leverage investments in sustainment technology to improve weapon system materiel availability and reduce life cycle costs in accordance with DoDI 5000.92.

These tasks are systematically addressed throughout this guidebook.

1.5 Relationship to Policy and Other Guidance

The PSM Guidebook aligns with DoDD 5000.01, DoDI 5000.02, and DoDI 5000.91 and is intended to be an overarching desk reference that complements DoDI 5000.91 by providing the detail required to plan and implement the activities identified as the responsibilities of the PSM. Along with DAU training and other guidance, it explains the PSBM, and illustrates how the PSM should execute the tasks identified in DoDI 5000.91 to achieve effective and efficient weapon system capability and life cycle management. It is not intended to provide all the necessary documentation to fully qualify an individual to be a PSM. It recognizes the need for formalized training, experience, resources, and companion documents that are part of the training continuum and product support reference library for PSMs in addition to the PSM Guidebook the PSM can utilize additional guidebooks that provide greater detail enabling the implementation of specific PSM responsibilities. These guidebooks include:

The Product Support Business Case Analysis Guidebook – In addition to OMB circular A-94 this guidebook provides the process for conducting a Product Support Business Case Analysis.

The Integrated Product Support Element Guidebook- Serves as a "one-stop shop" for detailed information about each of the twelve Integrated Product Support Elements.

[13] Title 10 U.S.C § 4324; previously U.S.C § 2337(d)(5)
[14] PL 110-417 The National Defense Authorization Act for Fiscal Year 2009, Section 815
[15] PL 113-66 The National Defense Authorization Act for Fiscal Year 2014, Section 803

The Performance Based Logistics Guidebook – Provides guidance to the defense acquisition workforce for developing effective PBL product support strategies and arrangements.

Logistics Assessment Guidebook – Provides detailed guidance to the program's assessment team on conducting, assessing, reporting and closing the assessment.

Public-Private Partnering for Product Support Guidebook - Provides best practices that facilitate public-private partnerships, and to frame the application of partnering in the remaining integrated product support elements encompassing the full scope of defense system product support activities.

Operating-and-Support-(O&S)-Cost-Management-Guidebook – Provides product support planning activities to identify and pursue early procedural means to mitigate O&S costs and specific tools to reduce O&S costs.

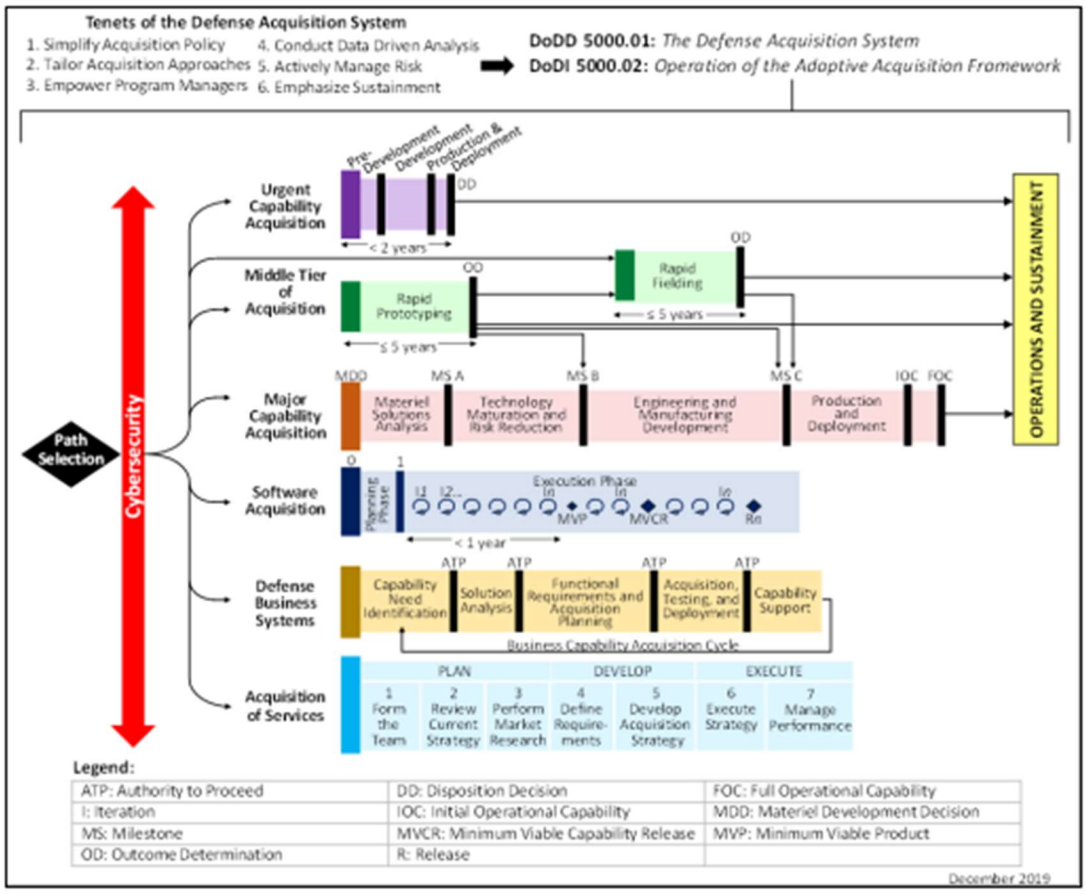
Human Systems Integration Guidebook - Provides HSI guidance, tools, techniques, approaches, and methods to infuse HSI activities into SE and product support.

In addition to these guidebooks that are product support and sustainment focused, the PSM may use reference material developed by other functional areas to augment their knowledge. Some examples include Program Management, Intellectual Property Strategy, Systems Engineering (including Digital Engineering), and Cost Estimating.

1.6 Adaptive Acquisition Framework

DoDD 5000.01 describes the overarching management principles that govern and guide the Defense Acquisition System. DoDI 5000.02, which describes the AAF, requires systems delivered to the end user be operationally effective (reliable, maintainable, available, and supportable) at an affordable cost. To achieve this objective, DoD utilizes the AAF comprised of six acquisition pathways, each tailored for the unique characteristics and risk profile of the capability being acquired. **Figure 3** depicts the AAF pathways and associated key events. Depending on the pathway(s) used during development, the PSM should tailor the PS approach, including program documents required in the Acquisition Framework Document Identification (AAFDID) tool.

Figure 3: DoDI 5000.02 Adaptive Acquisition Framework



Regardless of the pathway selected, it is essential that design attributes, such as reliability and maintainability (R&M), and the Product Support Strategy be considered early and continually addressed throughout development and production. The DoDI 5000.91 requires that a Life Cycle Sustainment Plan be developed and approved no later than Milestone A for covered systems and a tailored LCSP for non-covered systems.

DoDI 5000.88 requires that for all defense acquisition programs, the Lead Systems Engineer (LSE), working for the PM, will integrate R&M engineering as an integral part of the overall engineering process and the digital representation of the system being developed. It is essential to establish the digital engineering ecosystem needed to flow data between model-based systems engineering (MBSE) and digital product support, also known as model-based product support. DoDI 5000.02 requires Program Managers to prioritize product support and affordability during early program planning to ensure sustained mission effectiveness.

Considering R&M and product support early in design and development is the most technically and cost-effective approach. Attempting to correct R&M deficiencies or a lack of proper support planning after a system is in full-scale production or after fielding is expensive and time-consuming. Furthermore, it is difficult if not impractical to make more than modest improvements to a system after the design is “frozen.” The earlier design deficiencies are addressed, the better.

> "A standard rule of thumb used in most system designs is that the cost of fixing a defect (or failure) [by changing the design] rises by an order of magnitude with each assembly level at which it is found. For example, if it costs x dollars to replace a defective part, it could cost 10x to replace that part if the defect is found at the printed circuit board level,100x if found at the equipment level, etc." [16]

Likewise, it is always better to develop the Life Cycle Sustainment Plan early in a development program, refining it as the design evolves.

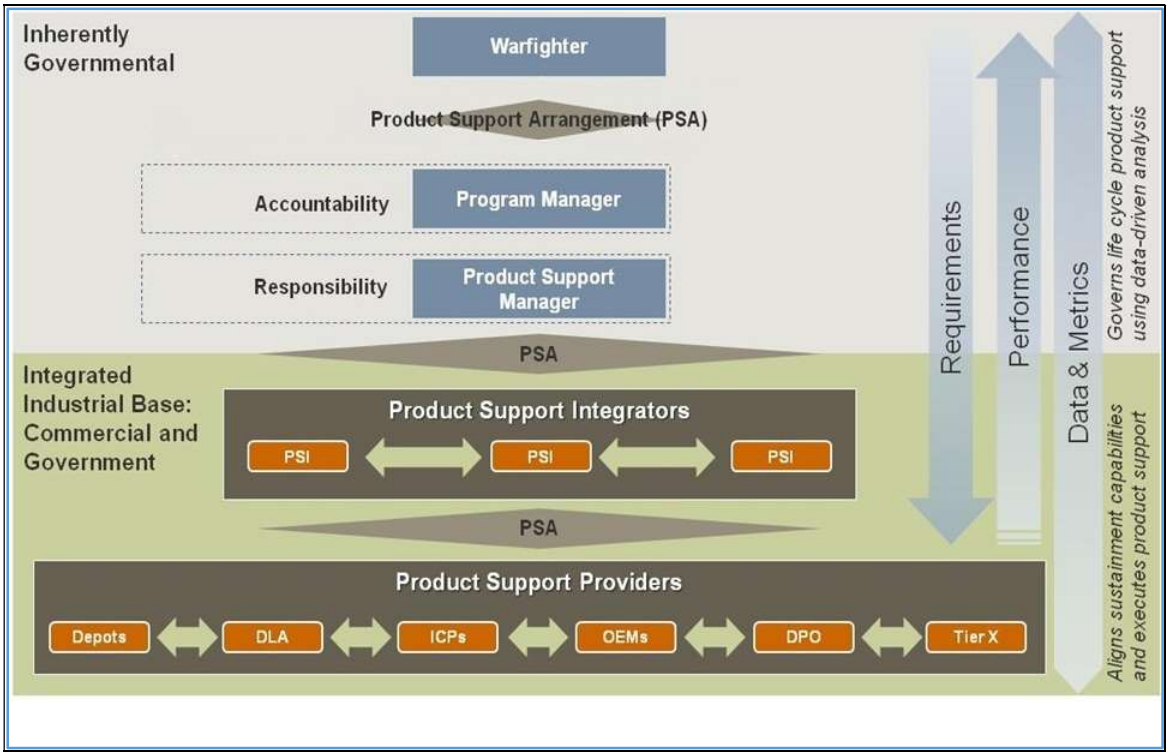
[16] From MIL-HDBK-338B, "Electronic Reliability Design Handbook,"1 October 1998.

Section 2: Product Support Business Model

The Product Support Business Model (PSBM) defines the hierarchical framework in which the planning, development, implementation, management, and execution of product support for a weapon system component, subsystem, or system platform to be accomplished over the Life Cycle. The PSBM effectively describes the methodology by which DoD ensures achievement of optimized product support through balancing maximum weapon system availability with the most affordable and predictable Total Ownership Cost (TOC).

The PSBM provides a clearly delineated description of the roles, relationships, accountability, responsibility, and business arrangements among the managers, integrators, and providers of product support. Those roles and responsibilities, consistent with their level of accountability and responsibility, are portrayed in **Figure 4**.

Figure 4: Framework of PSBM Roles and Responsibilities



The PSBM underscores the PSM's role as the Warfighter's principal product support agent, responsible for integrating PSIs to achieve Warfighter requirements.

2.1 Roles & Responsibilities

The upper tier of the PSBM framework depicted in **Figure 4** designates the inherently governmental functions of developing and managing the overall PSS process across the Life Cycle, beginning with the Warfighter's performance requirements. The PM is assigned LCM responsibility and is accountable for the implementation, management, and oversight of all activities associated with development, production, sustainment, and disposal of a system across its Life Cycle. As part of this, the PM has the responsibility to develop an appropriate sustainment strategy to achieve effective and affordable operational readiness consistent with the Warfighter resources allocated to that objective. The PM's responsibilities for oversight

and management of the product support function are typically delegated to a PSM, who leads the development, implementation, and top-level integration and management of all sources of support to affordably and effectively meet Warfighter sustainment and readiness requirements. This top-level Government role is crucial to the delivery of not only system level, but also portfolio and enterprise level capabilities across the spectrum of defense resources.

The PSBM framework's lower tier portrays the product support implementing agents. Consistent with the model's emphasis on a performance/outcome-based product support approach, there may be a requirement for one or more PSIs who are chartered with integrating sources of support, public and private, defined within the scope of their implementing arrangements, to achieve the documented outcomes. There is a clear need for entities (public and/or private) assigned the responsibility for delivering performance outcomes to be endowed with authority to integrate, manage, and provide oversight over the lower-level support functions that, in combination, achieve the specified outcomes.

2.1.1 Role of the Product Support Manager

The principal duties of the PSM are as follows:

1) Provide weapon system product support Subject Matter Expertise (SME) to the PM for the execution of the PM's duties as the Total Life Cycle Systems Manager. (Per DoDI 5000.91, para 4.1d)
2) Develop and implement a comprehensive, outcome-based PSS. The PSS, which includes a description of the implementation of the 12 Integrated Product Support Elements, should be designed to maximize value to the DoD by providing the best possible product support outcomes for the Warfighter at the lowest O&S cost. Documented in the LCSP, the strategy is generally expressed in terms of the Sustainment Key Performance Parameter (KPP) (consisting of Materiel Availability (A_m) and Operational Availability (A_o)); Key System Attributes (KSAs) or Additional Performance Attributes (APAs) of reliability, maintainability, and O&S cost; and additional metrics as appropriate. (Per DoDI 5000.91, para 4.1)
3) Promote opportunities to maximize competition and small business participation at the appropriate tiers while meeting the objective of best value, long-term outcomes to the Warfighter. Securing the appropriate intellectual property (IP) and rights to enable opportunities to maximize competition, where there is more than one available source, is a means to an end (i.e., obtaining supplies and services at the best value to the Government). Tradeoffs between the benefits of long-term relationships and the opportunity for cost reductions through the competitive processes should be considered together with associated risk. (Per 10 U.S.C. 4324c(2)(H))
4) Leverage enterprise opportunities across programs and DoD Components. Enterprise strategies are a priority where the component, subsystem, or system being supported is used by more than one Component. Product support strategies should address a program's product support interrelationship with other programs in their respective portfolio and joint infrastructure, similar to what is performed for operational interdependencies. (Per DoDI 5000.91, para 4.3b(10))
5) Coordinate with the Lead System Engineer (LSE) and R&M engineering to use the results of appropriate predictive analytical tools to determine the preferred PSS that can improve material availability, reliability, maintainability, and reduce O&S cost. Analytical tools can take many forms, such as Analysis of Alternatives (AoA), Supportability Analysis, Reliability Growth Analysis, Core Logistics Analysis (CLA)/Depot Source of Repair, and Product Support BCA (including cost-benefit analysis, as outlined in Office of Management and Budget Circular A-94, and the *DoD Product Support BCA Guidebook*). The choice of tools depends upon what is being evaluated and the stage within the program's Life Cycle. Where applicable, tools should analyze the digital representation (e.g., three-dimensional models and other digital product information) of the

system being developed using the digital Authoritative Source of Truth (ASoT). Predictive analytical tools are used to help identify the best possible use of available DoD and industry resources at the system, subsystem, and component levels by analyzing all alternatives available to achieve the desired performance outcomes. Additionally, resources required to implement the preferred alternative should be assessed with associated risks. Sensitivity analyses should also be conducted against each of the IPS Elements and tracked to determine those IPS Elements where marginal changes could alter the preferred strategy. (Per 10 U.S.C. 4324c(2)(C))

6) Develop appropriate PSAs for implementation. These arrangements could take the form of memorandums of agreements, memorandums of understanding, performance-based agreements, service level agreements, and commercial services agreements, along with partnering agreements or contractual agreements with PSIs and PSPs, as appropriate. Development and implementation of PSAs should be a major consideration during strategy development to assure achievement of the desired performance outcomes. (Per 10 U.S.C. 4324c(2)(I))
7) Working in concert with the PM, users, resource sponsors, and force providers, adjust performance levels and resources across PSIs and PSPs as necessary to optimize implementation of the strategy and manage risk based on current Warfighter requirements and resource availability. (Per 10 U.S.C. 4324c(2)(E))
8) Ensure that PSAs for the weapon system describe how such arrangements ensure efficient procurement, management, and allocation of Government-owned parts inventories in order to prevent unnecessary procurements of such parts. (Per 10 U.S.C. 4324c(2)(I))
9) Document the PSS in the LCSP. The LCSP describes the plan for the integration of sustainment activities into the Acquisition Strategy and operational execution of the product support strategy. The PSM prepares the LCSP to document the plan for formulating and executing the PSS so the design and every facet of the product support package (including any support contracts) are integrated and contributes to meeting the Warfighter's mission requirements. The LCSP is updated to reflect the evolving maturity of the PSS and associated arrangements at a minimum prior to each change in the PSS or every five years, whichever occurs first. (Per 10 U.S.C. 4324c(2)(A))
10) Conduct periodic PSS reviews or sustainment reviews for covered systems in accordance with 10 U.S.C 2441, now 10 U.S.C. 4323. The PSS evolves with the maturation of the weapon system through its Life Cycle phases. At Full Rate Production (FRP), the LCSP should describe how the system is performing relative to the performance metrics and any required corrective actions to ensure the metrics are achieved. Reviews and revalidations of the strategy and underpinning analysis should be performed at a minimum of every five years or prior to each change in the strategy to ensure alignment across system, subsystem, and component levels in support of the defined best value outcomes. The PSM's reassessment should evaluate potential opportunities for evolving toward an enterprise portfolio approach (i.e., across platforms; inter-Service) where opportunities for leveraging commonality and economies of scale exist. In all situations, the reassessment should consider opportunities to make better use of industry and DoD resources.[17]
11) Maintenance Planning and Management. The PSM is responsible for providing the planning, documentation, and for advocating and resourcing depot activations to meet fielded weapon system availability requirements. The PSM should also ensure funding is secured to provide for field and depot level maintenance and to provide requisite training and initial spares to support operation of the weapon system. (Per DoDI 5000.91, para 4.2)

[17] Title 10 U.S.C. §4324, previously 2337– Life-Cycle Management and Product Support

PSMs assigned to major programs must satisfy certain training, certification, and experience requirements. See **Appendix D – PSM Training, Certification & Experience Requirements**.

2.1.2 Role of the Product Support Integrator

The PSI's role is assigned within the scope, direction, and oversight of the PSM. Please note that a PSI is assigned at the discretion of the PSM. Not all programs require a PSI. Alternatively, some programs may use multiple PSIs. PSIs accomplish their product support role through use of one or more PSPs. Integrators are responsible for the activities and output of one or more PSPs within a specific product support element or across product support elements. There may be a system-level PSI that manages subsystem level PSIs. A PSI may also perform the function of a PSP. A PSI may be either a Government or commercial entity. For more information refer to the PBL Guidebook, sections 2.8 (Designate PSIs) and 2.11 (Establish/Refine Product Support Arrangements).

2.1.3 Role of the Product Support Provider

The PSPs are assigned responsibilities to perform and accomplish the functions represented by the IPS Elements that, per the BCA process and consistent with statute and policy, comprise the range of best value or statutorily assigned workloads that achieve the Warfighter support outcomes. For more information refer to the PBL Guidebook, sections 2.9 (Identify PSPs) and 2.11 (Establish/Refine Product Support Arrangements. There is also more information contained in this ACQuipedia article on PSIs and PSPs at https://www.dau.edu/acquipedia/pages/articledetails.aspx#!395.

Note: There is no requirement for the PSM to assign a PSI as part of the product support solution. Depending on the complexity of the program and activities being managed, a PSM may retain all responsibility for product support.[18]

2.2 Product Support Strategy & Implementation

A PSS is an overarching strategy to meet sustainment requirements. The PSS encompasses the means by which defense system sustainment is accomplished. It is not a one-time decision made early in the system Life Cycle and executed in the same form throughout the Life Cycle. It is evolutionary, since the requirements, capabilities, competencies, operational mission, and material condition of defense systems change over time. The PSM should be cognizant of the baseline conditions and assumptions when assessing and selecting the appropriate strategy, monitoring its performance, and when revising the strategy as circumstances change.

2.2.1 Product Support Strategy Alternatives

A support strategy alternative is simply one of any number of options for providing support. DoD weapon systems are increasingly an integration of discretely developed and very sophisticated subsystems and components. While a system comprises a war fighting capability to a combatant commander, from a sustainment perspective, it is comprised of separately designed and integrated subsystems such as propulsion, electronics, or fire control. Each of these has an inherent sustainment "tail" that ensures its readiness and availability, which in turn, achieves the operational readiness of the system. Accordingly, a PSS considers the optimum approach for the level of support as well as the scope and cost of support.

[18] PBL Guidebook, page 100

Product support for weapon systems may be categorized into three levels: system, subsystem, and component level.

- A “system” is defined as a weapons platform, such as a tactical aircraft, a main battle tank, or guided missile destroyer. (A system may house or support another system managed by a different PM.)
- A “subsystem” is a functional grouping of components that combine to perform a major function with an element such as electric power or propulsion.
- A “component” is generally defined as an item that can be readily removed and replaced. Components can be repairable assemblies or a commodity item requiring little or no repair, such as aircraft tires.

This type of breakdown also applies to Defense Business Systems (DBS) or other DoD systems. While every item on a system requires some level of support, the degree of integration in the outcome-based solution is dependent on many factors. In selecting the level of support to be provided, the PSM weighs the financial and non-financial benefits of a highly integrated approach (e.g., at the system level) to the more fragmented but tightly focused approach available at the subsystem or component levels. Outcome-based strategies focused on optimizing system level availability require more complex development.

2.2.2 The Range of Product Support

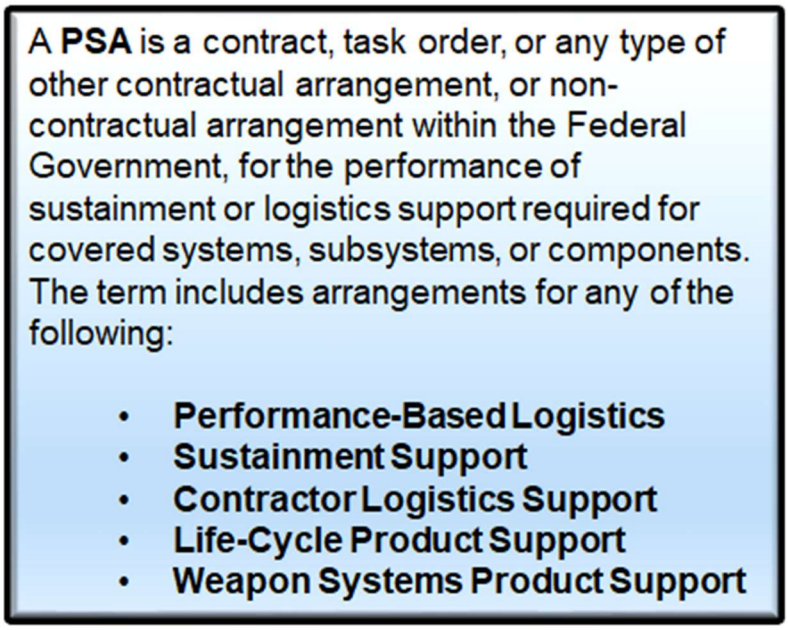
The range of product support is generally defined by the scope of the IPS Elements comprising the support strategy. For example, many of the component level support strategies are narrow in scope, encompassing primarily supply support activities. Conversely, most system level strategies are much broader in scope, and include the majority of the IPS Elements. The range of product support is primarily determined by the desired level of service for the component, major subsystem, or system and the desired outcomes. For example, if the desired outcome for an Auxiliary Power Unit is “availability at retail inventory,” then the functions necessary to ensure that availability includes Supply Chain Management (SCM), distribution, maintenance and repair, and some level of sustaining engineering. PSMs should give careful consideration to the appropriate range of support to ensure there is consistency with the level of support and the desired performance outcomes.

2.3 Product Support Arrangements

The foundational documents that enact and implement the relationships across the PSBM are PSAs. It begins with the Warfighter (user) defined performance requirements that are initiated through the Joint Capabilities Integration and Development System (JCIDS), where applicable (for example, the Middle Tier of Acquisition pathway does not require JCIDS documentation). Inclusion of support requirements in the Capability Development Document (CDD) and CDD Update are critical for an effective and affordable support solution in sustainment. The PSM (acting on behalf of the PM) incorporates the appropriate needs and constraints in arrangements with PSIs (or directly with PSPs when appropriate). PSIs in turn, ensure that the necessary performance requirements to meet their arrangements are properly passed to the PSPs, who accomplish the product support activities. PSAs ensure performance expectations of all product support entities are clearly articulated.

PSAs require defined outcomes and differ from a “best effort” approach typical of some DoD organic support processes. PSAs provide a clear delineation of performance outcomes, corresponding support requirements, and the resources required to achieve both; they create a clear understanding of the outcomes and the commitments required to achieve those outcomes among all stakeholder parties.

Figure 5: Product Support Arrangements



Properly constructed PSAs include:

- Clearly understood cost, schedule, and performance objectives and metrics to achieve documented Warfighter requirements
- Roles and responsibilities
- Conflict adjudication procedures
- Reliability, availability, maintainability, supportability, and cost improvement targets
- Authoritative data sources and collection/update frequency
- Arrangement terms and conditions
- Planned flexibility
- Unforeseen circumstances identification and management
- Meeting cadence
- Performance reviews
- Incentives and penalties

Section 3: Life Cycle Sustainment Management Tools

3.1 Sustainment Maturity Levels (SMLs)

Developing and fielding the product support package evolves over time. Support packages are dependent on variables such as operating doctrine, changes in technology, as well as commercial and Government repair capabilities. As a result, a consistent metric to measure the maturity of the implementation process is useful in conveying the progress across the various communities. The SML concept may be used by the PSM to assess the program's progress in implementing the PSS, including the design and resultant Product Support Package to achieve the sustainment metrics consisting of the Sustainment KPP, Key System Attributes (KSAs), Additional Performance Attributes (APAs), and lower-level metrics that drive sustainment performance. The SML concept addresses the full range of support options, from traditional organic based to full commercial based product support without prescribing a specific solution. In addition, the SML approach can be applied across major sub-systems to provide a common, consistent, repeatable means of articulating and understanding the product support package maturity.

Achieving SMLs along an indicated timeline helps the PSM evolve the program's product support approach to achieve the best value support solution. Achieving the "up front" levels help in designing support actions to reduce TOC and ensure the product support package is being developed using supportability analysis concepts such as Failure Mode, Effects, and Criticality Analysis (FMECA), Fault Tree Analysis (FTA), Reliability Centered Maintenance (RCM) Analysis, Level of Repair Analysis (LORA), and Maintenance Task Analysis (MTA). Using an SML construct can also help ensure the PSS can be continuously improved based on actual data collected during the testing and operations phases. (Refer to Appendix G for additional details)

3.2 Independent Logistics Assessment

The PSM uses DoDI 5000.91, the criteria in their Component Independent Logistics Assessment (ILA) guidance, and the *DoD Logistics Assessment (LA) Guidebook*[19] as a guide to maximize the likelihood that the product support organization can achieve the Warfighter-required outcomes. Each row of the criteria in the DoD guidebook is phrased as a leading statement to inspire critical thinking and investigation and is not intended to simply be a compliance statement.

An ILA is an analysis of a program's supportability planning conducted by an independent and impartial team of SMEs not directly associated with the program being assessed. It is an effective and valid assessment of the program office's PSS, as well as an assessment of how this strategy leads to successfully operating a system at an affordable cost. The ILA closely aligns with the IPS Elements, with each element assessed and given an individual score. Note, however, that four IPS activities, Program Support Budgeting and Funding, Corrosion Prevention and Control (CPC), System Safety, and Environment, Safety, and Occupational Health (ESOH), are assessed independently of the IPS Elements since they are heavily dependent on SMEs from outside of the product support organization and have assessment criteria distinctly different from the other activities comprising their IPS Elements. ILAs can also include HSI SME(s), where applicable, to assess HSI domain equities and risks.

[19] See DoD (Independent) Logistics Assessment (ILA) Guidebook (https://www.dau.edu/tools/t/Logistics-Assessment-Guidebook)

3.3 Metrics

A key component of any PSA is the establishment of well-understood and achievable metrics.[20] What constitutes performance should be defined in such a way that the achievement of required outcomes can be tracked, measured, assessed, and revalidated as required. The identification of top-level metrics achieves this objective. The PM and PSM work with the user or Warfighter to establish system performance needs and then works with the PSI to fulfill those needs through documentation of the requirements, including appropriate metrics, in PSAs. An effective PSS implementation depends on metrics that accurately reflect the user's needs and can be an effective measure of the PSI and PSP performance.

Linking the program's sustainment metrics to existing Warfighter measures of performance and reporting systems is essential. Many existing logistics and financial metrics can be related to top-level Warfighter performance outcomes. Although the actual PSS may delineate metrics at levels lower than the Warfighter top-level measures (e.g., system availability), it is important that the initial identification of performance outcomes be consistent with the sustainment metrics. These measures are applicable to all product support strategies and are discussed in greater detail later in this guidebook.

3.3.1 Sustainment Metrics

The sustainment metrics are a powerful tool for the PSM to create an aligned PSS. While the JCIDS metrics are mandatory for designated Major Capability Acquisition (MCA) programs, all programs, regardless of pathway, should consider additional, subordinate metrics aligned to the JCIDS metrics to ensure Warfighter system requirements are met. Sustainment metrics are defined in DoDI 3110.05 and are reported for major weapons systems in a common framework across the life cycle in the Advana Sustainment Executive Analytics database. Metrics that the PSM might use are provided in **Appendix B**. In all cases, the program metrics are integrated to communicate a shared understanding of expectations across stakeholders and to measure success in achieving the A_M outcome. Each stakeholder understands how their performance contributes to the overall system A_M. While the metrics management process described below starts prior to program initiation, it is a repetitive process that is applied in all Life Cycle phases. The main difference is that later in the Life Cycle, metrics are analyzed at a greater level of detail based on actual performance rather than estimates created early in system life. Developmental test and operational test results for supportability provide the earliest actual vs. estimated data. These metrics and additional in-service data elements are reported through the life cycle in the Advana Sustainment Executive Analytics database using the same portfolios, lexicon, and data definitions to support full life cycle sustainment visibility.

The sustainment KPP is Availability (Availability consists of two components: A_M and A_O). Reliability, Maintainability, and O&S costs are the three supporting sustainment Key System Attributes (KSAs) or Additional Performance Attributes (APAs).[21]

These requirements establish sustainment outcome requirements throughout a program's Life Cycle. Threshold requirements for these materiel readiness outcomes are set in the JCIDS process and then designed, resourced, and supported throughout the life cycle. These metrics are reported in the top right quadrant of the Sustainment Quad Chart shown in **Figure 6**, which is an example of an MCA programs status towards these goals reported at Program Reviews.

[20] DoDI 5000.91 Product Support Management for the Adaptive Acquisition Framework
[21] CJCSM 3170 Manual for the Operation of the JCIDS, 30 Oct 2021

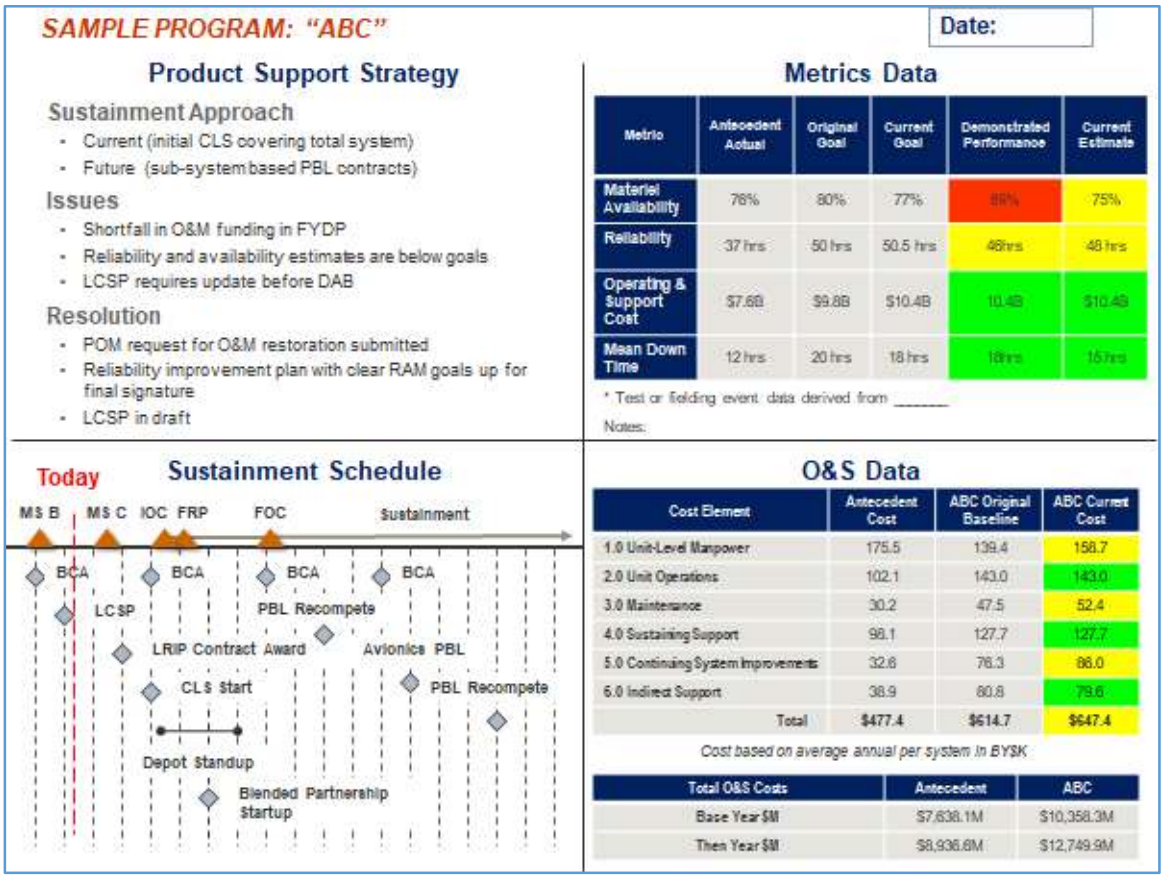
Once fielded there are multiple additional readiness and availability metrics that are tracked for sustainment outcomes. Additionally, data on these metrics for Major Defense Acquisition Programs (MDAPs) programs must be reported quarterly to OSD using the Defense Acquisition Visibility Environment (DAVE) system.

The Reliability, Availability, Maintainability, and Cost (RAM-C) Rationale Report provides a quantitative basis for assessing the validity and feasibility of R&M performance attributes during the development of a system's capability requirements. The RAM-C Rationale Report is typically prepared by the requiring organization (e.g., combat developer) in conjunction with the materiel developer (e.g., program office) and other stakeholders and includes a comprehensive assessment of the Sustainment KPP and other sustainment requirements, including the trade space associated with those requirements. The RAM-C Rationale Report informs system requirements established in JCIDS documents, (e.g., the Capability Development Document (CDD)), which in turn informs system specifications and other contract requirements. The PSM and SE team collaborate with the warfighter to prepare a data-driven RAM-C Rationale Report."

(Note - See ACQuipedia article -
https://www.dau.edu/acquipedia/pages/articledetails.aspx#!738 ***for more information.)***

Detailed instructions for using the Sustainment Quad Chart are in **Appendix C**.

Figure 6: Sustainment Metrics



3.3.2 Energy Metrics

The Energy KPP ensures combat capability by balancing the energy performance of systems and the provisioning of energy resources to sustain all required systems and forces by the operational commander in relevant threat environments. Energy sustainability can be a critical enabler or constrictor of military operations and is key to meeting new operational concepts. The Energy KPP identifies energy demands and supply relationships. DoD Components need to consider the Energy KPP early in system development. Energy consumption directly affects the sustainability of the force to provide and protect critical energy supplies. System fuel and electric power demands, including demands when not connected to main utilities or when not receiving supply, should be included. The PM balances the energy performance of a system with the provisioning of energy to sustain required forces and systems by the operational commander in relevant threat environments in accordance with the JCIDS Manual Energy KPP Guide, for all applicable programs.

3.3.3 Using Metrics Across the Lifecycle

Sustainment requirements and metrics need to be sub-allocated into lower levels of indenture to specific subsystems and equipment. These requirements are then used to develop the specific support strategies and maintenance plans for both the system and its logistic support system. The requirements that drive supportability are be inserted into acquisition documents and the PSM ensures the appropriate program documentation, and planning, programming, and budgeting actions are put into place to develop, field, and sustain the product support package. Technical Performance Measures (TPMs) are be put in place to monitor the progress of the design in relationship to supportability. TPMs should be jointly developed by the SE and product support teams at the start of the program.

Special coordination and emphasis is required between the PSM and the engineering and test communities to ensure the proper design features are included in design planning, system specifications for sustainability[22] and reinforcement of product support goals that are assessed during test and evaluation. The PSM works with the chief engineer or systems engineer to ensure the SE Plan (SEP) includes the processes to achieve the required sustainment performance along with the contractor reporting requirements. The Test and Evaluation Master Plan (TEMP) and other test documentation includes the means to verify that the performance estimates including the sustainment metrics and vital product support elements (e.g., training, support equipment, maintenance and operator publications, spares, etc.) are adequate to achieve stated thresholds. Specific PSM efforts focused on metrics during system development and fielding include:

- Prioritizing metrics for management attention (including developing risk mitigation strategies and options for each, as well as identifying when the options have to be implemented, if the estimates indicate the thresholds are not likely to be met)
- Ensuring sustainment requirements are addressed during the AoA and included in acquisition documents such as the Acquisition Strategy, SEP, TEMP and LCSP
- Establishing detailed measurement and evaluation criteria for each sustainment metric (including any key enabling technologies) to validate/verify performance as well as

[22] Title 10 U.S.C. §0139b, Paragraph (b)5(A)(ii-iv)

provide information about sustainment risk and mitigation, as the development and testing continue[23]

- Actively participating in design reviews, managing assigned Integrated Master Plan (IMP) criteria, and monitoring sustainment metrics estimates based on the evolving design process, including model-based design analysis and/or prototyping to help provide confidence the system is able to achieve the sustainment objectives
- Actively participating in test reviews, advocating for realistic and representative test conditions, and monitoring the maturation of design suitability and associated product support metrics including product support elements (e.g., training, facilities, support equipment, maintenance and operator publications, spares, etc.) throughout test and deployment
- Tracking the product support provider's performance during development to ensure there are no performance anomalies when the system is fielded

Finally, the results of the PSM's efforts during acquisition are listed in the sustainment quad chart. This chart strengthens sustainment governance by providing senior management visibility of key sustainment factors to help ensure the PM's sustainment strategy is meeting the Warfighter materiel readiness objectives with long-term affordability considerations.

3.3.4 Using Metrics to Adjust Product Support

Once the system is fielded starting at Low Rate Initial Production (LRIP) and Initial Operational Test and Evaluation (IOT&E) for Major Capability Acquisition (MCA) or Urgent Capability fielding, or Rapid Fielding (Middle Tier of Acquisition Pathway), actual performance tracking enables determining whether corrective actions and adjustments are needed to the design (e.g., reliability, maintainability) and to the product support package to achieve Warfighter requirements and to control O&S cost.[24] This is accomplished by continually comparing performance against requirements, defined as thresholds; and expectations, defined as objectives. Actual equipment and support performance data and costs should be used, improving product support strategies to meet the users' requirements. This includes updating the variance analysis that examines actual versus predicted cost and performance, supply chain processes based on actual values to help balance product support through a thorough review of readiness degraders, maintenance data, maintenance capability, and support process implementation. For example, reliability data captured through the maintenance process can be compared, using reliability and maintainability modeling, to user system reliability and maintainability thresholds and planned reliability maturation. The critical reliability and maintainability drivers can then be analyzed to determine the most cost-effective mitigation strategies.

3.4 Enterprise Synergies

"Enterprise Synergies" refers to the ability to leverage the efforts of other programs or portfolio of programs as well as existing capabilities for sub-systems and components (i.e., non-developmental items). The PSM's challenge varies throughout the Life Cycle and grows more complex over time as fleet configurations change due to varying ages, blocks, and modifications of the systems being managed. Other systems and functional organizations are also evolving in parallel with the PSM's, providing opportunities for the PSM to identify and take advantage of synergistic relationships across the enterprise. For example, the PSM of the T-7 might take

[23] PL 112-81 The National Defense Authorization Act for Fiscal Year 2012, Section 832, Paragraph 7
[24] PL 112-81 The National Defense Authorization Act for Fiscal Year 2012, Section 832, Paragraph 6

advantage of the F/A-18's F404 engine sustainment enterprise (e.g., for engine modules and components) based on the similarity of engines between the two aircraft. Similarly, the Army, Navy, and Air Force H-60 programs leverage the sustainment enterprise for common helicopter components. This would create economies of scale in procurement of the system upgrade, consolidate and add efficiency to spending for supply chain management, and accelerate the learning curve for installation and maintenance. Each of these benefits would result in improvements to the Warfighter and minimize LCC. Enterprise synergies can be achieved through various methods, such as:

- Design joint systems with joint resilient supply chains to improve performance and achieve cost benefits of common processes.
- Use shared IPS Element expertise whenever possible, rather than establishing separate organizations, to develop deep and broad expertise in tasks such as sustaining engineering, supply support analysis, and maintenance management.
- Use common IPS Element hardware, software, and processes where possible (i.e., common support equipment) across multiple platforms to achieve economies of scale.
- Evaluate shared innovations in digital product support, Condition Based Maintenance Plus (CBM+), data analytics, machine learning and artificial intelligence, advanced manufacturing, etc. to leverage investments in product support technologies

Ultimately, enterprise solutions should be coordinated at the DoD Component or portfolio-level and leveraged by the PSMs of individual programs, as applicable.

3.5 Product Support Analysis

PSMs should base decisions on data and proven analytical techniques to ensure they are made as objectively as possible. Analysis supports informed decisions. All major decisions regarding PSS development, including assignment of workloads and responsibility for integration of those workloads (PSI delegation), should be informed by unbiased analysis. Decisions should also include all stakeholders and accounts for applicable cost assessed equitably across alternatives to meet Warfighter requirements. Likewise, the PSM should understand the cause(s) of variances between predicted and actual product support cost and performance. The level of analysis depends on the Life Cycle phase, and the purpose and scope of the cost analyses.

- Early Life Cycle analysis is used to determine the best value portfolio of strategic sourcing and support alternatives to address each IPS Element in a program from a set of candidate alternatives. This process is iterative; it evolves and matures as the data, support infrastructures, and availability of support providers and alternatives evolves
- Later in the life cycle, analysis is used to identify the best value alternative product support solution vs. the current product support solution and to determine whether a change in PSS is beneficial. It is characterized by mature cost, performance, and supportability data and readily available, in-place product support infrastructure(s)

3.5.1 Data Quality for All Analyses

Data used for sustainment governance should be obtained from authoritative data sources such as Advancing Analytics (ADVANA), Enterprise Visibility and Management of O&S Cost (EVAMOSC), Navy VAMOSC, Air Force Total Ownership Cost (AFTOC), Operating and Support Management Information System (OSMIS), and Component Enterprise Resource Planning (ERP) tools that, as much as possible, rely on automated data collection. Ideally, these same data sources can be used to populate the consolidated cost figures used in Service and DoD reporting

and planning. If this dual use of data is not possible, then any data sources used are validated to ensure they provide timely, accurate, and usable data that reflects actual program performance.

3.5.2 Product Support Analyses

The goals of PS and related supporting analyses are to ensure that supportability is included as a system performance requirement and to ensure the system is concurrently developed or acquired with the optimal support system and infrastructure. PS and Supporting Analyses include the integration of various analytical techniques with the objective of designing and developing an effective and efficient Product Support Package. The primary techniques used in PS Analyses are:

- Reliability and maintainability analyses
  - Failure Mode, Effects, and Criticality Analysis (FMECA)
  - Fault Tree Analysis (FTA)
- Support Analyses
  - Reliability Centered Maintenance (RCM) Analyses
  - Level of Repair Analysis (LORA)
  - Core Logistics Analysis (CLA)
  - Source of Repair Analysis (SORA)
  - Depot Source of Repair Analysis (DSOR)
  - Business Case Analysis (BCA) (See 4.2.5 of this document)
  - Maintenance Task Analysis (MTA)

Further guidance can be found in MIL-HDBK-502A- Product Support Analysis.

PSMs should coordinate with Systems Engineering and R&M Engineering to ensure that appropriate analyses are performed and that predictive and analytical tools are used over the course of the weapon system life cycle. While specific requirements vary by program, in general, statistical process control tools such as control charts may be used to monitor program trends and keep program processes in control. Likewise, variance between predicted and actual performance and cost is evaluated periodically to ensure processes are actually achieving required outcomes and to provide opportunities for continuous process improvement within the program.

PSMs should also collaborate with the HSI and HSI-domain level SMEs and practitioners for HSI domain support to execute the PSA techniques and activities

3.6 Supply Chain Management

SCM includes but is not synonymous with the Supply Support IPS Element. In its broadest sense, the supply chain touches on almost all of the product support elements and its accomplishment could require collaboration with the lead systems engineer. PSMs should be cognizant of their system's supply chain from a logically bounded end-to-end perspective. Typically, this means that they view it as an integrated network that extends from their suppliers to their customer's clients and back. This does not mean that the PSM should act as an agent of the prime manufacturer performing sub-vendor management functions. However, the PSM should always hold the prime accountable for the performance of their vendor based need to maintain situational awareness of the supply chain from the raw material source to the Warfighter to disposal, while considering requirements for international shipping such as documentation and marking to international standards. This is critical to support the warfighter in a non-CONUS area. Precious and rare earth elements including metals need to be identified at time of acquisition for recycling at the life cycle disposal phase into the National Strategic Stockpile for reuse.

SCM responsibility includes the distribution, asset visibility, cybersecurity protection, obsolescence, and counterfeit parts mitigation for weapon system sustainment material. From a Warfighter's perspective, transportation and asset visibility have a substantial impact on high-level sustainment metrics and should be emphasized in the product support strategy. All the skilled labor, advanced technology, and performance of a modern weapon system mean little without the ability to get the "right part, in the right place, at the right time."

3.6.1 Supply Chain Resilience

PSMs should strive to implement resilient supply chains that monitor and manage risks from a variety of sources such as:

- Environmental (e.g., climate and weather)
- Geo-political
- Economic
- Technological (e.g., including software and Authority to Operate updates)
- Cyber
    - Counterfeit or subverted parts
    - Open-source software pedigree and provenance
    - Security of development and test environments, processes, and tools
- Foreign influence
- Material factors (e.g., Diminishing Manufacturing Sources and Material Shortages (DMSMS)/obsolescence)
- Human capital factors
- Financial factors
- Design risks
- Operational factors (e.g., Contested Logistics)
- Defense Industrial Base and National Technology and Industrial Base considerations

Resilient supply chains withstand or recover quickly from disruptions to continue to meet Warfighter performance objectives.

3.6.2 Diminishing Manufacturing Sources and Material Shortages

DMSMS management is a multidisciplinary process that works best when there is collaboration between engineering and logistics and is prescribed per DoDI 4245.15. A successful DMSMS process mitigates risks resulting from obsolescence due to the loss of manufacturing sources or material shortages. It involves recognizing and identifying instances of DMSMS, assessing the potential for negative impacts to readiness, analyzing potential mitigation strategies, and implementing cost-effective strategies to ameliorate negative outcomes. Occurrences of DMSMS issues are inevitable, so program managers need to manage them in a way that cost-effectively:

- Minimizes or eliminates schedule delay.
- Avoids (or at least minimizes the scope of) out-of-cycle redesign
- Prevents degradations to mission performance, safety, and readiness. The SD-22, Diminishing Manufacturing Sources and Material Shortages: A Guidebook of Best Practices for Implementing a Robust DMSMS Management Program, provides best practices for robust DMSMS management. Designed primarily for the DMSMS practitioner, it should also be useful for program managers, engineers, and life cycle logisticians.

3.6.3 Supply Chain Risk Management

SCRM is the process for managing supply chain risk by identifying susceptibilities, vulnerabilities and threats throughout DoD's supply chain and developing mitigation strategies to combat those threats whether presented by the supplier, the supplied product and its subcomponents, or the supply chain. PSMs should collaborate with engineers and work with the PM to ensure SCRM occurs throughout the weapon system life cycle. SCRM includes working with appropriate DoD and Office of the Director of National Intelligence (ODNI) organizations on program threats (foreign and counterintelligence), technology vulnerabilities, contractor threat assessments, counterintelligence vulnerabilities, and global distribution risks.

Of special concern to the PSM is the need to constantly look for and implement mechanisms to reduce and streamline the logistics footprint. This may involve continued collaboration with systems engineers but might just as easily involve using existing supply chains that are supporting other systems rather than developing a new supply chain, thereby minimizing redundancy and associated footprint.

3.7 Life Cycle Sustainment Plan & Product Support Package Update

Development of a life cycle PSS and plan are critical steps in the delivery of the product support package. The LCSP remains an active management tool throughout the life of a program and is updated as needed to meet the Warfighter's sustainment performance needs. Based upon the AAF pathway chosen, PSMs are responsible (per Title 10) for developing and maintaining an LCSP consistent with the PSS, beginning at the start of the program. All covered systems require an LCSP. Per DoDI 5000.91 all non-covered systems may use a tailored LCSP as approved by the LCSP signature authority.

At a minimum, a tailored LCSP should describe: (Refer to LCSP Outline for additional details)

1) Actions for achieving supportability and sustainment requirements and the PSS
2) Methods to identify responsible individuals for sustainment planning
3) Required elements of sustainment planning
4) Timing of sustainment planning activities in the acquisition process
5) Measures and metrics to assess compliance with sustainment plans
6) Actions to continuously monitor PSIs and/or PSPs performance and ensure compliance with LCSP or sustainment plans
7) The content and implementation status of the product support solution (including any sustainment contracts) to achieve and maintain the product support
8) Description of Intellectual Property (IP) (e.g., technical data and software deliverables and associated license rights) necessary to enable cost-effective product support
9) Identification of PSPs and PSIs
10) Results of the Product Support Business Case Analysis
11) Core depot analysis
12) Predictive analysis and modeling tools to improve A_m and reliability, increase A_o and reduce O&S costs.
13) A bed-down plan defining system quantity by year until system retirement and disposal

System sustainment is enabled by effective planning, development, implementation, and management of the PSS. To accomplish this, the PM and PSM plan for the long-term supportability and sustainment through the development and application of a performance-based life cycle PSS. The plan for implementing the strategy seamlessly spans the entire life cycle and

is documented in the LCSP. The LCSP is an evolutionary document begun prior to program initiation as a strategic framework for delivering optimal sustainment at minimal LCC. The basis for developing a new system's PSS should be the existing system/capability that is to be replaced. The shortfalls or limitations of the existing system's design and PSS are incorporated into the new system's design and PSS. On this baseline, the sustainment requirements (supportability KPPs and KSAs/APAs) and PSS satisfies operational, statutory and regulatory sustainment requirements, identifies the intellectual property (IP) requirements, and informs the development of affordability caps and goals and cost reduction initiatives for sustainment. It evolves into an execution plan for how sustainment is applied, measured, managed, assessed, and reported after system fielding. As the program matures, it contains details on how the program is fielding IPS Elements to meet readiness targets, sustain system performance capability threshold criteria, mitigate O&S cost, reduce the logistics footprint, mitigate corrosion and material degradation risk, and comply with ESOH and other logistics related statutes and regulations. The PSM collaborates with the HSI and HSI-domain level SMEs and practitioners for HSI domain support to execute the LCSP and PSP techniques and activities. See HSI Guidebook.

The LCSP serves as a repository of the issues, analysis, and decisions associated with developing and executing a product support solution. Continuously updated by the PSM organization, the LCSP is a single source of integrated data for both day-to-day and strategic decisions. The LCSP helps to ensure the coordinated actions across a wide organizational and stakeholder range are coordinated. The LCSP is one of the key acquisition documents and aligns with the Acquisition Strategy, SEP, Program Protection Plan, TEMP, Cost Analysis Requirements Description (CARD), and other key program documentation.

The PSM should update the LCSP as needed when the PSS or operating environments change. However, the PSM will officially update the LCSP for any Post-Initial Operational Capability (IOC) Sustainment Reviews (SR) which is an assessment of the PSS, performance, and O&S costs of a covered system in accordance with 10 U.S.C. 4323, previously 2441, at a minimum every five years or when:

- Subsequent increments are approved and funded to reflect how the support strategy evolves to support multiple configurations
- Significant changes are required to the product support package to achieve the objective sustainment metrics, including major support provider changes

The planning outlined in a LCSP is implemented through the system's Product Support Package. The Product Support Package evolves to reflect changes in the outcomes required by the sustainment strategy. The PSMs need to take corrective action if the planned Product Support Package does not align with the LCSP. Corrective actions can range from: modifying maintenance or supply chain functions, renegotiating PSAs, restructuring teams to better accomplish IPS Element support functions, adjusting the Product Support Package to acquire new/better capabilities to redesigning the system. Regardless of the corrective action(s), the LCSP needs to be adjusted to convey changes in program direction. (Refer to LCSP Outline for additional details)

3.8 Maintenance Planning and Management

Maintenance planning and management is the development process that defines the repair and upkeep tasks, schedule, and resources required to sustain a weapons system with the focus being to define the actions and support necessary to attain the system's Operational Availability

(A_o) objective. It is considered part of the LCSP/Product Support Strategy development starting as early as the Technology Maturation and Risk Reduction Phase in the system's life cycle. It includes the identification of all the manpower and funding resources required to develop and implement the maintenance and modernization plan.

Maintenance of DoD's weapon systems and military equipment is a critical element in the readiness and sustainability of combat forces. A maintenance program effectively aligned to deliver A_m optimizes life cycle costs. DoD maintenance is accomplished by two different yet complementary components: depot-level and field-level maintenance activities. The two components are distinguished largely by their relative capabilities, flexibility, agility, and capacity. The activities occurring within the scope of this IPS Element is integrated with other product support element areas in keeping with KPP and KSA or APA optimization goals and constraints.

Per DoDD 4151.18, Maintenance of Military Materiel, maintenance programs for DoD materiel shall be structured and managed to achieve inherent performance, safety and reliability levels of the materiel. Maintenance tasks restore safety and reliability to their inherent levels when deterioration has occurred. Maintenance programs are structured for meeting readiness and sustainability objectives (including mobilization and surge capabilities) of national defense strategic and contingency requirements.

Per DoDI 4151.20, Depot Maintenance Core Capabilities Determination Process, the core capability requirements determination process underpins the establishment and retention of a broad set of public sector depot maintenance capabilities necessary for the DoD. The core capability requirements determination process is used to identify required core capabilities and the workloads necessary to effectively sustain those capabilities. The required core capabilities and depot maintenance workloads necessary to sustain those capabilities are calculated by Military Services and then aggregated to determine the overall DoD core requirements.

Refer to the DoD IPS Element Guidebook for more information on Maintenance Planning & Management activities and considerations.

3.9 Intellectual Property Strategy

No later than MS A (or equivalent), the PM and PSM coordinate with IP SMEs, including consultation with Component IP representatives (as needed) pursuant to DoDI 5010.44 and DoDI 5000.91, to develop the PS input into the Intellectual Property (IP) Strategy. In order to inform development of the IP strategy, no later than program initiation, the PM and PSM should review the initial PSBCA results with their Service, OSD, or DoD IP Cadre (as applicable) to identify aspects of the recommended sustainment alternative that influence pricing and valuation criteria, rights in technical data, and licensing options and impacts. The PSM should review the initial PSA with the PSM IPT to determine which assemblies, sub-assemblies, individual components and piece parts will be funded by the government, which will be funded by the contractor, and which will be funded with a mix of government and private dollars. The PSA will also inform which components make sense to implement a modular and open systems approach (MOSA), this will inform the long-term IP strategy for MOSA components (please refer to the Intellectual Property Guidebook for more information on MOSA and IP relationships).

The PSA will also inform which components class I engineering change proposals (ECPs) can be applied to in order to introduce competitive re-procurements in the out years to support reliability, availability, and maintainability requirements, and reduce cost, this further informs the IP strategy

(including tradeoffs) and support development of the PSS. These analyses and activities will determine and inform the PSBCA COA. Once the PSBCA COAs have been identified, the PSM should consult with the PSM IPT (including their Service IP SMEs) to review the recommended logistics, maintenance and sustainment alternatives to ensure best value mix of appropriate technical data, computer software and data rights to support implementation of product support strategy. These inform the IP strategy and should be priced and competed during each RFP to support competition and reduce cost. The technical data, computer software, and rights must be documented in a contract data requirements list (CDRL) in order to support delivery. The IP strategy (technical data, computer software, rights, and timing of delivery of the priced options, and all deliverables) are documented in the Acquisition Strategy, PSS, or LCSP (MDAPs) in accordance with the acquisition pathway the program is using and DoDI 5010.44.

Note: Please refer to the Intellectual Property Guidebook for more detail on IP strategy development, including use and timing of priced options for product support related IP planning and implementation. This guidebook is in final review and will be available prior to issuance of the PSM Guidebook.

The below table lists the Standards (STD) and Handbooks (HDBK) for the relevant product support analyses (PSA) and activities. Another resource for PSA is Military Handbook 502A. The PM and PSM will need to work with the cross functional team to develop tailored contract data requirements lists (CDRLs) that detail timelines, levels of rights in data, specific frequency, and timelines to incrementally review data, terms of accepting data, quality reviews, format to receive data, etc.

PMs and PSMs can locate and search for data item descriptions (DIDs) for all PSA listed below at https://quicksearch.dla.mil/qsSearch.aspx. CDRLs can be tailored using the scientific and technical data DID or can be very specific using DIDs for the report or summary being requested via the CDRL. PMs and their teams need to first assess whether existing DIDs meet the unique requirements of their program, or whether they want to tailor their CDRLs using a more generic DID with a very detailed CDRL.

Table 2: Product Support Input into the IP Strategy

PSA	STD/HDBK	Activity	Description	Product/LPD	Data Item Description (DID)
FMECA	SAE-TA-STD-0017	9.5	Identifies potential design weaknesses through systematic documented consideration of all likely ways in which a component or equipment can fail, the causes for each failure mode, and the effects of each failure	Critical task list (CTL) for technical manual verification; Preventative Maintenance Checks Services (PMCS)	DI-SESS-81759 For tailored data, also see MIL-STD-3034 for specific DIDs, and https://quicksearch.dla.mil/qsSearch.aspx
RCM	SAE-TA-STD-0017	9.7	Identifies preventive or scheduled maintenance tasks for an equipment end item in accordance with a specified set of procedures and establishes intervals between maintenance tasks; task analysis	Functional Failures, PMCS and MIL-STD-3034	DI-SESS-81759 For tailored data. See MIL-STD-3034 for specific DIDs
LORA	SAE-TA-STD-0017 SAE AS 1390	11.7	Identifies the recommended maintenance levels and support costs associated with unscheduled maintenance tasks	Maintenance Allocation Chart (MAC)	DI-SESS-81759 (Tailor the CDRL and request the data required for the U.S. Government to conduct the LORA)
MTA	SAE-TA-STD-0017	12	Analyzes required operations and maintenance tasks for the new system/equipment/software; reliability program identifies the frequency of failures; maintainability program identifies the elapsed time to correct a failure; the maintenance task frequency identifies maintenance intervals and validates the maintenance task relevance	Manpower requirements criteria (MARC) data, CTL, (Marc data feeds the basis of issue plan feeder data)	DI-SESS-81759 (Tailor the CDRL to the system and analysis required).
LSAR	SAE-TA-STD-0017 and SAE GEIA HB 0007-1	12.9	Identifies appropriate part, configuration status, and parts sources based on provisioning data submitted for screening.	PPL, EDFP, RPSTL, PMAC, MAC, BOM in accordance with MIL-PRF-49506 Notice 1, LMI data.	DI-ALSS-81529, DI-ALSS-81530, DI-SESS-81758A, DI-ILSS-8115A, DI-ILSS-81140A
Design Change Notification (DCN)	SAE-TA-STD-0017 and SAE GEIA HB 0007		Delivery/Transfer of Provisioning/Cataloging Data – Design change notices are critical to ensure the Government captures all design changes and impacts to logistics products and provide input through the configuration control board process.	DID - Cite DI-SESS-81758 in the contract for transfer/delivery of the relevant logistics product data.	DI-ALSS-81529
Software	N/A	N/A	Through the lead software developer and PSM, identify relevant transition plans and consider requesting a requirement in the base contract or priced options that will be used to discuss and develop program life cycle software management efforts	License rights, warranties and specially negotiated license rights will be determined through the software business case analysis. U.S. Government purpose rights at the minimum to support organic sustainment	Software development plan (data item description (DI-IPSC-81427 B)) and software transition plan (data item description (DI-IPSC-81429 A))). Software License Requirements List DI-PSSS-82046. DI-PSSS-82046

The PSM will document the plan to implement the IP Strategy in the LCSP's IP and technical data plan in accordance with Title 10 U.S.C. 4324, previously 2337 and DoDI 5000.91. The data deliverables and timing of those deliverables required to implement the PSS and the IP Strategy should be provided in the CDRL and documented in the LCSP.

3.10 Contract Planning

Starting with development of the initial contract, and re-iterated in subsequent contracts, PSMs work with the contracting team to map user assessments and performance metrics to Source Selection Evaluation Criteria (SSEC). If practical, PSMs may establish a cross-functional team of SMEs to support the PM in incorporating supportability and sustainment factors into draft RFPs and participate in the development and resolution of questions from potential offerors to assess risk.

3.10.1 Designs in Development

PSMs should coordinate with systems engineers and the contracting officer to incentivize designing for supportability through SSEC mapped to system performance metrics. PMs should ensure, when possible, that users influence the design through early and iterative user assessments of prototype engineering design models (to include virtual or digital models), or physical system prototypes. PMs ensure user feedback is applied, if practicable, to improve maintainability, and other sustainment functions such as training and supportability in the design before the final configuration is approved.

3.10.2 Completed Designs

PSMs should work with systems engineers and contracting officers to emphasize supportability and sustainment risk reduction through user assessments and use of contract incentives that incentivize incremental improvements to reliability, maintainability, and availability over the development effort in order to achieve A_m and A_o objectives and reduce O&S costs.

3.10.3 Supportability Assessments

PSMs should incorporate user feedback and assess the following supportability and sustainment considerations during pre-development and subsequent contracts to develop tailored PS approaches balancing risks with program goals.

3.10.3.1 Human Systems Integration

Human systems engineering design analyses and user assessments of Human Systems Integration to assess the design's intuitiveness and ease of operation and maintenance. For maintenance, the best practice is to utilize the Human Engineering Design Approach Document-Maintenance (HEDAD-M), DI-HFAC-80747. For operations, the best practice is to utilize Human Engineering Design Approach Document-Operator (HEDAD-O), DI-HFAC-80746. Compare contract deliverable requirements from DI-HFAC-80747, DI-SESS-81758A and DI-SESS-81759A to avoid duplication of Maintenance Task Analysis data during RFP development.

3.10.3.2 Technology Refreshment and Insertion

Plan for technology refreshment and insertion and partner with engineers to assess whether designs considered through market research support modular open-source approaches to increase competition, sources of supply, security, and flexibility in mitigating obsolescence, cybersecurity risks, and supply chain risk impacts to hardware and software over the program life cycle.

3.10.3.3 Operational Use

Assess whether the design of the proposed capability meets operational environment requirements at an acceptable risk and within cost. See MIL-STD-810H for guidance on environmental design and test.

3.10.3.4 Enterprise and Portfolio Considerations

Assess whether the system's supply support and/or repair capabilities are already established through an existing enterprise contract or future enterprise capability that could meet program timelines.

3.10.3.5 Organic Capability

Assess whether existing organic sources of repair across the DoD have adequate capability and capacity established for the system being developed. This effort can be facilitated by provisioning and cataloging and depot maintenance activation planning to include depot maintenance interservice capability.

3.10.3.6 Trades and Performance Metrics

The PSM use performance metrics to identify tradeoffs to the PM, to assist with meeting program schedules while including supportability. If the PM determines schedule to be the highest priority, the PM should employ early planning and work with the PSM and contracting officer to include priced options for PS deliverables within the initial contract to mitigate risk to the schedule, cost, and performance over the program life cycle.

3.11 Funding Alignment

For a PSS to succeed, a PSM should work with the PM and Business Financial Management and Cost Estimating communities to ensure it is correctly and adequately funded. It is important to align funding appropriations with support requirements. Typically, acquisition phase product support is funded out of Research, Development, Test, and Evaluation (RDT&E) and Procurement appropriations for the initial product support package (e.g., spares, support equipment, trainers, simulators, interim contractor support (ICS) etc.).

As the system transitions to operational use, support is typically funded from the Operations and Maintenance (O&M) appropriation. PSMs should work to identify O&M funding requirements early enough to ensure adequate planning and budgeting of sustainment funds once the system has been fielded. As the system evolves into the O&S phase of its life cycle, it may be necessary to include Procurement and RDT&E funding for necessary modifications and upgrades to the system to prevent degradations in performance and/or to mitigate rising cost for sustainment as the system ages.

Each program typically has a group of Business Financial Managers (BFMs) who track funding and funding alignment. The PSM should endeavor to meet with program BFMs on a periodic basis to maintain situational awareness and oversight on all appropriations affecting platform support. In addition, the PSM should work with the BFM community to ensure the program of record reflects the financial resources required for support and sustainment of the weapon system. This includes close collaboration on recurring cost estimates to ensure all product support requirements are included.

The table below gives additional information on the funding categories used by program offices to fund acquisition and sustainment activities.

Table 3: Military Appropriations

Research Development Test and Evaluation (RDT&E)
(2 years obligational authority, 5 years expenditure)
• Initial Product Support Package Design and Development in synchronization with the overall program Development.
• Could include most of the integrated Product Support Elements suc as (Maintenance Planning, Training for Test, Developmental publications, Simulators and Training system design, Test and Evaluation, Support Equipment Design and Test Support, Test support spares and repair etc.)
• Future improvements as part of upgrades to the system
Procurement
(3 years obligational authority, 7 years expenditure except for Ships which are 5 years obligational authority 10 years expenditure)
• Initial non-recurring and recurring production of the product support package (Initial Spare and Repair parts, Technical Publications, Support Equipment (Field and Depot), Maintenance Training, Trainers, Simulators
• Interim Contractor Support
• Modernization and Upgrades to the system
Operations and Maintenance
(One year obligational authority, 3 years expenditure)
• Repair and Maintenance (Labor and Materials)
• Minor improvements as part of repairs
• Parts and Supplies
Military Construction (MILCON)
(5 years obligational authority, 10 years expenditure)
• Facilities and Infrastructure (Maintenance Facilities Forward Sites and Depots, Hangars, Docks)
• Base Realignment and Closure
Military Personnel (MILPERS)
• Funding appropriated for the military personnel associated with the system

3.12 Environment, Safety, and Occupational Health

PMs should address programmatic ESOH evaluation requirements throughout the program life cycle. PMs must comply with 42 U.S.C. § 4321 et seq, National Environmental Policy Act (NEPA), and Executive Order (EO) 12114, Environmental Effects Abroad of Major Federal Actions and ensure compliance with statutory ESOH requirements.

Additionally, PMs should:

1) Manage ESOH requirements and minimize risks throughout the system's life cycle. The methodology in Military Standard (MIL-STD)-882E will be used to identify hazards, assess the ESOH risks where hazards cannot be eliminated and track the risks associated with identified hazards. The Joint Service Software Safety Authorities (JSSA) Software System Safety Implementation Guide may be used to assess software's contributions to system-level mishap risk by considering the potential risk severity and the degree of control that software exercises over the hardware.
2) Initiate the Programmatic ESOH Evaluation (PESHE) at Milestone (MS) A or the Initial Program MS, and provide updates at MS B, MS C, and Full-Rate Production Decision Review. The PESHE and NEPA/E.O. 12114 Compliance Schedule are attached to the SEP and after MS C are included as an annex to the LCSP. The PESHE documents the results of hazard analyses, ESOH risk assessments, and statutory requirements compliance activities across the system's life cycle. PSM will ensure ESOH logistics efforts are considered during Product Support Analysis in accordance with TA-STD-0017. Use of digital engineering system models and artifacts or other documentation to record the status, results, and conclusions of the ESOH analyses and statutory compliance activities is encouraged.

3) Identify other ESOH requirements applicable to the system, such as design criteria (e.g., airworthiness) and required external safety reviews, approvals, and certifications.
4) Ensure ESOH risks are accepted by the following authorities before exposing people, equipment, or the environment to known system-related hazards: Component Acquisition Executive for high risks; Program Executive Office for serious risks; and the PM for medium and low risks. The user representative, as defined in MIL-STD-882E, is part of this process throughout the system's life cycle and will provide formal concurrence prior to all serious- and high-risk acceptance decisions. For joint programs, risk acceptance authorities reside within the lead DoD Component.
5) Report the status of ESOH risks and acceptance decisions at technical reviews. Address the status of all serious and high ESOH risks at acquisition and sustainment program reviews and fielding decisions.
6) Identify Hazardous Materials (HAZMAT) (both embedded in the system and required for system operations and maintenance) and wastes and pollutants generated by system operations and maintenance. Eliminate, minimize, or provide for safe disposal of identified system hazardous materials, wastes, and pollutants. Use and place on contract the Aerospace Industries Association's National Aerospace Standard (NAS)411 and NAS411-1 to manage HAZMAT, tailored as needed to meet Service or Command Program specific HAZMAT management requirements and needs.
7) Maintain a current NEPA/E.O. 12114 Compliance Schedule that covers all known or projected system-related activities throughout the life cycle that may trigger compliance requirements including testing, fielding, and support of the system. The PM provides system-specific analyses and data to support other organizations' NEPA and E.O. 12114 analyses of activities involving the Program's system. The compliance schedule includes timelines and locations for system-related activities to enable consideration of potential impacts to the environment and completion of appropriate documentation in accordance with DoD Component implementing procedures.
8) Comply with insensitive munitions requirements for all systems containing energetics in accordance with the DoD and Component policy requirements as required by Section 2389 of Title 10, United States Code.
9) Incorporate the identification of hazard and risk mitigations and hazardous materials in system technical data to ensure that system operators and maintainers are aware of and understand the required risk mitigations.
10) Provide system and ESOH information needed by testing, training, and receiving activities to prepare arrival and sustainment support of the system.

3.13 System Safety Engineering

The PM shall address System Safety Engineering (SSE) throughout the overall program life cycle. The methodology in Military Standard (MIL-STD)-882E shall be used to identify system safety hazards (hardware and software) and their associated risks. DoDI 5000.88 requires the documentation of the strategy for the SSE program in accordance with MIL-STD-882E. MIL-STD-882E reinforces integration of other functional disciplines to ultimately improve consistency of hazard management practices across programs. Ensure system safety is fully integrated into program activities, Integrated Product Teams and other stakeholder functional areas (i.e., Logistics, Test & Evaluation (T&E), Software, Software Quality). The SSE engineering program and activities shall include the assessment of software using the software system safety methodology in MIL-STD 882E to identify software contributions to system hazards and risks and to include the assessment of new technologies (e.g. Artificial Intelligence, Autonomy and

Unmanned capabilities and functionality). In addition to MIL-STD-882E, the PM may use the guidance identified in the DoD Joint Software Systems Safety Engineering Handbook during the software system safety assessment.

The PM should also support system-related Class A and B mishap investigations by providing analyses of hazards that contributed to the mishap and recommendations for materiel risk mitigation measures, especially those that minimize human errors.

3.14 Digital Product Support

As discussed in paragraph 1.2, PSMs should collaborate with SE to develop, document, and implement the program's Digital Engineering Implementation Plan with specific focus on use of digital models and simulations for product support activities. PSMs should leverage modern predictive analytics tools using artificial intelligence and machine learning (AI/ML), CBM+, Prognostics and Health Management (PHM), and onboard and offboard collection of performance and maintenance data to inform product support analysis, planning, and decision-making early in and throughout the life cycle. Digital product support methodologies, leveraging the Authoritative Source of Truth managed in a Product Lifecycle Management (PLM) or equivalent system, can improve cost-effective delivery of product support outcomes. See more on Digital Product Support at https://www.dau.edu/acquipedia/pages/articledetails.aspx#!734 and PLM at https://www.dau.edu/acquipedia/pages/articledetails.aspx#!391.

Section 4: Developing a Product Support Strategy

4.1 Introduction

The DoD Product Support Strategy Process Model provides a ready reference to the iterative twelve steps for defining and implementing product support strategies.

Figure 7: DoD Product Support Strategy Process Model

Programs may change their weapon system PSS over their life cycle as they transition from IOC to a fully fielded and mature system and ultimately to retirement. The development of, or revision to, a PSS adheres to a logical methodology captured in the 12-step model depicted in Error! Reference source not found.**7**.

The Life Cycle Product Support Strategy Process Model represents the major activities required to implement, manage, evaluate, and refine product support over the life cycle. It is not a one-time process, but rather a continuing, iterative process in which the sustainment of a system (or systems) is adapted and evolved to optimally support the needs and requirements of the Warfighter in an effective and affordable manner. A description of the Product Support Strategy Process Model's 12 steps follows.

4.2 12-Step Product Support Strategy Process Model[25]

4.2.1 Integrated Warfighter Requirements & Support

Translate system operational requirements into the sustainment strategy that delivers those requirements. The objective of Product Support is to develop, enable, and execute a sustainment strategy that delivers optimum operational readiness to the Warfighter, consistent with Warfighter requirements, at an affordable, best value cost. Warfighter requirements are expressed in operational terms. Those requirements are interpreted and translated as needed into sustainment objectives that drive the achievement of those outcomes.

An effective outcome-based strategy implementation begins in the JCIDS process (or equivalent requirements process for non-MCA pathways) by focusing capabilities needs on overall performance and linking supportability to performance.

Understanding Warfighter requirements in terms of performance is an essential initial step in developing a meaningful support strategy. The PSM team consults with the operational commands and organizations that support the war fighting combatant commanders. The operational commands are generally PM's primary customers. Their Warfighter capability needs are translated into requirements. The metrics are derived from the requirements to drive outcomes that serve as the primary measures of support provider performance. Supportability requirements should also be a KPP or KSA/APA consideration or a testable performance metric.

Understanding Warfighter requirements is not a one-time event. As scenarios change and the operational environment or funding profiles evolve, performance requirements may also evolve, leading to changes in the suitability requirements which in turn drive supportability strategy and outcome-based sustainment methodology. Thus, meeting Warfighter needs and remaining in close alignment with Warfighter requirements and logistics personnel are essential and continuous processes for the PSM.

To achieve this needed flexibility, product support strategies are implemented via PSAs that specify the roles, responsibilities, duration of support, resource commitments, and any specified support or performance outcomes and the corresponding metrics sufficient to achieve the operational requirements. Ideally, the product support strategy be aligns across various tiers of support and operations tempos.

4.2.2 Form the Product Support Management Integrated Product/Process Team

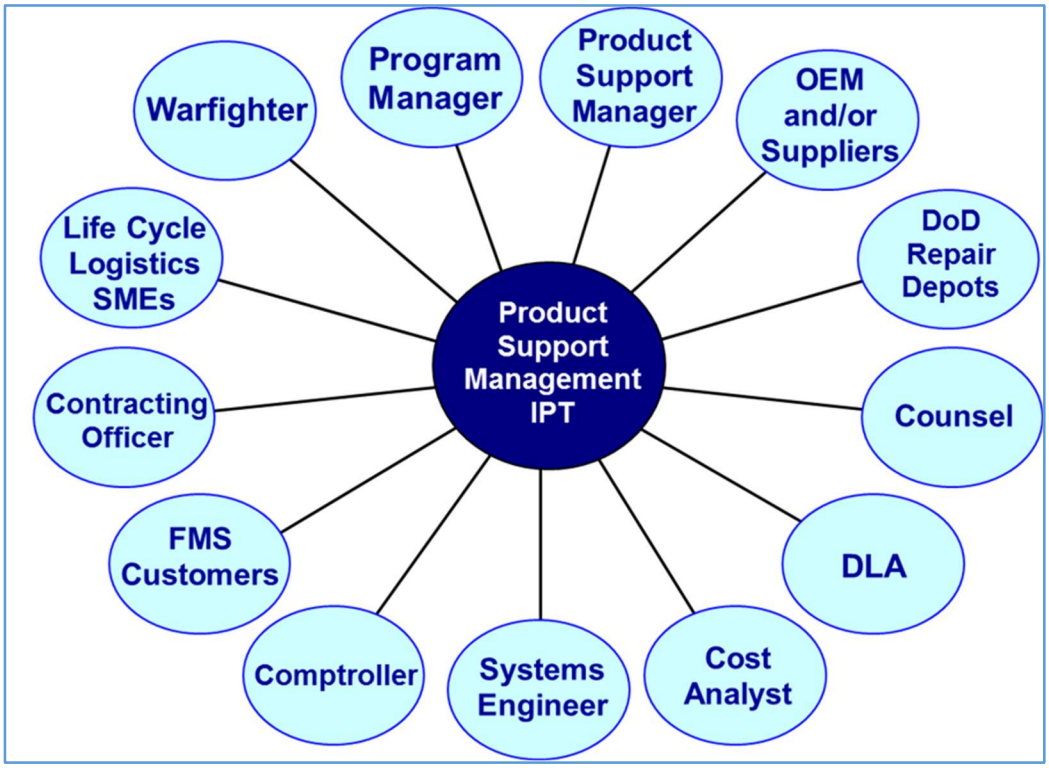
Form the PSM team that develops, implements, and manages product support. The PSM is charged with the responsibility to plan, develop, implement, and execute the product support strategy. Product support encompasses a range of disciplines, including logistics, requirements, financial, contracts, legal, and engineering.

Although the PM is the life cycle systems manager, the PSM is responsible to the PM for the life cycle product support management. Effective product support strategies require the participation and consensus of all stakeholders in developing the optimum sustainment strategy. The IPT team, led by the PSM, may consist of Government and private sector functional experts and

[25] For a more detailed explanation of how to use the 12-step process to develop and implement performance-based product support solutions, see the *DoD PBL Guidebook* (https://www.dau.edu/tools/t/Performance-Based-Logistics-(PBL)-Guidebook)

include all appropriate stakeholders including Warfighter representatives, as shown in the notional IPT depicted in **Figure 8**. However, it is vital that members can work across organizational boundaries. Teambuilding to achieve a system orientation focused on integrating support across the IPS Elements to achieve Warfighter required performance is critical.

Figure 8: Product Support Management IPTs



Product Support Management IPTs are cross-functional and include the Warfighter or DoD customer. The structure of the team may vary depending on the maturity and the mission of the program. Where appropriate, the team may employ an agile project management approach. The PSM need to consider where the system is in the life cycle, understand what major decision points or events are approaching, and ensure the correct representatives on the team to provide useful information to the decision makers for the program to move forward through the life cycle successfully.

IPT membership typically includes a program office "core" team who has a daily responsibility to plan, develop, implement, and oversee the product support strategy; the core team can be supplemented, often on an ad hoc basis, by other stakeholders and SMEs as needs arise. After the IPT is organized, the members establish their goals, develop plans of action and milestones (documented in an approved IPT Charter), and obtain adequate resources.

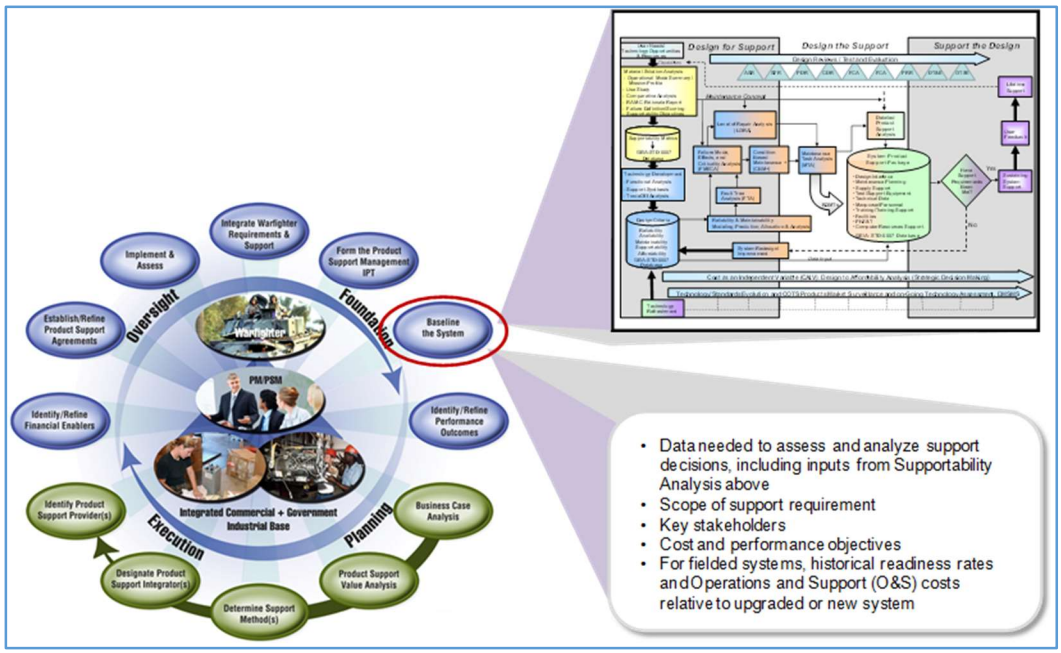
The Product Support Management IPT could include representatives from a component command headquarters and logistics representatives from supply, maintenance, and transportation staffs. It could also include representatives from operational commands or defense agencies, as well as engineering, technical, procurement, comptroller, information technology organizations, and contract support. Depending on the stage of the life cycle, the team could also include the PSI(s) and key PSP(s). After the team is organized, the members establish their goals, develop plans of action and milestones, and obtain adequate resources. In addition to

assisting the PM/PSM in developing, refining, and implementing the product support strategy, the Product Support Management IPT also ensure consideration, throughout support strategy design and development, of all factors and criteria necessary to achieve a best value strategy that leverages the best capabilities of the public and private sectors to meet Warfighter performance, readiness, and availability requirements at the lowest LCC.

4.2.3 Baseline the System

Collect the data, or begin data collection for new systems, which will be needed to assess and analyze support decisions, including inputs from engineering and supportability analyses. This data includes such things as reliability, maintainability and diagnostics predictions, FMECA, Failure Reporting and Corrective Action System (FRACAS), LORA, MTA, RCM, and other key maintenance planning tasks, as well as Reliability, Availability, and Maintainability (RAM), and LCC analyses.

Figure 9: Designing the System Baseline for Support



Baselining the system helps PMs identify the difference between existing and desired performance requirements to develop an effective support strategy.

Defining and documenting the system baseline answers four key questions.

1) What is the scope of your support requirement?
2) Who are the key stakeholders?
3) What are your cost and performance objectives?
4) For fielded systems, what are the historic readiness rates and O&S cost relative to the upgraded or new system?

The PM needs to identify the difference between existing and desired performance requirements to develop an effective support strategy, as shown in Error! Reference source not found.**9**. Accordingly, the PM identifies and documents the current performance and cost baseline. The life cycle stage of a program determines the scope of a base lining effort. For new programs with

no existing product support infrastructure, the baseline should include an examination of the cost to support the replaced systems. If there is no replaced system, LCC estimates can be used. For new systems, the business model for supporting the product demonstrates its risks and benefits as part of the SE process. This proof of concept for the support solution is part of the Engineering and Manufacturing Development (EMD) phase for programs using the Major Capability Acquisition (MCA) pathway. Timing may vary for programs using other Adaptive Acquisition Framework (AAF) pathways; however, early evaluation of product support concepts can minimize impacts to fielding. For existing systems, the baseline assessments are the basis for the Product Support BCA's assessment of the various alternative product support approaches. It is essential to determine the sustainment and readiness performance history and associated O&S cost, so actual data should be used for fielded systems.

The process of developing the system baseline is to identify all of the information known about the system to include performance, support, reliability, maintainability, and cost data. A robust Integrated Data Environment (IDE) (or, alternatively, Integrated Digital Environment and/or Product Lifecycle Management (PLM) capability) should be initiated (or accessed) as a fundamental component in PSS development or revision to capture and maintain the system's ASoT. This stage of the process also provides an essential linkage to a variety of SE and life cycle logistics efforts to ensure a system is designed with supportability in mind, including key inputs from Supportability Analysis activities. These include IPS activities such as FMECA, FRACAS, FTA, LORA, MTA, RCM, and other related maintenance planning tasks, as well as RAM and LCC analyses. Throughout the maintenance planning process, however, it is important to remember that the PM integrates the product support design into the overall design process, and assess enablers that improve supportability, such as diagnostics and prognostics, for inclusion in the system performance specification. As the design matures, the PM ensures that life cycle affordability is a factor in engineering and sustainment trades.

Implementation of a disciplined design for support approach, including these SE analysis tools are directly linked to a system's RAM attributes and LCC, and plays a key role in not only establishing top-level product support metrics, but in ultimately meeting Warfighter performance requirements. Close collaboration between systems engineers and life cycle logisticians is critically important during system design and development and throughout the life cycle. These tasks are further refined during the subsequent BCA to determine a cost effective, sustainable product support solution to meet user needs in an operational environment.

4.2.4 Identify/Refine Performance Outcomes

Using the program's product support requirements, develop a process for identifying critical product support outcomes and how you measure success. Identify the critical behaviors that your metrics influence to achieve the program's PSS outcomes. The starting points for metrics identification are Warfighter outcomes and DoD specified top-level weapon system metrics. Each PSS, as it evolves, is to be tailored consistent with the maturity of data and existence of in-place support infrastructure and capabilities. The metrics defined as accountable outcomes are tailored accordingly, with an objective to maintain a close correlation with, and enable the achievement of, the Warfighter and DoD top-level outcomes.

Having collected the Warfighter, Service, and DoD requirements for each IPS Element, the PSM decides on the actual and as-measured performance outcomes required for the product support strategy.

A Product Support Arrangement (PSA) (e.g., Memorandum of Agreement (MOA)) between the PSM and the Warfighter states the objectives and concept of operations (CONOPS) that form the basis of the product support effort. The PSM focuses on a few key outcomes, such as weapon system availability, mission reliability, logistics footprint, or overall system readiness levels. Using metrics that link key reliability, availability, maintainability, and supportability to existing Warfighter measures of performance and reporting systems is essential. Many existing logistics and financial metrics can be directly related to top-level Warfighter performance outcomes.

Performance-Based strategies are critical to affordably delivering Warfighter support. In accordance with DoDI 5000.91, at the program level, all product support solutions will be performance based. Performance based strategies fundamentally change the way we structure product support. It directly ties the delivery and support of products and services to Warfighter product support outcomes to enable Warfighter effectiveness. In an era of shrinking budgets and increasing costs, support solutions balance Warfighter outcomes with the cost of delivery. PBL strategies/arrangements are included in sustainment cost reduction initiatives to balance cost and performance, regardless of industry or the Government providing the service. PBL also provides explicit productivity incentives and ensures the best value for the DoD.

Note: All PBL arrangements are required to maintain property accountability and FIAR requirements

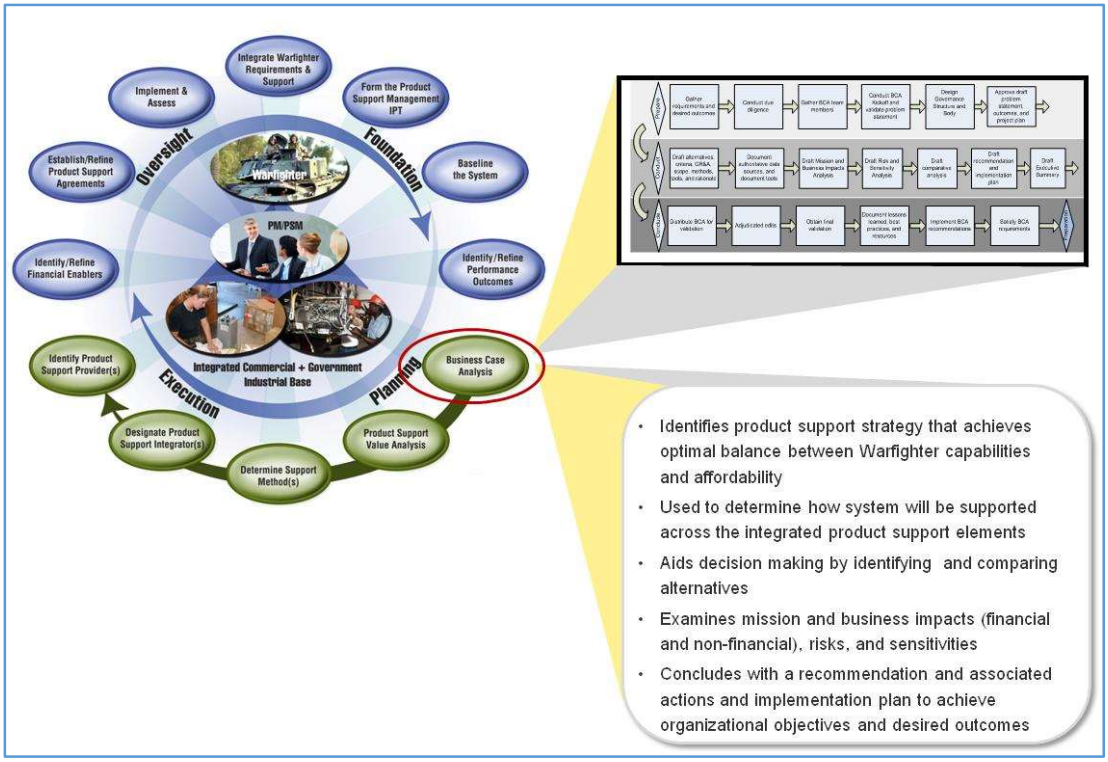
4.2.5 Product Support Business Case Analysis

Assess the capabilities, effectiveness, cost, competencies, and process efficiencies to identify the optimum best value product support solution.

4.2.5.1 Product Support Business Case Analysis Purpose

Figure 10 shows where the PSBCA occurs, at the beginning of the planning cycle. A PSBCA is a structured methodology and document that aids decision making by identifying and comparing alternatives by examining the mission and business impacts (both financial and non-financial), risks, and sensitivities. The PSBCA concludes with a recommendation and associated specific actions and implementation plan to achieve stated organizational objectives and desired outcomes. The goal of a PSBCA is to identify the product support strategy that achieves the optimal balance between Warfighter capabilities and affordability. A PSBCA does not replace the judgment of a decision maker, but rather provides an analytic, standardized, and objective foundation upon which credible decisions can be made. The PSBCA should be a full, fair, and accurate comparison when evaluating multiple alternatives. A PSBCA is used for major life cycle, sustainment, and other product support decisions, especially those that result in new or changed resource requirements. The PSBCA helps leadership with significant investment and strategic decisions. For example, use a PSBCA to evaluate a decision on whether or not to transform business operations such as the degree of commercial involvement and choosing a PSI/PSP, develop a Web-based curriculum, or retire an asset.

Figure 10: Product Support BCA



Note: This figure can be found in the BCA Guidebook, Figure 5, Section A.2 at https://www.dau.edu/pdfviewer?Guidebooks/Product-Support-Business-Case-Analysis-(BCA)-Guidebook.pdf

A PSBCA provides a best value analysis, considering not only cost, but also other quantifiable and non-quantifiable factors supporting the product support strategy implementation and related investment decisions.

4.2.5.2 Product Support Business Case Analysis Structure

PSBCA contents and implementation processes are described in the *DoD Product Support BCA Guidebook* and include:

1) Executive Summary
2) Introduction
    a. Problem Statement
    b. Background
    c. Scope
3) Desired Outcomes & Requirements
    a. Desired Outcomes
    b. Requirements
4) Assumptions & Methods
    a. Ground Rules & Assumptions
    b. Analysis Methods, Tools & Rationale
    c. Evaluation Criteria
5) Alternatives

   a. Current Baseline/Anticipated Initial Support/Status Quo
   b. Alternatives
6) Mission & Business Impacts
   a. Benefits & Non-Financial Analysis
   b. Cost & Financial Analysis
7) Risk Analysis & Mitigation Plans
   a. Risk Analysis
   b. Mitigation Plans
8) Sensitivity Analysis
9) Conclusion
   a. Comparison of Alternatives
   b. Summary of Results
10) Recommendations
11) Implementation Plan

The PSBCA becomes an iterative process, conducted and updated as needed throughout the life cycle as program plans evolve and respond to changes in the business and mission environment. The PSBCA is not intended to incorporate in all cases the same methodology or level of analysis. Any analysis should be tailored to the nature of the specific product support decision. The PSM should identify the appropriate analytical methodology for the circumstances while addressing the costs, benefits, risks, and sensitivities to changes in the available support alternatives.

4.2.5.3 Product Support Strategy Value Analysis

Best value analysis to optimize long-term LCC and benefits would include:

- Optimum level of support (system, sub-system, or component level), evaluation of product support strategy considerations related to the twelve IPS Elements
- SCM strategy
- Workload allocation strategy (including Depot maintenance from organic, commercial and interservice sources, and PPP considerations)
- Refinement of program Data Management Strategy (DMS) and Intellectual Property (IP) Strategy
- Strategies for continuous modernization and improvement of system RAM, and proactively addressing DMSMS/obsolescence and corrosion issues
- LCC control and risk mitigation
- Affordable alignment with Department strategic objectives

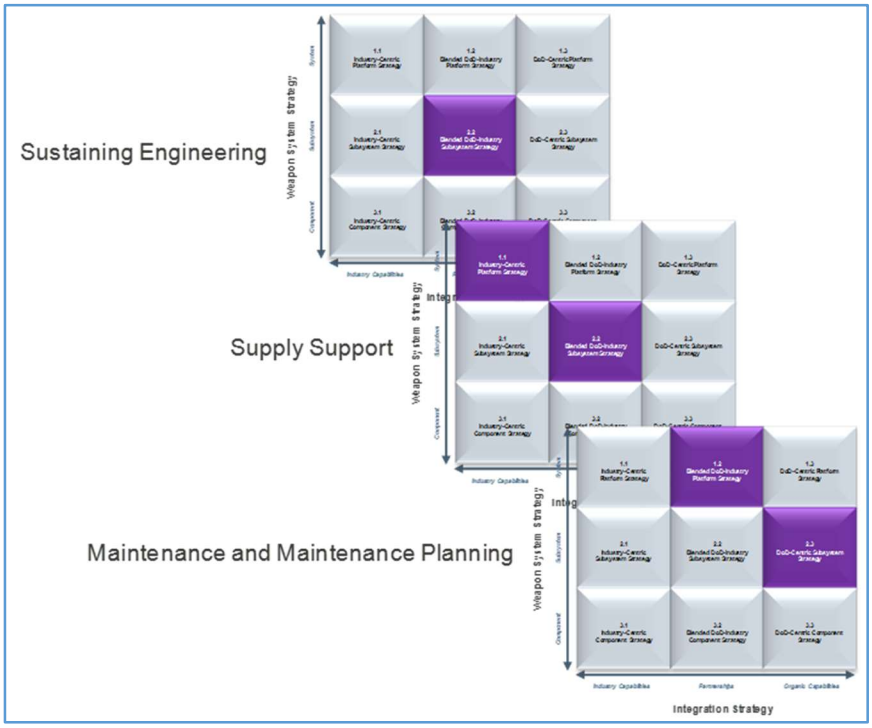
A product support BCA provides a best value analysis, considering not only cost, but also other quantifiable and non-quantifiable factors supporting PSS implementation and related investment decisions. This can include, but is not limited to, performance, producibility, reliability, maintainability, and supportability enhancements. In outcome-based product support strategies, it is important and frequently necessary to make up-front investments in R&M improvements and proactive DMSMS/obsolescence mitigation that result in short-term increases in system costs to generate the requisite LCC savings later. To effectively provide this justification, it is critical that the process, scope, and objectives of the PSBCA be clearly understood and communicated. A PSBCA should be developed in an unbiased manner, without prejudice, and not constructed to justify a preordained decision. The analysis should stand on its own and be able to withstand rigorous analysis and review by independent audit agencies. A PSBCA is an iterative process, periodically revisited, or updated throughout the life cycle. Strategic decisions informed by BCAs in general also include:

- The initial decision to invest in a project
- The decision to select among alternative approaches
- The validation of any proposed project scope, schedule, or budget changes
- The identification of various budget accounts and amounts affected by the various product support strategies
- The verification that planned benefits are realized at the completion of the project

The Product Support BCA should be a living document (i.e., as project or organization changes occur, these should be reflected in updates to the business case). This information should be used in further decisions to sustain or enhance the solution and to refine estimation of benefits and costs for future projects in the organization. The independently and objectively derived PSBCA should identify which alternative provides optimum mission performance given cost and other constraints, including qualitative or subjective factors.

The outcome of the PSBCA supports an integrated PSS which falls somewhere on the PSDM shown in **Figure 11.** Note that this matrix shows the continuum between component and system-centric strategies and Government and commercial capability-based strategies. As mentioned earlier, virtually every PSS is comprised of both Government and commercial product support. Finding the right blend of both public and private support while simultaneously determining the level (component, subsystem, system) of support, and tailoring that support to the objective system dependent on its life cycle phase, mission, operational environment, and funding requirements is a complex process. While the PSDM shows nine discrete support strategy "blocks," in reality there are variations within each of those blocks, resulting in a continuum of product support alternatives. This means the PSM looks at selected strategies from the perspective of what is required for their system with regard to determining the appropriate mix of support sources required to achieve Warfighter requirements at a best value.

Figure 11: Sample PSBCA Recommendations on Best Value Alternatives



Each IPS Element should have a recommendation to achieve Warfighter requirements at a best value, with this recommended alternative falling somewhere on the PSDM.

Figure 11 shows how an aircraft PSBA might recommend the best value alternative for the Sustaining Engineering, Supply Support, and Maintenance and Management Planning IPS Elements. Similar PSDMs would show the best value strategy for each of the remaining IPS Elements. In this example, Sustaining Engineering would be performed on a subsystem basis with a dedicated team of Government and commercial engineers. Supply Support would similarly have a partnership to support engines with Government and commercial personnel. Conversely, the Supply Support strategy for the aircraft that is independent of the engine is to use capabilities that are predominately held by a commercial entity with only minimal Government involvement to manage the airframe PSI. Finally, Maintenance and Maintenance Planning would have a partnership with roughly equal Government and commercial capabilities providing Depot-level maintenance services at the system level with organizational-level maintenance performed by organic personnel.

4.2.5.4 Determine Support Method

Determine whether support might be acquired from the PSIs or PSPs using an outcome- or transactional based acquisition method**.** Decision(s) are validated or made using a best value analysis consistent with the PSBCA.

A PSM does not perform product support. Rather, he or she is the architect of that support, conducting a considered analysis leading to a decision as to where, how, and by whom that support is be accomplished. Once they have selected the providers of product support, they decide how that support is to be acquired. There are ultimately only two options available to them (with some variations between these two options). They can either acquire the discrete goods and services necessary to enable the required Warfighter outcomes, or they can acquire the outcomes themselves. The former is the "transactional" support model, and the latter is the "performance-based" (or outcome-based) model. DoD policy and guidance specifies a preference for the performance-based model wherever possible. In using the transactional model, the PSM and the organic support industrial base determine the quantities, timing, and locations where the unit-purchased goods and services are delivered or accomplished – a demanding and complex task. If the support purchased proves to be inadequate (or too much) the risk for performance, cost, and obsolescence, along with storage, maintenance, and distribution lies entirely with the organic acquirer of support. In the performance- or outcome-based model, there is a shared risk equation.

The PSM, in assigning responsibility for outcomes to a PSI (who accomplishes them through management of subordinate PSPs), is responsible for specifying and incentivizing the appropriate outcomes. If those have been specified correctly, the responsibility for delivering them is shared between the PSM and the PSI. The method of support, transactional or performance-based does not alter the basic functions or tasks that comprise the support, only in how that support is acquired. The PSM retains the overall role of and accountability for managing product support on behalf of the Warfighter.

4.2.5.5 Designate Product Support Integrator(s)

For outcome-based support, identify the PSI(s) who will be delegated the responsibility to integrate support providers to deliver the specified outcomes assigned consistent with the scope

of their delegated responsibility. Decision(s) are validated or made using a best value analysis consistent with the PSBCA.

A fundamental tenet of the PSBM is identifying single-point accountability for support. That responsibility belongs to the PSM, who delegates, as informed by the data driven PSBCA, responsibility for one or more components of support to one or more PSIs who are responsible for integrating their sources of support, public and private, to meet the identified performance outcomes. The PM or PSM, selects a PSI from the Government or private sector to coordinate the work and business relationships necessary to satisfy the PSA.

The PM's responsibilities for oversight and management of the product support function are typically delegated to the PSM, who leads the development and implementation of the product support strategies and ensures achievement of desired support outcomes during sustainment. The PM/PSM and the Product Support Management IPT employ a PSI, or a number of PSIs as appropriate, to achieve those outcomes. The PSI is an entity performing as a formally bound agent in accordance with a PSA such as a contract, MOA, Memorandum of Understanding (MOU), Service Level Agreement (SLA), etc.) charged with integrating all sources of support, public and private, defined within the scope of the PSAs to achieve the documented outcomes. The PSM, while remaining accountable for system performance, effectively delegates the responsibility for delivering Warfighter outcomes to the PSI. In this relationship, and consistent with outcome-based product support, the PSI has considerable flexibility and latitude in how the necessary support is provided, so long as the outcomes are accomplished.

Given the stated preference (by policy and statute) for outcome or performance-based acquisition of product support services, an effective PSS includes designation of one or more PSIs who responsible, within the scope of their assigned product support outcomes, for managing and integrating the functions and PSPs necessary to achieve the specified performance and/or support outcomes designated by the PSM. Note that there are circumstances when transactional support is an appropriate product support solution (i.e., tank, ship or aircraft battle damage or incident repairs which are unpredictable in numbers and scope of effort.) and may be evaluated as an alternative. In all cases, the PSM is accountable to the PM for the support outcome.

The role of the PSI can be narrow or broad, as directed and designed by the PSM. At one end of the spectrum, a single PSI could be assigned with the responsibility for entire system level outcomes (e.g., materiel availability, A_M). This approach has the advantages of clearly assigning responsibility (and visibility) of Warfighter outcomes to a single point of responsibility and provides for a comprehensive and horizontally integrated support solution that accounts for all the product support elements. Alternately, the PSM can assign top-level PSI roles for the major system subsystems; the most prevalent example would be dual PSIs for an aircraft system, with a PSI designed for the airframe and a PSI designated for the propulsion system. Devolving further, PSIs could be assigned for multiple major subsystems that comprise a larger platform system capability, such as a naval vessel. The determination of the number, designation, and responsibilities of the PSIs comprising a product support strategy framework result from both the PSBCA process as well as the PSM's consideration of the operational mission role, environment, and support requirements of the objective system.

The PM or PSM selects a PSI from DoD or the private sector. Activities coordinated by support integrators can include, as appropriate, functions provided by organic organizations, private sector providers, or partnership(s) between organic and private sector providers. The PSM ensures that the product support concept is integrated across the IPSEs to provide an agile, robust, and cost-effective combat capability. The PM /PSM invites the Service and Defense

Logistics Agency (DLA) logistics activities to participate in PSS development and IPTs. These participants help to ensure effective integration of system-oriented approaches with commodity-oriented approaches (common support approaches), optimize support to users, and maximize total logistics system value.

Like the PSA with the Warfighter, the PSI function and PSA is a key component of the PSS documented in the LCSP. While product support execution is accomplished by numerous organizational entities (i.e., PSPs), the PSI is the single point of accountability for integrating all sources of support necessary to meet the agreed to support/performance metrics. The most likely candidates for the integrator role are:

- The system's Original Equipment Manufacturer (OEM) or prime contractor/vendor
- An organic agency, product, or logistics command (e.g., DLA, NAVSUP Weapons System Support (NAVSUP WSS), Depots)
- A third-party logistics integrator from the private sector
- The PM's own product support organization

Once the PM has answered some key questions, he or she is better able to evaluate the PSI options and select the alternative that provides the greatest benefits.

- What sustainment functions are planned to be included?
- What specific capabilities are required to perform these functions?
- Are these functions inherently Governmental?
- Are there statutory or regulatory limitations associated with performance of these functions?
- Are the desired functions more commonly performed in the commercial sector?
- Which provider offers the optimal mix of required performance at the lowest LCC (also frequently referred to as best value)?

Any organization that provides products or services in the sustainment of a DoD system is a PSP. The primary role of the PSI is to integrate the activities of the various PSPs. The PSI function can be aligned along vertical (weapon system platform) or horizontal (at the sub-system, commodity, or component level) axes. The primary difference in the two approaches is whether or not the PSI is assigned the responsibility of implementing and managing the support functions from the top down (a weapon system platform approach), or incrementally across a range of subsystems that may support multiple platforms.

4.2.5.6 Identify Product Support Provider(s)

Utilizing the PSBCA as well as PSI discretionary decisions for lower tied supplier support, select the best mix and blend of sources to perform the product support functions. Decisions are validated or made using a best value analysis consistent with the PSBCA.

A primary objective of the PSBCA process is to determine, for the individual IPS Elements and, in aggregate, the objective system, the optimum sources of support depending on capabilities, competencies, best value, and the qualitative efficiency and effectiveness of support. For each of the IPS Elements, there are logical candidates, both public and private, to accomplish the required product support. Within each of the IPS Element support functions the work further delineates into technical, hands-on, management, and quality tasks. DoD guidance expresses a clear preference for performance-based support, unless there is compelling financial, statutory, or other factors compelling pursuit of a transactional approach. The PSM may elect to assign support integration responsibilities to one or more PSIs assigned specified performance or

support outcomes and, consistent with that assignment, given authority to manage the PSPs and functions necessary to achieve those outcomes. The "mix" of PSIs and PSPs may be Government or commercial, as determined by the BCA process. The use of a performance-based PSS can simplify the complex process of configuring the broad range of sustainment functions and support providers so as to optimize achievement of required Warfighter capabilities. The most likely candidates for the PSP roles include:

- The system's OEM or prime contractor/vendor
- Commercial-sector suppliers, vendors, sub-contractors, support contractors, etc.
- An organic agency, product, logistics or materiel command, DLA, NAVSUP WSS, Depots, USTRANSCOM
- Commercial sector logistics, Maintenance, Repair, and Overhaul (MRO), and transportation organizations
- The PM's own product support organization

4.2.6 Identify/Refine Financial Enablers

Identify the types and amount of funding needed to perform the range of required support activities consistent with the terms, conditions, and objectives of the PSAs.

Once the PSS "framework" has been finalized to show the range and responsibilities of the PSIs and PSPs and the enabling PSAs have been drafted, the PSM should work the financial aspect of assuring that appropriate types and levels of funding are resourced to successfully execute the strategy. The amounts and types of funding required are driven by the unique needs and characteristics of the system and its operational priorities. Product support can be accomplished by various funding appropriations throughout the life cycle, including RDT&E, Procurement, Military Construction (MILCON) and Operations and Maintenance (O&M).

The PSM should plan and advocate for sufficient funding from the organizations to which those funds have been appropriated. This can involve actions that include developing preliminary estimates based on the best information at the time and ensuring they are inserted into the Planning, Programming, Budget, and Execution (PPBE) process. These estimates should be sufficient to successfully complete the research and development of all IPS elements required to support the system and to effect transition of a development system to operational use with sufficient funds for support, including RDT&E and Procurement funds. In addition, estimates and budget submissions for known required modifications and upgrades necessary for effective sustainment of the system.

These preliminary budget estimates should be refined over time during each budget cycle as the system and support elements design matures and empirical vs predictive data on system performance become available. Changes in the reliability and maintainability (better or worse than predicted) can cause drastic changes in these budget requirements. Once the funds have been appropriated, the PSM should work with the PM and Business Financial Manager to ensure the funds are made available as needed to fund the support as defined in the PSAs. While the Warfighter advocates for the required funding, the PSM has a clear management and oversight role of the funds used for product support. The PSM should work with the PM and Business Financial Manager to request the full amount of funding needed and provide impact statements and reclamas to the Warfighter, PM, program sponsor, and Comptroller explaining the impact of the reduced support that would result from inadequate funding. Linking these reclamas to impacts to major milestones such as test and evaluation schedules, Initial Operational Capability

(IOC), site activations, and initial deployment schedules reinforces the magnitude of impact budget shortfalls might have on program execution.

4.2.7 Establish/Refine Product Support Arrangements

Document the implementing PSAs (contract, MOA, MOU, CSA, etc.) that assign and delineate the roles, responsibilities, resourcing, and reciprocal aspects of product support business relationships.

PSAs, discussed in detail in **Appendix E, PSA Types**, serve to formalize the roles, responsibilities, relationships, and commitments of the active participants in the PSS, including, at a minimum, the PM, PSM, Warfighter customer, resourcing Commands, PSIs, PSPs, and associated stakeholders or participants in product support. PSAs may take a variety of forms, including performance-based agreements, service level agreements, MOUs, MOAs, CSAs, and contracts, or a combination of any or all of these. The PSM should ensure that PSAs are in place to document and define each relationship that is part of the execution of the product support strategy. These PSAs should reflect the price and performance agreements used in source selection and include agreed-upon mechanisms to demonstrate achievement of outcomes. The PSAs should ensure the PSM's plan is be executed in a manner agreeable to both the PSI and the PSM.

4.2.8 Implement & Assess

Implement and manage the PSS, including documenting updates to the LCSP, conducting, and implementing recommendations from the ILA, sustainment review (if applicable), and maturing the PSS. Include the continuous, ongoing assessment of Product Support effectiveness through using the established governance mechanisms driving decisions to review, modify, revise, or evolve product support strategies and business arrangements. The PSMs oversight role includes monitoring performance, revising the LCSP and updating the Product Support Package as needed. The PM also acts as the agent for the Warfighter, certifying PSI performance and approving incentive allocations. The PSM should take a hands-on approach and not assume that the PSAs are self-regulating.

Programs are required to conduct periodic post-IOC assessments of system support strategies to determine actual versus expected levels of performance and support.[26] These reviews occur nominally every five years after IOC, after changes in requirements/design, or for performance problems. These reviews should at a minimum assess the following items, as well as the statutory requirements identified in 10 U.S.C 4323, previously 10 U.S.C 2441.

- PSI performance
- Product improvements incorporated
- Configuration control
- Modification of PSAs as needed based on changing Warfighter requirements or system design changes
- Affordability and cost control of current PSS
- Revalidation or re-accomplishment of the PSBCA

[26] PL 111-84, The National Defense Authorization Act for Fiscal Year 2010, Section 805 – Requirements for Lifecycle Management and Product Support

Note: Revalidating the PSBCA does not mean it must be redone every 5 years. If the PSBCA ground rules, assumptions & operating environment have not changed, no errors in the original PSBCA are uncovered, and the Product Support solution is performing well, no other action is required. If the conditions under which the support solution was implemented have changed or before a new product support solution is implemented, the GR&A should be updated and a new PSBCA performed.

"For covered systems, Sustainment Reviews (SR) are required 5 years after IOC and every 5 years thereafter."[27] "The SRs focus on statutory sustainment elements and track O&S cost growth. SRs satisfy the requirement for ILAs after a program has achieved initial operational capability (IOC)."[28]

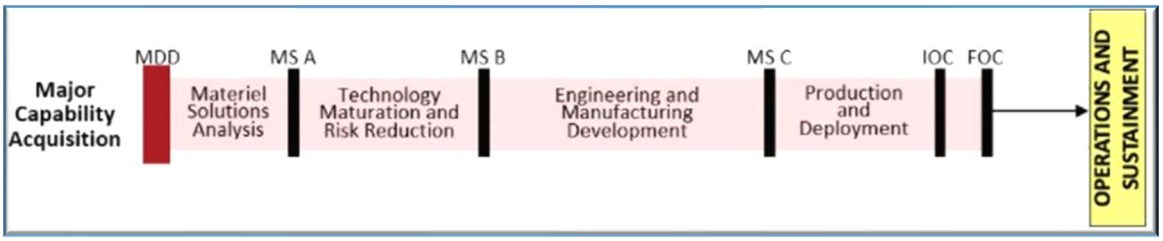
The PSM should review each PSI's performance against its PSA on at least a quarterly basis and use that data to prepare for the post-IOC assessments.

[27] 10 U.S.C. 4323, previously 2441

[28] DoDI 5000.91 para 4.10

Section 5: PS Management for the AAF - General Procedures for the MCA Pathway

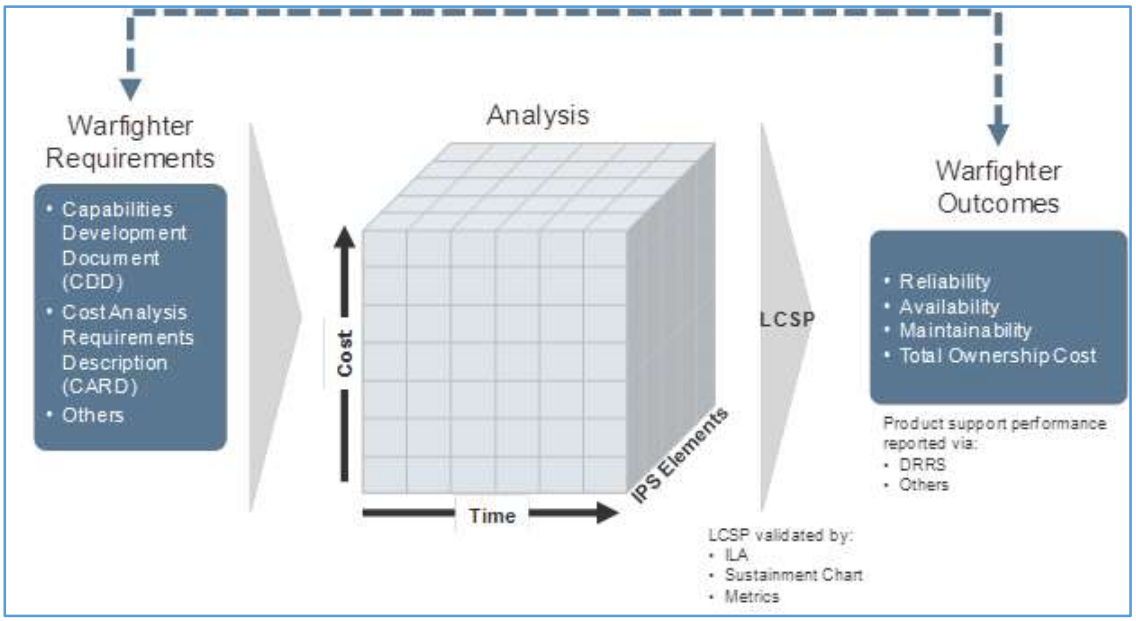
Figure 12: Major Capability Acquisition Pathway



5.1 Introduction

This section is oriented around the major phases of an MCA program's life cycle and the activities and deliverables associated with each phase and start with the Warfighter and sustainment stakeholders developing sustainment requirements. The PSM then develops a strategy and plans to fulfill these requirements. These strategies and plans address each of the IPS Elements and change over time. This change over time is represented by the SMLs, which describe the expected level of maturity and summarize key documents and capabilities of the sustainment program at a given point in the weapon system life cycle. Execution of these plans and strategies result in associated costs that also vary across the life cycle. Finally, execution of these plans and strategies also result in Warfighter-desired support outcomes. This process is shown in **Figure 13**.

Figure 13: Life Cycle Product Support Process



A successful outcome-based PSS uses structured analysis to convert Warfighter requirements into product support outcomes.

The sections that follow address each of the life cycle sections shown in the integrated view above. Specifically, this guidebook addresses: MSA, Technology Maturation and Risk Reduction (TMRR), Engineering and Manufacturing Development (EMD), Production and Deployment (P&D), and Operations & Support (O&S) phases. These sub-sections include the following:

- The program life cycle phase overview with key events, SML considerations, and recurring major objectives
- Key information requirements for the life cycle phase (see the AAFDID Tool for more information)
- PSM Guidance on specific activities within the life cycle phase

Specific Product Support activities linked to the ILA are included in **Appendix F – Using the ILA Assessment Criteria**, as a product support management tool. Refer to the Engineering of Defense Systems Guidebook for AAF pathway-specific R&M engineering activities related to product support.

5.2 Materiel Solution Analysis Phase

5.2.1 Overview

The purpose of this phase is to conduct the analysis and other activities needed to choose the concept for the product that is acquired, to begin translating validated capability gaps into system-specific requirements including the KPPs and KSAs/APAs, and to conduct planning to support a decision on the Acquisition Strategy for the product. AoA solutions, key trades between cost and performance, affordability analysis, risk analysis, and planning for risk mitigation are key activities in this phase. Unless this phase of the Acquisition process is being applied to a legacy system that is receiving a major modification, there may be little actual data and most estimations may be derived from analogous systems or engineering projections. Accordingly, the primary objective of this phase is ensuring user requirements and operational environmental constraints impacting sustainment are identified and documented in the LCSP

The PSM team executes the activities required in the MSA phase to support the maturing support solution characterized by the SMLs which are aligned with program key events in **Table 4**.

Table 4: Materiel Solution Analysis Activities and Documents

Life Cycle Phase	Program Inception	Material Solution Analysis (MSA)	Milestone A
SMLs		SMLs 1-4	
Key Events, Entry/Exit Products/Documents	ICD	AoA	ICD, LCSP, PSBCA, SEP, RAM-C, DMS
IPS Elements			
Product Support Management		X	X
Design Interface		X	X
Sustaining Engineering		X	X
Supply Support		X	X
Maintenance Planning & Management		X	X
PHS&T		X	X
Technical Data		X	X
Support Equipment		X	X
Training & Training Support		X	X
Manpower & Personnel		X	X
Facilities & Infrastructure		X	X
Information Technology (IT) Systems Continuous Support		X	X

5.2.2 Sustainment Maturity Levels in the Materiel Solution Analysis Phase

SMLs 1-4 **(Refer to SML Descriptions in Appendix G)** identify Warfighter requirements and operational concepts that should be identified to ensure that they are understood and agreed upon by all stakeholders. Note this would normally be the responsibility of the PSM but there may be a different entity performing this since the PSM might not yet be designated. The logistics and sustainment capabilities and potential maintenance concepts should be evaluated as part of the AoA. Boundary conditions for this phase should include the following:

- **Operational CONOPS.** Conduct a "day in the life" use-case scenario to understand how the system might be supported in an operational environment.
- **IPS Elements.** Assess each IPS Element and establish the initial baseline for each IPS Element's implementation.

SML 1–3 activities use these boundary conditions while SML 4 activity focuses on how the program developmental efforts acknowledges and defines logistics and sustainment KPP/KSAs and APAs as considerations in the program integrated system requirements definition. **Table 5** lists key entry/exit events/documents.

5.2.3 Key Documents

Table 5: MSA Phase Key Documents[29]

Entry
Initial Capabilities Document (U.S.C. 4251 previously 2366a)
AoA Plan
Alternative Maintenance & Sustainment Concept of Operations
Exit
AoA (including market research results) (U.S.C. 4251 previously 2366a)
Capability Development Document
Consideration of Technology Issues (part of the Acquisition Strategy)
T&E Strategy
Acquisition Strategy
SEP
RAM-C Rationale Report
LCSP
Product Support Analysis Plan (ref. MIL-HDBK-502A)
Intellectual Property Strategy
IUID Plan (part of SEP)
PESHE and NEPA/E.O. 12114 Compliance Schedule
PSBCA
Cost Target (U.S.C. 4251 previously 2366a)
Core Logistics Determination (U.S.C. 4251 previously 2366a)

5.2.4 Major Activities

5.2.4.1 Enterprise Synergies, IPS Element Trades & Key Relationships

The greatest flexibility in defining a PSS exists during this phase. The fundamental goal is aligning broad PSS requirements with the Warfighter's requirements. Also, no new system-specific investments have been made in supporting the weapon system. Accordingly, PSMs have the least constraints during this phase and should actively search within and outside of their Service for existing solutions for each IPS Element and understand the extent to which potentially shared solutions achieve performance and cost outcomes that are highly similar to their Warfighter customer's requirements. The beginning of a program's life cycle is the best time to promote standardized systems, components, spare parts and support equipment. PSMs should specifically look to their logistics directorates, their Secretariats, Office of the Assistant Secretary of Defense (Sustainment), DLA, and industry sources to efficiently gain the broadest possible perspective on potential enterprise synergies.

[29]For complete list of required information/documentation go to https://www.dau.edu/aafdid/Pages/About.aspx.

5.2.4.2 Analysis

Once potential high-performing outcome-based strategies are identified, the PSM should analyze the feasibility of migrating those solutions to their program and determine whether clarification and negotiation of changing requirements with the Warfighter are warranted.

IPS Elements are still relatively unconstrained during this phase since their primary function is in helping define potential product support alternatives. Two broad areas are directly influenced by IPS Element trades and relationships in this phase.

1) **Logistics Footprint.** Logistics footprint minimization in projecting and sustaining the force is an overarching DoD goal because minimizing the logistical burden a system places on deployed forces benefits the user, improves deployment time, and can help reduce the LCC. During this phase, footprint metrics appropriate to the system and its operational environment should be analyzed and considered as subsequent KPP, KSA/APA, or design requirements. At a minimum, logistics footprint metrics to meet the concept of operations should be established to be used in baseline trade analyses throughout the life cycle to help impact the design and establish a minimal logistics footprint for the system concept.
2) **System Design.** Address the system's design and planned logistics resources to support its readiness requirements and wartime utilization. This includes consideration of activities and resources (such as fuel and power) necessary for system operation as well as real world constraints and environment. It also includes all resources that contribute to the overall support cost (e.g., personnel; equipment; technical data; and maintenance procedures to facilitate the detection, isolation, and timely repair/replacement of system anomalies).

While data in this phase may be minimal and uncertainty high, the PSM should try to bound this uncertainty by creating a high-level PSBCA framework. This framework could be based on like or similar system data that is progressively updated as empirical data is obtained and the system matures during development and test. The primary objective of analysis during this phase is to ensure complete LCC is captured and used to create fair comparisons between alternatives as potential sustainment strategies are developed. This means that key sustainment related cost performance criteria, such as site activation non-recurring costs and O&S cost per operating hour should be considered in implementing the Cost as an Independent Variable (CAIV) principle. Additionally, the PSM ensures modeling and simulation is used in support of a robust AoA during the TMRR Phase selection process and to define the desired ranges for the sustainment metrics thresholds and objectives. Refer to para 3.5.2 for additional information.

5.2.4.3 Supply Chain Management

Supply chains in this phase are notional at best since supply support and maintenance concepts are not yet known. However, part of understanding potential enterprise synergies involves understanding potential supply chain synergies and risks. For example, if the system is an advanced attack helicopter, the cost and performance of a benchmark population of aviation systems should be examined to understand the results of potential supply chain models. To that end, using Supply Chain Operational Reference (SCOR) processes in accordance with DoDM 4140.01 V1 to understand the plan, source, make and maintain, deliver, and return aspects of alternative supply chains examined while looking for enterprise synergies to provide a ready way to quantitatively and qualitatively compare potential solutions and ensure all aspects of the supply chain are considered. A thorough review of currently fielded systems, components, spare parts,

and support equipment should be conducted to encourage the highest degree of standardization and prevent unneeded development of peculiar equipment requiring new supply chains.

5.2.4.4 Life Cycle Sustainment Plan & Product Support Package Initiation

The LCSP starts in this phase as the sustainment concept. The LCSP should capture initial support and maintenance concepts based on AoA results and requirements identified in the initial CDD. Also, create a plan to collect additional information to refine the LCSP and fill in all placeholders. There are generally no Product Support Package updates at this point of the life cycle.

Program Offices coordinate their LCSPs with sustainment command representatives to ensure their concerns are addressed early in the life cycle. The program offices should ensure transparency in transition to sustainment.

5.2.4.5 Maintenance Planning

In this phase, the life cycle logistician, or PSM if assigned, reviews the ICD to identify maintenance requirements in support of the Sustainment KPP, KSA(s), and APA(s). The logistician leads development of the maintenance strategy consistent with the overall Product Support Strategy and inputs to the Acquisition Strategy. The logistician coordinates with the Warfighter to develop and document the proposed maintenance concept and initial inputs to the RAM-C Rationale Report. The logistician also analyzes maintenance technology solutions, supports market research and trade studies, develops Maintenance Planning & Management inputs for inclusion in the RFP supporting the TMRR phase, and participates in or coordinates SME support for the TMRR phase source selection.

5.2.4.6 Funding Alignment

Funding during this phase is focused on ensuring any new sustainment technologies needed to achieve the requirements identified in the AoA are funded appropriately. Please see the appropriations chart **(Table 3)** for more detail.

5.3 Technology Maturation & Risk Reduction Phase

5.3.1 Overview

The purpose of this phase is to reduce technology, engineering, integration, and LCC risk to the point that a decision to contract for EMD can be made with confidence in successful program execution for development, production, and sustainment. The PSM's major objective in the TMRR phase is ensuring the supportability design features achieve supportability KPP/KSAs and APAs and are incorporated in the overall design specifications. Essential IPS Element activities are developing the supply chain performance requirements, product support risks and risk mitigation strategies, the maintenance concept and sustainment operational plan from the MSA phase documents, training strategies, support equipment plans, technical data management and infrastructure, and manpower and personnel strategies.

The PSM team should execute the activities required to support the Technology Maturation and Risk Reduction phase of the support solution characterized by the SMLs which are aligned with program key events as seen in **Table 6.**

Table 6: Technology Maturation and MS B Activities and Documents

Life Cycle Phase	Technology Maturation	Milestone B
SMLs	SMLs 5-6	
Key Events, Entry/Exit Products/Documents	PDR, ILA	APB, CDD, AS, LCSP, TEMP, DMS, SEP, RAM-C, ICE, PESHE
2366b Compliance		Core Logistics Capabilities Est, LCSP, Corrosion Prevention
IPS Elements		
Product Support Management	X	X
Design Interface	X	X
Sustaining Engineering	X	X
Supply Support	X	X
Maintenance Planning & Management	X	CLA
PHS&T	X	Transportability Report
Technical Data	X	X
Support Equipment	X	X
Training & Training Support	X	System Training Plan
Manpower & Personnel	X	X
Facilities & Infrastructure	X	X
Information Technology (IT) Systems Continuous Support	X	X

5.3.2 Sustainment Maturity Levels in the TMRR Phase

SMLs 5-6 propose that the initial system capabilities have been analyzed, initial supportability objectives and requirements have been defined and initial RAM management strategies have been formulated and integrated with the SE process. Design features needed to achieve the product support strategy, including diagnostics and prognostics, should be incorporated into system performance specifications. The TEMP addresses when and how sustainment design features and sustainment metrics are verified such as maintenance repair times, fault isolation within a given parameter or even the use of accelerated corrosion testing. The LCSP should be written and approved, to include supply chain performance requirements, manpower, information technology infrastructure, Corrosion Prevention and Control (CPC) planning, support equipment

plans, product support risks and mitigation plans, preliminary support strategies, and planned PSAs.

PSMs measure success in this phase by the quality, as measured by the ILA process, with which the following boundary conditions develop and influence the design of both the system and its Product Support Package:

- **Operational CONOPS**. Expand the "day in the life" use-case scenarios developed previously to include sparing levels, fleet sizes, operator and maintainer training, operating locations, manpower, information technology infrastructure, support equipment plans, and operating tempos
- **Approach to Design Influence to Achieve Support Strategy**. The maintenance and logistics support planning are closely coordinated with the design iteration process to accurately reflect the needs of the design and its current configuration and conversely, to influence design formulation consistent with the optimum product support strategies determined from an operational effectiveness and LCC viewpoint. If a model-based systems engineering approach is used, leverage system models to assess supportability
- **Life Cycle Phase Boundary Conditions for Product Support Elements.** Assess each IPS Element and establish the baseline for each IPS Element's implementation and use this to develop and establish the initial PSBCA framework and schedule
- **PSM Organizational Construct and Integration into the Program Management Team**. Collaborate with PM and ensure the PMO contains a cross-IPS Element and cross-organizational team to help manage product support with a focus on the requirements that were decided on in Milestone A and then integrating those requirements in SE process. **Table 7** lists key entry/exit events/documents

5.3.3 Key Documents

Table 7: TMRR Phase Key Documents[30]

Entry
Draft Capability Development Document (including sustainment technology issues)
Acquisition Strategy
Affordability Analysis
T&E Strategy
Initial Support & Maintenance Concepts
Support Strategy
DMS
Item Unique Identification (IUID) Plan
Exit
AoA (including market research results)
System Performance Specification
Capability Development Document
Preliminary Design Review results
TEMP
PESHE and NEPA/E.O 12114 Compliance Schedule
Intellectual Property Strategy
Acquisition Strategy
SEP
RAM-C Rationale Report
SEP incorporation of an Human Systems Integration Plan (HSIP) Annex
Cooperative opportunities
Core Logistics Analysis/ Depot Source of Repair Analysis
MDA-approved Depot Source of Repair decision
Industrial capabilities
LCSP
LCC Estimate & Manpower Estimate
RCM Analysis Results and Preliminary Maintenance Plans
Acquisition Program Baseline (APB)
Affordability Assessment
DoD Component Cost Analysis & ICE
Economic Analysis
Replaced System Sustainment Plan (RSSP)
Cost Target

5.3.4 Major Activities

5.3.4.1 Enterprise Synergies, IPS Element Trades & Key Relationships

Data in this phase is more mature since laboratory-generated data is more available and support concepts are more refined which allows for using better analogous data. This data should be used to further identify enterprise product support synergy opportunities that are captured during the build-out of the product support organization.

The PSM should use the more mature data available in this phase to begin a robust logistics portion of the TEMP. This plan should rely on a Model Based Enterprise for sustainment planning to design the complete life cycle sustainment concept and all interrelating IPS Elements.

[30] For complete list of required information/documentation, see https://www.dau.edu/aafdid/Pages/About.aspx.

This allows rapid systematic analysis of tradeoffs and understanding of relationships between those IPS Elements via modeling and simulation.

The PSM should ensure that data collected and information generated uses a standards-based Product Life Cycle Support data exchange to ensure that Life Cycle data can be used throughout the program by all system development and sustainment partners. The PSM should also ensure that all data is captured in a government accessible or managed IDE. Additionally, the Intellectual Property/Data Management Strategy should include the technical data requirements for initial provisioning and cataloging. Further, depending on the product support strategy, and in order to enable competition and mitigate DMSMS/obsolescence, the requirement for technical data necessary for re-manufacturing, re-procurement, and/or sustainment engineering should be addressed.

During this phase, the PSM should also create an initial baseline "map" of the desired product support organization that provides the concept of operations of how sustainment is executed. This map should be based on initial analyses and creates a convenient way for the PSM to understand the interrelationships of all entities that form the product support organization.

5.3.4.2 Product Support Analysis

The PSM should use product support analysis to refine conceptual support strategies developed previously into an integrated preliminary product support strategy. The PSBCA process should be used to accomplish this with a focus on understanding the likelihood of alternatives achieving the Warfighter required outcomes resulting from the requirements development process. Part of the outcome of the PSBCA process should be a list of potential risks and mitigation plans associated with the PSS documented in the LCSP. See para 3.5.2 for more details.

PSMs and HSI domain-level SMEs and practitioners work together conducting this activity to support the PM to achieve the lowest total ownership costs for the program. See the HSI Guidebook for more details.

5.3.4.3 Supply Chain Management

Supply chain performance requirements to meet the required system performance and cost metrics should be determined through analysis done in support of the TEMP. SCM enabling technologies such as usage of Service and Agency managed ERP software or the requirements for stand-alone software should be determined. Additionally, decisions on basing requirements and site activation should be made and documented in the LCSP.

5.3.4.4 Life Cycle Support Plan & Product Support Package Update

The LCSP is a living document and should be updated as the PSS evolves. The initial LCSP, however, should be finalized and approved during this phase. Product Support Package development plans should be structured at this time to construct the PSAs needed to execute the LCSP. Program Offices coordinate their LCSPs with sustainment command representatives to ensure their concerns are addressed early in the life cycle. The program offices should ensure transparency in transition to sustainment.

5.3.4.5 Maintenance Planning and Management

In this phase, the PSM reviews the CDD to identify maintenance requirements in support of the Sustainment KPP, KSA(s), and APA(s). The PSM leads refinement of the maintenance strategy consistent with the overall Product Support Strategy documented in the LCSP. The PSM

continues to analyze technology solutions, supports market research and trade studies, develops Maintenance Planning & Management inputs for inclusion in the RFP supporting the EMD phase, and participates in and coordinates SME support for the EMD phase source selection. In addition, the PSM ensures the Product Support BCA sustainment alternatives address and evaluate maintenance planning and management. The PSM develops the Depot Maintenance Strategy, prepares the Depot Source of Repair inputs to support readiness, sustainment, and affordability objectives (including mobilization and surge capabilities) of national defense strategic and contingency requirements, and participates in early Supportability Analysis activities (e.g., FMECA, MTA, LORA, RCM analysis, CBM+, etc.). The PSM also documents the estimated requirements for depot maintenance and repair as part of the CLA per Section 4252 (previously 2366b) of Title 10, U.S.C., and researches Core and 50/50 impacts. The PSM also advocates for investment funding to support Maintenance Planning & Management in the EMD phase. Finally, the PSM supports the PDR and prepares the LCSP, ILA report, and PSBCA report for the MS B review.

5.3.4.6 Funding Alignment

Funding during this phase is, as with MS A, focused on ensuring investment account funding is provided to develop the system, and innovations that should reduce LCC during sustainment are planned for and funded appropriately.

5.4 Engineering & Manufacturing Development Phase

5.4.1 Overview

The PSM's objective in the EMD phase ensures the program develops and fields a Product Support Package that meets readiness targets, sustains system performance capability threshold criteria, manages O&S cost, optimizes the logistics footprint, and complies with ESOH regulations. PSMs and HSI domain-level SMEs and practitioners work together conducting this activity to support the PM to achieve the lowest total ownership costs for the program. See the HSI Guidebook for more details.

The PSM team should execute the activities required to produce the solution characterized by the SMLs which are aligned with program key events as defined in **Table** 8: Milestone C Activities and Information**8**.

Table 8: Milestone C Activities and Information

Life Cycle PhaseA1:C7C6A1A1:C6	Engineering & Manufacturing Development	Milestone C
SMLs	SMLs 7-8	
Key Events, Entry/Exit Products	CDR, T&E, Log Demo, ILA	APB, CDD Update, AS, DSOR, LCSP,_TEMP, IUID Plan, CPCP, DMS, Depot Maintenance Support Plan, Disposal Plan, PSBCA, SEP, Non-Organic Support Transition Plan
IPS Elements		
Product Support Management	X	
Design Interface	X	Human Engineering Design Approach Document (HEDAD)-Maintenance
Sustaining Engineering	X	
Supply Support	X	Provisioning and Cataloging Data; Proposed Spares List; Bill of Materials
Maintenance Planning & Management	X	CBM+ Plan Scheduled Maintenance Plan Maintenance Allocation Chart Depot Activation Plan
PHS&T	X	Transportability Report; Reusable Container Design
Technical Data	X	Operations and Maintenance Manuals and Technical Data Package (TDP)
Support Equipment	X	Calibration Measurement Requirements Summary (CMRS) or Support Equipment Recommendation Data (SERD)
Training & Training Support	X	System Training Plan
Manpower & Personnel	X	Manpower Estimate
Facilities & Infrastructure	X	Facilities Design
Information Technology (IT) Systems Continuous Support	X	Software Development Plan

5.4.2 Sustainment Maturity Levels in the EMD Phase

SMLs 7-8 indicate that the Product Support Package element requirements are integrated, finalized, and reflect the approved system design and PSS. Testing validates that the design conforms to support requirements and that the boundary conditions are operationally suitable.

In addition, sustainment metrics are estimated based on the latest configuration and test results. The approved Product Support Package's capabilities, including associated supply chain and other logistics processes and products, are demonstrated and validated to ensure the support solution is operationally suitable and affordable. **Table 9** lists key entry/exit events/documents.

5.4.3 Key Events and Documents

Table 9: EMD Phase Key Entry/Exit events/Documents[31]

Entry
AoA (including market research results)
System Performance Specification
Capability Development Document
Preliminary Design Review (PDR) and Critical Design Review (CDR) results (Includes HSI Content)
Systems Engineering Plan (SEP) (Includes HSI Content)
RAM-C Rationale Report
TEMP (Includes HSI Content)
PESHE and NEPA/E.O 12114 Compliance Schedule - (Includes HSI Content)
Information Support Plan
Acquisition Strategy
Cooperative opportunities
Core Logistics Analysis/Depot Source of Repair (DSOR) Analysis
Industrial capabilities
LCSP (Includes HSI Content)
LCC Estimate & Manpower Estimate (Includes HSI Content)
Preliminary Maintenance Plans
APB
Affordability Assessment
DoD Component Cost Analysis & ICE
Exit
APB
Acquisition Strategy
Affordability Analysis
Capability Production Document
Clinger-Cohen Act compliance
Contract type determination
Cooperative opportunities
Core Logistics Determination/Sustaining Workload Estimates (Includes HSI Content)
General Equipment Valuation
Independent Cost Estimate
Independent Logistics Estimate
TEMP
PESHE and NEPA/E.O. 12114 Compliance Schedule
LCSP
Manpower Estimate
Intellectual Property Strategy
Corrosion Prevention & Control Plan
CDD Update input
SEP update (Includes HSI Content)
Technology Readiness Assessment (Includes HSI Content)
Full Funding Certification Memorandum
Cost Target

[31] For complete list of required information/documentation, see https://www.dau.edu/aafdid/Pages/About.aspx .

5.4.4 Major Activities

5.4.4.1 Enterprise Synergies, IPS Element Trades, and Key Relationships

The product support organization is solidifying during this phase. Initially there is some flexibility, but through analysis and negotiating of PSAs, that flexibility is replaced by a tangible product support organization. Synergies that should be captured during this phase are identified through analysis. These synergies are located primarily within the supply chain and include opportunities such as using preexisting contracts with commercial industry partners to gain economies of scale in the procurement of goods and services, expanding capabilities within those Centers of Industrial and Technical Excellence (CITEs), and maximizing the use of common DoD distribution processes via the Distribution Process Owner (DPO).

During this phase, supportability design features are incorporated into the maturing design via trades along with other design considerations such as weight, size, and bandwidth. Also, the product support organization should be matured to support IOC. Accordingly, IPS Element trades are made as part of ongoing negotiations between Warfighters and sustainers to finalize PSA requirements for PSIs and PSPs. The PSM should update the baseline product support organization "map" that addresses each IPS Element with the entities, required service levels, PSAs, information channels, and any other pertinent information.

5.4.4.2 Product Support Analysis

Data is more mature during this phase than in previous phases since the system prototypes should be in operation. This means that there is be much less reliance on analogous data and more on engineering analysis. Since there is less uncertainty, the PSBCA produced is used to develop the PSAs and make the investment decisions that are major components of the Product Support Package.

Product support models that are used for inventory planning, manpower planning, training planning, and all other IPS Elements should be updated with actual data as it becomes available. Variance between actual data and estimations created during previous analyses should be examined to validate or influence the selection of new product support decision tools.

5.4.4.3 Supply Chain Management

The supply chain design is finalized based on the PSS. Every aspect of the supply chain is driven to achieve the Warfighter required performance and cost metrics and have in place mechanisms to automatically and electronically share data and information between all Services, Agencies, and commercial entities that help manage and comprise the supply chain. The Supply Chain evaluation focuses on ensuring operational supportability and verifying performance. It includes a comprehensive description of the elements, and fielding plan.

Based on the outputs of the PSBCA and in alignment with the approved PSS, initial provisioning and cataloging decisions consider innovative approaches such as Direct Vendor Delivery (DVD), prime vendor, consignment, or leased repairables strategies in addition to Government owned inventory. When PBL arrangements use commercial sources, the PSM works with the ICP/DLA on smartly drawing down existing Government inventory and adjusting inventory levels and forecasting to meet changes in demand.

5.4.4.4 Life Cycle Sustainment Plan Product Support Package Update

The LCSP continues to mature in this phase. Resource requirements are driven by the specific Service approach to deploying and operating the system. Resource requirements for the production and deployment phase are determined and agreed on via collaboration between the program management team and external stakeholders. One item of particular importance at this time is selecting the Depot repair location(s). Depot Source of Repair (DSOR) assignments will be completed in accordance with DoDI 4151.24 no later than within 90 days of Critical Design Review (CDR). The DSOR determination process considers all existing Depot-level maintenance capabilities and assigns work to organic, commercial, and interservice sources. New competencies should be assigned to and developed at a single source of repair to the maximum extent possible. Further, DSOR assignments for workloads not needed to sustain core logistics capabilities should rely on a best value analysis and satisfy all applicable statutory requirements. Once approved, the DSOR assignments should be documented in the LCSP and all remaining actions to finalize Depot-level maintenance planning completed. At MS C the LCSP should focus on ensuring operational supportability and verifying performance. It should include a comprehensive description of the product support package elements and fielding plan

The LCSP should be updated with the final "map" of the product support organization. The product support strategies determined through the PSBCA process and approved by the ultimate decision makers are recorded in the LCSP. Also, the Product Support Package that implements the LCSP should be adjusted to contain the formal PSAs that document the PSIs and PSPs.

5.4.4.5 Maintenance Planning and Management

In this phase, the PSM reviews the CDD Update to identify any changes in maintenance requirements in support of the Sustainment KPP, KSA(s), and APA(s). The PSM leads continued refinement of the maintenance strategy consistent with the overall Product Support Strategy and LCSP. The PSM ensures the Product Support BCA (or revalidation) considers and evaluates maintenance planning and management. The PSM refines the Depot Maintenance Strategy, and workload impacts, and refinement of Supportability Analysis activities (e.g., FMECA, MTA, LORA, RCM analysis, CBM+, etc.) and Human Systems Integration (HSI), such as the Human Engineering Design Approach Document-Maintenance. The PSM advocates for investment funding to support Maintenance Planning & Management in the P&D phase and collaborates with the Warfighter and other DoD activities to plan for O&M and Working Capital Fund (WCF), (if applicable) funding, respectively. The PSM ensures Maintenance Planning & Management is evaluated during the ILA, risks are identified, and any findings are addressed. In collaboration with the Warfighter, R&M engineers, and the organic depot(s) (if applicable), the PSM develops the scheduled maintenance plan, maintenance allocation chart, and depot activation plan. The PSM works with T&E to ensure the TEMP includes maintenance-related T&E requirements. Finally, the PSM supports the CDR and prepares the LCSP, ILA report, and PSBCA report for the MS C review

5.4.4.6 Funding Alignment

Resource requirements are driven by the projected fielded design, likely Product Support Package performance-based on test results, and the specific Service approach to deploying and operating the system. Resource requirements for the production and deployment phase are determined and agreed on via collaboration between the program management team and external stakeholders. The Product Support Package fielding resources requirements must be in

place entering into the MS C decision, including resourcing future depot activation workloads and initial spares.

5.5 Production & Deployment Phase

5.5.1 Overview

The PSM's primary objectives in the P&D phase are to effectively execute the LCSP and to constantly monitor that execution to rapidly adjust the LCSP as operational realities dictate. The PSM team should execute the activities of the support solution characterized by the SMLs which are aligned with program key events as detailed in Error! Reference source not found.**10**.

Table 10: Initial Operational Capability Activities and Documents

Life Cycle Phase	Production & Deployment	IOC
SMLs	SMLs 9-10	
Key Events, Entry/Exit Products/Documents	LRIP, TPF, PPP, FRP, OT&E, ILA	Mission Support Plan, PSP, BCA, Materiel Release (MR) Approval, Materiel Fielding Plan (MFP), Disposal Plan
IPS Elements		
Product Support Management	X	BCA, Post-IOC Rev
Design Interface	X	RAM-C Rationale Report
Sustaining Engineering	X	Technical Assistance Requests, Deficiency Reports, Product Improvement
Supply Support	X	DMSMS Management Plan
Maintenance Planning & Management	X	Scheduled Maintenance Plan updates
PHS&T	X	
Technical Data	X	Operations and Maintenance Manual Updates
Support Equipment	X	SE Delivery
Training & Training Support	X	Type 1 Training, Simulators, Maintenance Trainers
Manpower & Personnel	X	Trained Personnel Ramp-up/transition
Facilities & Infrastructure	X	Field and Depot Maintenance Facilities Ready
Information Technology (IT) Systems Continuous Support	X	PD S/W Support, System Integration Lab and/or Software Development Lab

5.5.2 Sustainment Maturity Levels in the Production & Deployment Phase

SMLs 9-10 indicate that the Product Support Package is fielded to support initial operational capability. The Product Support Package is fielded at operational sites and sustainment and product support capabilities proven in an operational environment. Performance is measured against availability, reliability, and cost metrics. Any identified issues or "deficiencies" identified through testing have remediation plans that are being executed. Finally, the product support organization is measured against its ability to meet planned A_M, Reliability, Maintainability, Ownership Cost and other sustainment metrics required to support the Warfighter. In this phase, resource requirements for logistics infrastructure as outlined in the established boundary conditions are funded and implemented by the Services. Critical activities the PSM execute that drive results are as follows:

5.5.2.1 Service Capital Investment Follow-up

Complete essential activities such as Site Activation Gap Closure, sparing strategy execution, DMSMS Management Plan, Training Concurrency Options, Information Architecture Maturation Plan, Depot Activation Plan, and Maintenance, Repair, and Overhaul (MRO) continuous improvement.

5.5.2.2 Supplier Reliability Performance

Monitor and manage effectiveness of the product support organization at accomplishing required outcomes. **Table 11** lists key entry/exit events/documents.

5.5.3 Key Documents

Table 11: Initial Operational Capability Key Documents[32]

Entry
Initial Product Baseline
Test reports (includes HSI content)
PESHE and NEPA/E.O. 12114 Compliance Schedule (Includes HSI content)
Acquisition Strategy
TEMP (includes HSI content)
RAM-C Rationale Report
Information Support Plan (ISP) (includes HSI content)
LCSP (includes HSI content)
Updated Maintenance Plan (includes HSI content)
Updated Affordability Assessment (includes HSI content)
CDD Update input
Cost/Manpower Estimate update (includes HSI content)
Exit
LCSP/Supportability Assessment Strategy/Post Production Support Plan (includes HSI content)
PSBCA
PSAs (e.g., ICS, CLS, organic, performance-based)
Post Production Software Support Plan/Contract
Acquisition Strategy & Data Management Strategy
Materiel Release Approval & Materiel Fielding Plan
DMSMS Management Plan
Depot Maintenance Support Plan
Configuration Management Plan
Replaced System Sustainment Plan (RSSP)
PESHE and NEPA/E.O. 12114 Compliance Schedule

5.5.4 Major Activities

5.5.4.1 Enterprise Synergies, IPS Element Trades & Key Relationships

PSMs focus on monitoring product support developments within their own and others' parent organizations to capture emerging best practices or high performing shared services for their own use. This is important because the LCSP is relatively mature in this phase and support strategies are only going to be modified when there is a compelling reason to do so.

IPS Element trades and relationships are relatively unchanged from the previous phase, but the PSM's understanding of those relationships may evolve as data is collected. Observed changes should be reflected in the product support organization map.

5.5.4.2 Product Support Analysis

Analysis in this phase focuses on monitoring and identifying the root cause of variance between planned and actual cost and performance. Ongoing analysis of each IPS Element's achievement of required performance objectives, including variance between predicted and actual results, may

[32]For further details see https://www.dau.edu/aafdid/Pages/About.aspx

indicate that IPS Element implementation strategies should be modified to some extent. Any modifications are analyzed prior to implementation to maximize their likelihood of success.

The PSM should use a program management dashboard or other similar toolset that employs such tools as statistical process control charts or instantaneous performance meters to provide ongoing indication of program health. Moreover, the PSM should look specifically for leading indicators that help the PSM identify and mitigate potential product support issues before they happen.

5.5.4.3 Supply Chain Management

Supply chain performance should be closely monitored during this phase since this is the first real "stress test" the supply chain has faced. Any performance, risk management, or resiliency improvement opportunities identified are easier to address before the behaviors and practices that created those improvement opportunities are part of the product support organization's culture.

This phase also sees a strong reliance on using the production supply chain to support sustainment. The PSM should ensure that measures are in place that ensure the easy access to parts that are earmarked for production do not encourage complacency with supply chain managers, who may see that access as a ready source of spares, otherwise, the supply chain has a tendency to default to a spares-centric strategy. Furthermore, relying on a production supply chain risks putting undue stress on the production organization and may have cost implications.

Finally, if the PSS requires contractors in a battlefield environment, ensure the execution of this strategy is in accordance with Joint Publication 4-0 *Joint Logistics*, Chapter 5 and DoD Component implementing guidance. The PSM should coordinate supply chain services to ensure affected Combatant Commanders are aware of functions performed by contractors, together with functions performed by military personnel, and Government civilians, are integrated in Operations Plans (OPLANs) and Orders (OPORDs).

5.5.4.4 Life Cycle Sustainment Plan & Product Support Package Update

During this Phase, the Product Support Package implementing the approved LCSP is in place. The PSM should use continuous data collection to validate that performance and cost accrual is according to plan. If the PSBCA indicates a change in the LCSP is required, the PSM updates the LCSP and Product Support Package, as needed.

5.5.4.5 Maintenance Planning and Management

In this phase, the PSM focuses on ensuring the Warfighter and depot(s) are prepared for initial fielding and field and depot-level maintenance. The PSM and R&M engineer begin to analyze RCM analysis and in-service data and develop updates to the scheduled maintenance plan, CBM+, and related capabilities to continuously improve maintenance effectiveness and efficiency. Finally, the PSM supports the FRP decision review and preparedness for IOC and Full Operating Capability (FOC).

5.5.4.5 Funding Alignment

During this phase, some sustainment may be paid for with procurement dollars, but the PSM remains vigilant to ensure O&M dollars are being programmed to ensure product support plans

are executable. The PSM works with the PM and Program Executive Office (PEO) to align Service or Joint funding to support the system.

5.6 Operations and Support Phase

5.6.1 Overview

The O&S phase of the MCA Pathway frequently represents the longest duration period of the weapon system life cycle and constitutes the largest portion of weapon system LCC (approximately 60–70 percent). As the single largest component of the DoD budget, the impact of the O&S phase on LCC is enormous.

O&S begins when an operational capability has been fielded. This generally occurs at the IOC milestone, but depending on fielding strategies, may occur earlier. Sustainment of the weapon system begins prior to IOC as early production assets are delivered for T&E, LRIP, and/or other pre-operational uses. This "pre-operational" support is usually performed primarily by the OEM under an ICS arrangement due to lack of an organic infrastructure (Depot support capability must be in place no later than four years following IOC for systems determined to be "Core" IAW Title 10 U.S.C. § 2464, Paragraph (a) (3)). Active analysis, planning, and continuous refinement of the long-term PSS that is guided by the PSM should be underway.

At IOC, one of the primary objectives of the product support strategy is to ensure the Program can achieve the sustainment KPP, KSAs, and APAs. As used in operations, the PSM assesses the effectiveness of the sustainment approach in terms of these measures as a basis for evaluating and revising the product support strategy. Changes may be required due to changes in operational requirements (operational tempo, operational environment, mission changes), sustainment challenges (infrastructure and/or capabilities), funding constraints, or political shifts. Each change requires an evaluation of the product support strategy via the PSBCA process.

PSMs revalidate their program's PSS and ensure that it still strikes an optimal balance between suitability and affordability. Legislation requires revalidated PSBCA whenever a new PSS is proposed, or every five years, whichever comes first.[33] This update to the PSBCA and LCSP is done in conjunction with the statutory SRs (for covered systems) which are all on five-year update timelines once fielded. PSMs continually monitor and assess their programs to understand their sustainment strategies' suitability and determine when strategy updates are required, particularly considering how operating conditions and baseline assumptions change over the system life cycle. Although the PSM is not the decision authority making the final disposition decision, he or she also recognizes when the system has reached the end of its planned useful life to determine life extension or disposal plans. The PSMs, however, play a key role in providing input to the status of the system during O&S.

PSM tasks in the O&S phase differ from those during design or development. During design and development, the PSM is planning for sustainment. During O&S, the PSM is executing sustainment while continuously monitoring the performance of the system and assessing the effectiveness and affordability of the product support strategy. With the system in operational use, actual data is available as a basis for analysis and product support decision making. This data comes from Service specific sustainment management systems and is evaluated through federated data sources like the Advana Sustainment section to support portfolio analysis and trades. Operational issues, system reliability, demand rates, response-times, funding

[33] Title 10 U.S.C. 4324 previously 2337(c)(2)(G)

requirements, and PSP performance are visible and are addressed as needed. Incremental development of systems may precipitate the requirement to support multiple configurations or blocks of a weapon system.

As the system ages and evolves, the PSM role also evolves. Out-of-production systems may have an entrenched sustainment infrastructure in place and are typically suffering from declining performance and rising sustainment costs due to diminishing reliability as parts and components wear out or are impacted by DMSMS/obsolescence. It is difficult for the PSM to do a considered assessment and revision of the PSS in the face of significant day-to-day challenges to maintain operational readiness. The path of least resistance is often stopgap measures addressing evolving critical items, finding needed spares, and juggling shifting priorities, with little time available to analyze and revise the product support strategy. Yet unless the PSM takes a proactive action to accomplish this critical action, the “death spiral” of declining performance and rising O&S costs only worsen. These challenges should be successfully navigated by the PSM during the O&S phase to properly support the Warfighter. The PSM team should execute the activities of the support solution characterized by the SMLs which are aligned with program key events as detailed in **Table 12**.

Table 12: O&S Activities and Documents

Life Cycle Phase	Operations & Support	FOC
SMLs	SMLs 11-12	
Key Events, Entry/Exit Products/Documents	Post-IOC Review, ILA, CDA	Mission Support Plan, PPSP, BCA, MR Approval, Materiel Fielding Plan (MFP), Disposal Plan
IPS Elements		
Product Support Management	X	BCA, Post-IOC Rev
Design Interface	X	
Sustaining Engineering	X	Technical Assistance Requests, Deficiency Reports, Product Improvement
Supply Support	X	DMSMS Management Plan
Maintenance Planning & Management	X	
PHST	X	
Technical Data	X	Operations and Maintenance Manual updates
Support Equipment	X	
Training & Training Support	X	Training Program of Instruction, Type 1 Training, Simulators, Maintenance Trainers
Manpower & Personnel	X	Trained Personnel
Facilities & Infrastructure	X	Field and Depot Maintenance Capability
Information Technology (IT) Systems Continuous Support	X	PD S/W Support, System Integration Lab and/or Software Development Lab

5.6.2 Sustainment Maturity Levels in the Operations & Support Phase

SMLs 11-12 indicate that sustainment and product support performance is being regularly measured against sustainment metrics and that corrective action has been taken. The Product Support Package has been refined and adjusted based on performance and evolving operational needs and initiatives to implement affordable system operational effectiveness have been implemented. All support systems and services have been delivered and Depot maintenance is being performed in accordance with the LCSP.

Moreover, analysis has revealed opportunities for product improvement, modifications, and upgrades and these changes have been planned. The product support strategy has been refined to achieve Warfighter-required outcomes by leveraging the best value mix of organic and

commercial support for each of the IPS Elements. Finally, system retirement and disposal planning has been implemented as required.

If the program uses the tenets of this guidebook throughout the acquisition process, challenges in the O&S phase should be minimized due to the advanced planning inherent in the LCSP management process. Although still applicable, PSM s may be limited in their ability to apply all the tenets of this guidebook to a program that has already been fielded. The PSM can still work with the existing support solution to ensure product support success and evolve it over time to optimize performance. **Table 13** lists key entry/exit events/documents.

5.6.3 Key Documents

Table 13: O&S Key Documents

Entry
LCSP/Supportability Assessment Strategy/Post Production Support Plan
PSBCA
PSAs (e.g., ICS, Contractor Logistics Support (CLS), organic, performance-based)
Post Production Software Support Plan/Contract
Acquisition Strategy & Data Management Strategy
Materiel Release Approval & Materiel Fielding Plan
DMSMS Management Plan
Depot Maintenance Support Plan
Configuration Management Plan
Exit
Disposal Implementation Plan
Replaced System Sustainment Plan (RSSP)

If an entrance document does not exist, the information contained within it are accounted for by formally identifying the documents that contain the entrance document identification.

5.6.4 Major Activities

5.6.4.1 Enterprise Synergies, IPS Element Trades, & Key Relationships

PSMs should focus on monitoring product support developments within their own and others' parent organizations to capture emerging best practices or high-performing shared services for their own use. The LCSP is mature in this phase and support strategies are only going to be modified when there is a compelling reason such as large cost-savings opportunities that are obtainable through change or difficulty in hitting required performance targets that would necessitate change.

One synergy that is predominantly achieved during O&S is Technology Insertion (TI), which is a process for strategically improving system capability or reliability or mitigating

DMSMS/obsolescence issues via modernization. The PSM should understand the opportunity and risk relative to TI. Affordability gains are tied to scalability of TI over time and ease of inserting new technology. TI initiatives are planned to reflect a strategy for long-term affordability, supportability, performance and availability. Success is more likely when TI is addressed at the architecture level. The use of standards, modular design, model-based engineering/design, and open systems approach enables TI in the future. Although TI planning is successful at the system level for sustaining a given capability, large gains are more likely when TI is addressed at the domain or program office level and then coordinated within the specific programs. The role of PSM should coordinate and align with higher-level TI strategic planning and with other members of the IPT including SE and finance in relation to the development and fielding of the support system.

5.6.4.2 Product Support Analysis

The PSBCA initiated and completed prior to MS C is the tool the PM and PSM used to determine best support and best value sustainment solution for the weapon system. The PSBCA began with the development and establishment of the Program's Technical Baseline. The PSBCA's level of fidelity at this time depends on the design maturity of the system as well as the maintenance plan's maturity.

Specific instructions on PSBCA completion process, product template, and authoritative data sources are contained in the DoD Product Support BCA Guidebook. If the PSM's program is a legacy program and does not have a PSBCA of record, the PSM should complete a cost and performance baseline that addresses each portion of the standard DoD PSBCA to economically and effectively understand the program's current status and to enable future PSBCAs if required.

During this analysis PSMs should collaborate with the HSI and HSI-domain level SMEs and practitioners for HSI domain support to apply Digital Product Support methods to execute the PS Analysis during the lifecycle.

5.6.4.3 Supply Chain Management

The supply chain is evolving in parallel with the system it supports. PSMs should work closely with their PSIs/supply support activities to monitor the health and efficiency of the supply chain. Any performance and resiliency improvement opportunities identified may be easier to implement now than at any other time in the program's future since the behaviors and practices that create those improvement opportunities have not yet become part of the product support organization's culture.

Eventually, the system is no longer be in production and any PSS aspects that relied on the production supply chain should be shifted to a pure sustainment supply chain. Also, the risk of DMSMS/obsolescence increases over this time and the PSM constantly monitors and proactively manage this through annual assessments of the supplier base health. As PBL PSAs are implemented with industry, a balance is reached between using increased competition to keep a downward pressure on prices and appropriate contract lengths that encourage investment in process and product and reliability improvement through innovation. The goal is to deliver reliable performance at reduced costs rather than competing simply to drive cost down without regard to increasing the variability in performance experienced by the Warfighter.

5.6.4.4 Configuration Management

The PSM collaborates with the chief engineer or systems engineer to address Configuration Management (CM).[34] This CM should manage change by documenting and disseminating changes prior to or as they occur. The system configuration ASoT, consisting of digital system models and related digital product data and associated data, should be stored in an Integrated Digital Environment which includes a Product Lifecycle Management or equivalent capability. This ensures that product support integrators and product support providers operate from the same ASoT in support of the system (e.g., supply chain managers understand the material they are responsible for, and which material no longer applies to their system; and maintenance providers have access to authoritative, up-to-date technical data).

The PSM works with the systems engineer and configuration manager to ensure a CM process that includes surveillance of the combined and systematic application of the following sub-processes.

- Configuration Identification
- Configuration Control
- Configuration Control Board (CCB) as a member
- Configuration Audits
- Functional Configuration Audit (FCA)
- Physical Configuration Audit (PCA)
- Configuration Status Accounting

5.6.4.5 Life Cycle Sustainment Plan & Product Support Package Update

Prior to the O&S phase, the LCSP is predominantly based on estimations and assumptions. Update the LCSP with new analysis as it is generated and empirical data as it is collected during the O&S phase as needed based on product support performance and evolving needs to ensure the plan maintains or increases relevancy. Ensure these analyses and data are of sufficient detail and focus to ensure the acquisition, design, sustainment, and user communities integrated by the PSM maintain a common understanding of evolving sustainment requirements, approaches, and risks and to ensure the PSM has the data needed to make fact-based decisions.

5.6.4.6 Maintenance Plan Update

A key part of the LCSP are the maintenance plans, which includes such items as preventive maintenance plans and programmed Depot Maintenance Plans. These plans are updated throughout the O&S phase as new data is collected and analyzed. Also, conduct quality reviews, approve and issue maintenance plan updates and maintenance planning data for the users for acquiring the IPS Element products needed to sustain the weapon system and associated equipment. Finally, review the RCM Analysis, Maintenance Plan and Maintenance Concept for in-service equipment when one or more of the following events occur:

- Significant changes occur in the operational scenario
- Maintenance significant drivers change as monitored through proactive sustained maintenance planning
- Product support falls short of the design requirement adversely impacting readiness or costs

[34] EIA-649B National Consensus Standard of CM, and MIL-HDBK-61C

- Class-1 ECP changes in legacy systems or equipment
- Real-world experience gained from fielded system utilization

In the DoD, a maintenance plan is a "living document." The PSM should monitor the execution of the maintenance plan and ensure that maintenance is performed at the correct level and within the identified specification and scope of repair.

5.6.4.7 Maintenance Management

Monitor fleet maintenance to ensure maintenance is being performed in accordance with the established maintenance concept and maintenance plan. PSMs should use existing maintenance and supply chain reporting systems to monitor fleet maintenance, emerging ESOH issues, implementation design changes, and weapon systems usage trends that may impact service life and maintenance practices.

In the O&S phase the PSM relies on his or her Cognizant Engineering Activity (CEA) to provide support in monitoring trends in SCM, failure modes, reliability, material degradation and management of critical safety items. In some cases, SMEs may be deployed directly to the maintenance activities to provide updated training and instruction that supplements the established maintenance publications and instructions.

5.6.4.8 Funding Alignment

As a program transitions into O&S, emphasis shifts to supporting the fielded system by:

- Establishing and monitoring operational units
- Maintaining the readiness and operational capability of the deployed systems
- Continuing test and evaluation of modified systems and support
- Identifying and resolving operational/support problems
- Determining if product improvement/service life extension programs are warranted
- Addressing equipment obsolescence/aging technology, structural fatigue, component/parts wear out, premature failures, changes in fuel/lubricants, and aging systems
- Sustainment efforts start immediately upon fielding and deployment of a system.

General IPS Element services obtained from in-house field activities or by contract that are integral to out-of-production and in-service systems and equipment should be properly funded. The PSM's role regarding sustainment funding is to serve as an advocate for funding required to implement and execute an effective and affordable product support strategy. Additional information on appropriations can found in **Table 3**.

Product support strategy funding is governed by: Title 31 U.S.C. 1301 – Application (Purpose Statute); 31 U.S.C. 1502 – Balances Available (Time Money is Available to Spend); 31 U.S.C. 1517 – Prohibited Obligations and Expenditures (Amount Available to Spend); and 31 U.S.C. 1341 – Limitations on Expending and Obligating Amounts (Color of Money).

Sustainment funding consists primarily of Operation and Maintenance (O&M) appropriations that are budgeted for and appropriated to the Military Departments. The PSM relies on the Major Operational Commands within the Military Departments to provide funding for the sustainment of the objective system or subsystem, using:

- O&M, to pay the Defense Working Capital Funds (DWCF) for Depot-level maintenance and repair, including the purchase of necessary supply parts to accomplish those repairs

- Procurement funds, to pay for the upgrade of weapon systems and subsystems

The DWCF provides a unique, dedicated, integrated, DoD-owned and operated worldwide supply, transportation, and maintenance system.

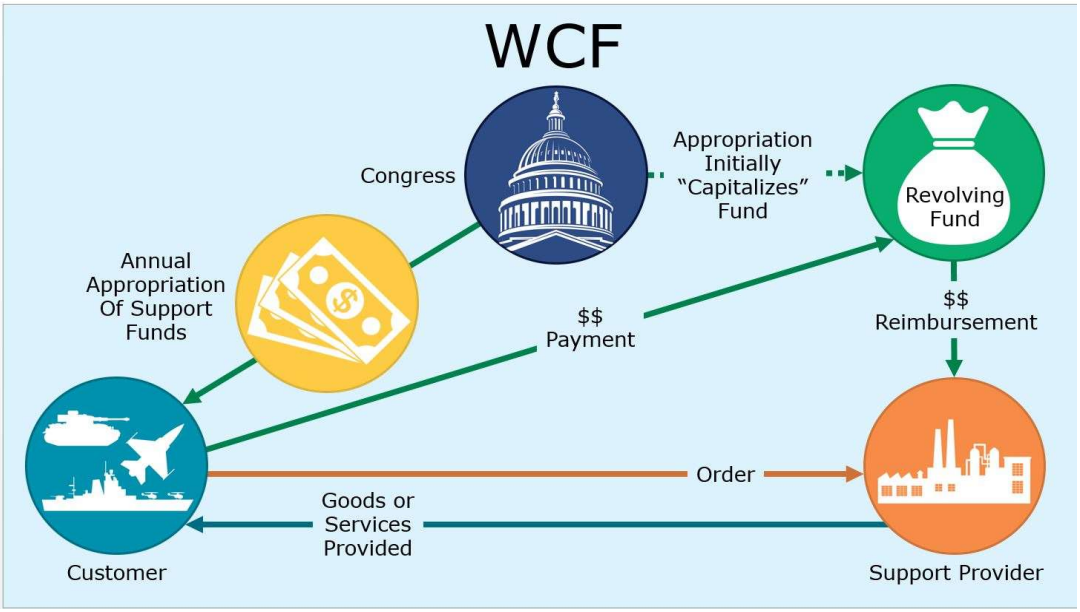
- Unlike other DoD organizations, the DWCF sells its products and services to its customers much like a private business and, with a few exceptions, it does not receive a direct appropriation.
- Unlike private sector companies that provide similar services, the DWCF activities are chartered to support the DoD Warfighter using DoD civilians and military personnel. The workforce is therefore stable, which is not always the case in a contract environment where contractors can change with each new competition.

What does the DWCF offer the PSM?

- Placing work with a DWCF activity is fairly straightforward, and, since the transaction is internal to DoD, Federal procurement rules do not apply.
- Since the DWCF is not operated for profit, it can retain capabilities that private sector companies may choose to divest. For example, it retains inventories of spare parts with low demand, an important consideration with aging weapon systems. It retains underutilized maintenance capacity during peacetime for use during extended contingencies.
- For new weapon systems, the PSM purchases and provides the DWCF with initial spares, which the DWCF sells. The DWCF then uses the cash collected from the sale of parts and supplies to purchase replacement stocks.
- Because the DWCF has budgetary contract authority, it can order replacements prior to the receipt of funded orders, an important consideration for long-lead-time items.
- The prices the DWCF charges for parts or maintenance once set in the budget are not normally changed during the execution year. Therefore, the PSM is protected from inflation; the price the PSM budgets for an item or labor hour is the price the PSM pays.
- The DWCF has extensive procurement expertise to seek the best price for spare parts from the industrial base and find new sources of supply when manufacturers decide to discontinue support.
- When necessary, the maintenance activities can fabricate the needed items.
- Several DWCF maintenance activities have special authorities that permit them to enter into partnership with private sector companies that permit the PSM to take advantage of the best of the public and private sectors. The private companies may operate in a DoD maintenance Depot dividing the work between the public and private workforces.

Figure 14 shows a simplified model of the DWCF business concept. Additional information on the financial aspects of the DWCF is available in the DoD Financial Management Regulation (FMR) 7000.14, Volumes 2B and 11B. In addition, the SMEs of the Revolving Funds Directorate in the Office of the Under Secretary of Defense (Comptroller) can provide policy and technical assistance.

Figure 14: Defense Working Capital Fund Operating Model



The DWCF provides a dedicated, integrated, DoD-owned and operated worldwide supply, transportation, and maintenance system.

5.6.4.9 IPS Element Trades & Key Relationships

PSMs continually review and assess the program's PSS. Changes to existing product support are usually driven by reliability, obsolescence, and maintenance support issues. Substantive changes to the operating environment or changes to the operational and mission requirements can also drive a review of the sustainment strategy. PSMs work closely with their supply chain managers and DLA to identify those areas of support that require reassessment.

The PSM documents these decisions within the LCSP and document any requirements to deviate from the decisions recommended by the PSBCA. The PSM should also maintain a complete history of PSBCAs over the course of the system life cycle to be able to track decisions and understand how real-world operations are causing deviations from predicted cost and performance.

Robust sustainment governance is vital to fulfilling Warfighter A_M requirements and achieving the Department's program life cycle management improvement objectives. The proper application of standardized, comprehensive and visible governance enables leadership focus on risk identification and continuous improvement and enforces a culture of collaboration and accountability in meeting sustainment objectives. Implementing and managing sustainment governance is a major focus for PSMs.

Formal requirements for sustainment governance, which are described below, have been established by the Department for acquisition programs. These requirements are considered minimum standards and should be augmented by PSMs as necessary to ensure a forward looking, action-oriented approach to sustainment governance is applied. The governance approach also ensures that responsibility for corrective action is assigned, and corrective progress monitored.

5.6.4.10 Reset

"Reset" is a set of actions to restore equipment to desired level of combat capability commensurate with the unit's future mission. Equipment reset includes the repair, upgrade, and replacement of equipment damaged, worn out or destroyed in combat.

The overall objectives of reset programs are to restore units to a desired level of combat capability commensurate with the unit's future mission. It encompasses maintenance and supply activities that restore and enhance combat capability to unit and pre-positioned equipment that was destroyed, damaged, stressed, or worn out beyond economic repair due to combat operations by repairing, rebuilding, or procuring replacement equipment. These maintenance and supply activities involve Depot- and field-levels (e.g., Organizational and Intermediate) repairs/overhauls centrally managed to specified standards and extensive supply support provided by commercial and organic supply organizations such as DLA. Included are Procurement, RDT&E, and Operation and Maintenance (O&M) funded major repairs/overhauls and recapitalization (Rebuild or Upgrade) that enhances existing equipment through the insertion of new technology or restores equipment to a zero miles/zero hours condition.[35] Roles and responsibilities include:

- Working with the Sustainment Engineering Team to develop maintenance requirements, based on the specific operational/environmental conditions and sustainment requirements; maintenance Tasks are derived from RCM analysis and organizational scheduled maintenance
- Addressing other considerations, including ensuring that publications are updated and reviewed, and that engineering investigation backlog and RCM are completed
- Organizing reset teams to take the burden off the operational maintainer by using a contractor field team embedded within the maintenance processes and meets the service specific requirements for maintenance safety and operations

Best practices suggest reconstitution be performed on all weapon system returning from the operational theater that have at least 60 days of consecutive operations in theater. During the reconstitution phase, the PSM should assist organizational maintenance activities by supporting maintenance and supply requirements applicable to the weapon systems returning from theater and actively involved in a reset program.

5.6.4.11 In-Theater Sustainment

Best practices suggest In-theater sustainment be performed on all weapon systems that are deployed on extended rotation (more than 1 year) to ensure equipment is ready for tasking before return to their home base.

During the In-Theater Sustainment Phase, the PSM should assist organizational maintenance activities in supporting maintenance and supply requirements related to all weapon systems in the operational theater in an active reset program. Organizational maintenance activities and programs collaborate with in-service engineering and logistics teams to maximize in theater sustainment capabilities.

[35] Joint Publication 4-0 – *Joint Logistics,* Chapter 5

Finally, the PSM proactively identifies and implements methods for reducing the logistics footprint required to sustain the system in-theater. Footprint reduction can be accomplished via several mechanisms, of which three common mechanisms are:

1) Identify logistics demand drivers, and then execute engineering change proposals to increase reliability to reduce that demand.
2) Leverage in-theater logistics networks to use existing infrastructure and personnel to support equipment rather than bringing additional material and personnel into theater.
3) Footprint reduction accounts for fully burdened costs of fuel and personnel sustenance and support associated with the system's sustainment.

5.6.4.12 Technology Refresh & Insertion

During the O&S phase, the PSM is actively engaged in any plans the program might have to implement TI, system upgrades, or implement windfalls or projects, engineering change proposals, value and logistics engineering change proposals. An evolutionary approach delivers capability in increments, recognizing up front the need for future capability improvements while recognizing the opportunities to improve reliability, maintainability, and availability.

5.6.4.13 Assessing Manufacturing Risk

Per DoDI 5000.88 manufacturing risks should be identified and managed through the system lifecycle. Manufacturing Readiness Level (MRL) criteria are DoD's best practice to conduct these assessments (Refer to www.dodmrl.org). MRL criteria include potential product support considerations and risks: industrial base capabilities, supply chain, supplier quality, DMSMS/obsolescence, special handling, and special tooling/test/inspection equipment, and needed workforce skills. Later in the lifecycle, the PSM may support manufacturing related activities (e.g., sustainment operations, re-manufacturing, system upgrades, production line restart, and depot activation). MRLs provide a proven risk assessment tool.

5.6.5 System & Block Upgrades

With the onset of Service Life Extension Program (SLEP) system, block upgrades are becoming commonplace. Upgrades are sometimes pursued without due diligence. Some areas that continue to be overlooked that have a direct impact on supportability include:

- Technology maturity
- Commercial Off-the-Shelf (COTS)
- Design interface
- Configuration management and status accounting
- Supportability Analyses

It is important the PSM actively engage with the PM, Systems Engineer and the Warfighter to determine opportunities to leverage improvements within the scope of the modification. The modifications and upgrade process comes with a great responsibility for maintaining focus on improving the maintainability and suitability of the fielded system, while reducing LCC. While involved in a modification to the weapon system the PSM:

- Ensure reliability growth opportunities are being considered and aggressively pursued
- Identify opportunities to improve support
- Identify and plan for associated risk
- Ensure all support requirements have traceability preventing requirements creep

- Continuously influence the deployed system design for support
- Identify and address supportability cost drivers such as obsolescence during the modification process using the PSBCA
- Consider support strategies such as PBL to support the modified system/sub-system/component
- Ensure the allocation of funding for product support, support planning, and implementation
- Perform comprehensive analysis to evaluate proposed changes to each of the IPS elements in support of the upgrade

5.6.6 Technology Insertion

5.6.6.1 Tools & Methods

State-of-the-art methods and tools that may be useful in implementing and improving the effectiveness of planning for TI include:

5.6.6.2 Modeling & Simulation Tools

Such tools may be used to create and manipulate executable system modeling language (e.g., SysML) architectures and digital system models to verify that the proposed TI in fact addresses the subject capabilities, and to develop testing scenarios for the effort, to include virtual testing prior to manufacturing and assembly of TI components. Ensure these tools provide a digital ASoT-based, focused, quantifiable set of results that adds value to the verification and validation processes.

5.6.6.3 Change Road Maps

Developing a roadmap would establish the strategic context for the insertion initiatives and identify the tactical efforts that are necessary to achieve the stated goals. Roadmaps provide a higher level of planning than a work-breakdown structure. The level of abstraction keeps the focus on the goals of TI and puts it in the appropriate timeframe.

5.6.6.4 Value Networks

A value network is a graphic representation of all of the organizations, groups, and individuals that are or could be involved in the development, marketing, and use of a technology. Valuable information is derived in the course of building such a network that provides insight into innovative technology solutions and partnerships, which might provide funding or in-kind resources along with improved speed and efficiency of implementation, and the influence of key players and opinion leaders.

5.6.6.5 Commercial off-the-Shelf

The PSM should be actively involved in the AoA when COTS systems are considered for technology refresh or insertion. Although COTS may offer reduced schedule, greater technology maturity/stability and reduced cost initially, if it is deemed difficult to support in the long-term it may not be a feasible selection. COTS can come with significant technical, schedule, and cost risks due to an underestimation of the following:

- Configuration management
- Maintenance planning
- Design integration complexity

- Rigidity applicable to intended operational environment
- Intellectual Property (IP) access
- Design interface challenges (system of system compatibility)
- Obsolescence

5.7 Demilitarization and Disposal Activities

The incorporation of demilitarization (DEMIL) and disposal requirements into the initial system design is critical to ensure compliance with:

- DoD DEMIL and disposal policies
- Legal (Federal, State, local) and regulatory requirements and policies relating to ESOH compliance, safety (including explosive safety), security, and the environment

PMs and PSMs should ensure, as an essential part of program life cycle planning, that DEMIL and disposal requirements are incorporated in system design to minimize DoD's liabilities, reduce costs and protect critical program information and technology. This includes integrating DEMIL and disposal into the allocated baseline approved at the Preliminary Design Review (PDR) and refining DEMIL and disposal requirements in the initial product baseline at the Critical Design Review (CDR). DEMIL and disposal requirements are included in the program's Systems Engineering Plan (SEP), LCSP and contract(s). For munitions programs, DEMIL and disposal documentation need to be in place before the start of Developmental Test and Evaluation.

DEMIL eliminates functional capabilities and inherent military design features from both serviceable and unserviceable DoD materiel. It is the act of destroying the military offensive or defensive advantages inherent in certain types of equipment or material. DEMIL may include mutilation, scrapping, melting, burning or alteration designed to prevent the further use of this equipment and material for its originally intended military or lethal purpose. Systems Engineers integrate DEMIL considerations into system design to recover critical materials and protect assets, information and technologies from uncontrolled or unwanted release and disruption or reverse engineering. PMs should ensure the DEMIL of materiel is accomplished in accordance with DoDI 4160.28, DoD Demilitarization Program.

Disposal is the process of reusing, transferring, donating, selling or destroying excess surplus and foreign excess property. Disposal first ensures adequate screening is accomplished to satisfy all valid DoD and other U.S. Government agency needs. After assurances that Government needs for surplus DoD property are met, the materiel disposition process:

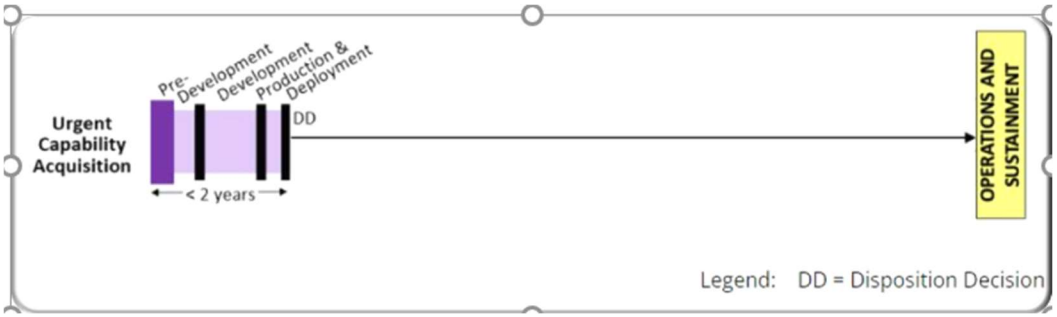
- Permits authorized transfer or donation to Government or non-Government entities.
- Obligates DoD to obtain the best-available monetary return to the Government for property sold.

PMs ensure disposal is accomplished in accordance with DoDM 4140.01, Volume 6, DoD Supply Chain Materiel Management Procedures: Materiel Returns, Retention, and Disposition and DoDM 4160.21-M, Volume 1, Defense Materiel Disposition: Disposal Guidance and Procedures.

The program's plan for DEMIL and disposal of DoD excess and surplus property includes a review of and compliance with applicable ESOH regulations and requirements to protects the environment and personnel safety during DEMIL and disposal activities. Early, balanced analyses of ESOH hazards and assessment of risks also factor into DEMIL and disposal planning for a system.

Section 6: PS Management for the AAF - General Procedures for the UCA Pathway

Figure 15: Urgent Capability Acquisition Pathway



6.1 Overview

1) This section describes:
   a) The application of product support planning, policies, and procedures to provide supportability and sustainment applicable to the (Urgent Capability Acquisition (UCA) pathway, as outlined in DoDI 5000.81. See also the Engineering of Defense Systems Guidebook for AAF pathway specific R&M engineering activities related to product support.
   b) The elements of the product support approach needed to achieve desired materiel readiness outcomes and reduce total life cycle costs if the disposition analysis and determination direct the capability to transition to a program of record (PoR).
2) Statutory product support requirements apply to a UCA only to the extent provided in the underlying statute.
3) Supportability for UCAs will be assessed IAW DoDI 5000.81 and DoDI 5000.91 and documented in a tailored AS or tailored LCSP.

6.2 Product Support Management

1) The PM coordinates the procedures outlined in Section 4 of DoDI 5000.81, required to develop supportability and sustainment over the development phases of the urgent need solution, with a Life Cycle Logistician (LCL) or consult with a Service appointed PSM. The PM coordinates with a PSM in developing the PSS within the acquisition strategy and consider requiring data collection from the OEM as part of the follow-on UCA contract.
2) No later than one year after an urgent need solution enters the O&S phase (or earlier if directed by the DoD Component), the Component should appoint a disposition official, pursuant to DoDI 5000.81, to conduct a disposition analysis. The PSM or LCL assigned by the DoD Component or Military Service should advise the disposition official on matters related to supportability. The DoD Component should notify the Executive Director, Joint Rapid Acquisition Cell, and the Deputy Director for Requirements and Capability Development in the Joint Staff J-8 when the disposition analyses for joint urgent operational needs, joint emergent operational needs, critical warfighter issues identified by the Warfighter Senior Integration Group, or Secretary of Defense or Deputy Secretary of Defense rapid acquisition authority determinations are to be completed.

6.2.1 Disposition Analysis

PMs and PSMs (or LCLs) use operational data, including the assessment of operational utility from the fielded urgent need solution as well as user feedback of system performance, to help inform the disposition official's recommendation and highlight key areas of risk. The PSM or LCL identify risks to inform any follow-on procurement and product support performance metrics required to incentivize improvements in the design to A_m, A_o, and control costs.

1) If the urgent need solution involves a weapon system, the PM coordinates with the PSM to tailor the initial PSS to the proposed weapon system life cycle (service life and fleet size/density) and procurement strategy (e.g., Commercial off the Shelf (COTS), Non-Developmental Item (NDI), or Government off the Shelf (GOTS), or whether the system requires major modifications) to meet operational requirements in the intended environment.
2) The disposition analysis should consider the continuation of non-materiel initiatives, the extension of science and technology developments related to the fielded capability, and the completion of Milestone Decision Authority (MDA) approved and funded materiel improvements.

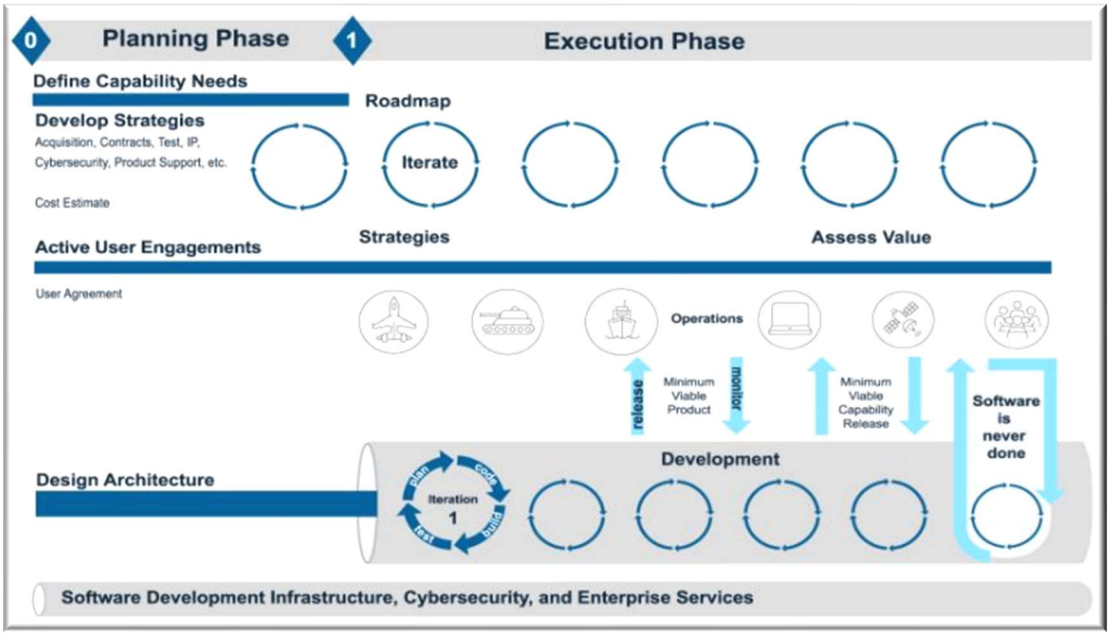
6.2.2 Disposition Determination

See Section 4.5 of DoDI 5000.81 for a complete list of recommendations considered by the Disposition Official. When the disposition official recommends transition to a PoR, the PSM or LCL uses field operational data to conduct an economic level of repair analysis (LORA) and any other related analyses to develop a PSBCA in accordance with DoDI 5000.91. The PSBCA is used to determine a best value performance-based PSS. The PSS should detail the timeline and costs to transition to either organic support, continue with contracted logistics support, or a combination of both along with any contracts, arrangements or agreements, as well as the PSBCA recommended PSIs or PSPs selected to execute sustainment, maintenance, and logistics activities. The PSM documents the initial PSS in the PoR LCSP, when the PoR is a Major Defense Acquisition Program (MDAP).

The Disposition Official may recommend the urgent need solution be kept as an enduring capability in a PoR. If approved, then the PM and the PSM supporting the determination decision assess whether or not PS-related IP requirements are included in the follow-on contract and, if so, conduct risk mitigation analysis to determine impacts to cost and supportability.

Section 7: PS Management for the AAF - General Procedures for the SW Acquisition Pathway

Figure 16: Software Acquisition Pathway



7.1. Overview

This section describes the application of product support planning and procedures to provide supportability and sustainment for the software acquisition pathway. DoDI 5000.87 emphasizes sharing of information as early and often as possible across functional areas between the requirements team, development team, and users, seamlessly integrated in the acquisition process. This helps ensure software developed within this pathway is aligned with agile development tenets and rapid delivery of capability.

Note: Software programs that meet the definition of a covered Defense Business System (DBS) should use the DBS pathway in accordance with DoDI 5000.75 but may elect to incorporate this pathway for custom developed software, if they can demonstrate the viability and effectiveness of capabilities for operational use not later than one year after the date on which funds are first obligated to develop the new software capability. The one-year requirement is for all programs utilizing the software acquisition pathway.

Product support management is a vital attribute to successfully navigating the software acquisition pathway. IAW DoDI 5000.91, PSMs, if assigned, integrate with the cross-functional team at program inception for early integration between the requirements team, development team and the users, seamlessly built into the acquisition process. The PSM may also refer to the Engineering of Defense Systems Guidebook for pathway specific R&M engineering activities related to product support.

The PSM develops a PSS and potential source(s) of software support based on analyses of the system's operational and support requirements, as well as the operational concept. In developing the program's software sustainment strategy, the PM considers the extent of COTS and/or GOTS software; new software development; security classification; certification; and accreditation,

including authorities to operate. The PM also considers test and integration needs, transition of operational software and support tools from the developer to the post-deployment support organizations, help-desk requirements, and safety critical requirements.

Properly phasing or programming for the software maintenance cost allows early budget planning for program support. Estimated costs for post-deployment software support include continuous monitoring of software bill of materials, system patches, technology refresh, system help desk support, licenses, software assurance, to include static and dynamic code analyses, vulnerability assessments, certification (e.g., safety, air worthiness), initial field and depot software maintenance, and manning required for sustainment. Planning for technology refresh includes identifying the initial refresh year and the frequency of refresh.

7.2. Product Support Activity

7.2.1 Requirements for Continuous and Integrated Product Support Planning

PMs and PSMs should partner with the software developers and cross-functional team to treat software development as a continuous evolution of capability to ensure the PSS enables the software to meet relevant user training and operational requirements. PSMs should consider existing enterprise or portfolio software PS support solutions before setting up unique PS arrangements.

7.2.2 Software Continuous Engineering and Life Cycle Cost Estimation

The PM, through their PSM, should coordinate with the lead software developer and the business financial manager to include capability insertion cost impacts of new capability insertion to logistics products (e.g., training, hardware, drawings/models, design documents, parts provisioning data and associated technical data). PSMs coordinate with the PM and the business financial manager to plan for costs associated with the disposal of self-hosted, obsolete servers and hardware, and labor associated with data cleansing and archiving and disposal, if applicable. Life cycle cost updates ideally occur as software changes occur.

7.2.3 Key software development cycle activities

Key activities include Requests for Proposal (RFPs), user assessments, Technical Manual (TM) and training package development, verification, and continuous product updates, test and evaluation events, and PSS updates driven by software deliveries (e.g., at minimum viable capability release (MVCR), and post-MVCR releases). When possible, user products (or updated user products) should be fielded in advance of or concurrently with MVP/post-MVCR releases. **Table 14** depicts the documentation by software track (embedded or applications).

Table 14: Software Pathway Track and PS Products

Software Acquisition Pathway Track	PS Product
Applications	• Simplified Software PSBCA • Software PS Strategy as Appendix to the Acquisition Strategy
Embedded Systems	Use the documents from the overarching program PSS

7.3. Performance Based Considerations for Software PS Business Case Analysis

Table 15: BCA Considerations for Software

Cost Category	Description
Software Development Labor / Organic	This element captures the cost of the Agile team for organic (government civilians) to perform activities related to changing the software baseline (via configuration management), quality control, cybersecurity, etc., through acceptance testing of the developed software.
	Includes activities such as continuous improvement through functional requirements, enhancements, correction of deficiencies, defects, cybersecurity, and independent verification and validation. This also includes code developed to automate infrastructure deployment and configuration (infrastructure as code).
Software Development Labor / Contracted	This element captures the cost of the Agile team for contracted support to perform activities related to managing the software baseline through testing and government acceptance of the developed software.
	Includes activities such as continuous improvement through enhancements, correction of deficiencies, defects, cybersecurity, and independent verification and validation.
Infrastructure Engineering / Continuous Integration (CI) /	Includes engineering effort associated with establishing infrastructure as code and automation, application orchestration, cloud storage.
	This may include activities such as: setup, maintaining, and securing a continuous integration and continuous delivery platform / pipeline, technical monitoring, performance management, capacity and availability management, and reliability engineering.
	Related to the work to maintain the infrastructure that enables continuous development. Also includes contract engineering services, studies/investigations, technical advice, software configuration management and system engineering effort. Embedded software, test procedures, manual and automated testing processes and tools, technical data (required to continuously test and re-engineer the software over system life cycle, including cost to update documentation (operator and maintainer manuals with updated faults, cautions, warnings, advisories, interface control documents, test reports, software design descriptions, supporting workflows and Ux).
Software Program Management	Includes all costs associated with the Agile management practices and process, including management of the implementation, delivery, testing, deployment, and sustainment of software.
Licenses	This element includes the cost associated with license procurement and license maintenance fees. Includes all licenses necessary to operate and maintain the system. This includes licenses in those to support the development and testing environment, continuous integration, automated testing environment as well as the deployed software system.
Hosting / Infrastructure	This element includes all costs associated with hosting, either in a traditional data center or in the cloud. Includes activities associated with computing resources and servers that execute all or some portion of an application from a central location across a network. Also includes storage and services necessary to maintain and manage server hardware and operations. If system is cloud hosting, specify if costs represent infrastructure as a service, platform as a service, or software as a service.
	Also includes cost for software and services used for any container orchestration and load balancing.
Field Service Engineers/Representatives	This element includes the cost associated with the on-site support of a deployed software product or system in its operational environment, and related training costs.
Facilities	This element includes the system specific cost associated with establishing and operating an environment such as a lab for software related development and testing.
Continuity of Operations (COOP Planning)	Informs all software development types.

7.3.1 Software Product Support Business Case Analysis

In developing life cycle cost estimates and software business case analyses for agile development, PMs and PSMs should consider the following key assumptions:

1) Continuous and early integration and delivery equates to increased learning for developers and testers (a key benefit of Agile development efforts), which reduces risks to quality and delivery.
2) Reduced lead times (lead times are dramatically reduced due to development, security, and operations (DevSecOps) methodologies that focus on implementation of a continuous pipeline, which automates integration, testing, security and deployment processes. The benefit of the pipeline is delivery of the end-to-end product faster with increased quality.

3) Increased quality, value to users and reduced total life cycle costs due to the improved value delivery process (delivering in shorter increments) and fast feedback cycles.
4) Product may be continuously developed by a core team from initial development through disposal in order to achieve continuity of operations.

7.3.2 Software Product Support Business Case Analysis Risks

When considering risks and assumptions for the software pathway PSBCA, ensure PS courses of action (COA) address reduction of lead times, increased quality, and continuous integration that are impacted by procuring the right technical data, license rights, software development environments. Document the timing and incorporation of MOSA, and Public-Private Partnerships (PPP) that increase quality and value for users, increased learning for developers (through continuous incremental and early engineering) and reduced lead times, that directly correlates to meeting wartime surge requirements. Risks that are considered in a software PSBCA include:

1) Scalability, surge, mission change (tied to cybersecurity and intelligence threat assessments)
2) Learning curve impacts to deliveries
3) Technical data requirements over the life of the program
4) Product support provider experience and performance
5) Configuration management (to include functionality challenges)
6) Cost thresholds as outlined in Acquisition Program Baseline
7) Section 508 of the Rehabilitation Act of 1973 (as applicable)

7.3.3 Business Case Analysis Approval

The approving authority for all software PSBCA is the designated acquisition executive (e.g., MDA or as delegated).

7.3.4 Software Product Support Strategy

Results of the software PSBCA drives the refinement of the best value PSS for the continuous development cycles of the program from inception to disposal. The software PSS is documented within the system's Software Acquisition Pathway's system Acquisition Strategy and details integration between the overarching end item PS strategy to include integration of hardware and software key test events and assessments. It is also documented IAW DoDI 5000.91, which states "the PSM document the PSS within a tailored LCSP and update it over the software life cycle." The software PSS details any PS arrangements (e.g., MOAs and MOUs), identify PS integrators and provider relationships, and detail the software disposal strategy.

7.3.5 Agile and Product Support Manager Team Alignment

Advance and ongoing coordination and alignment between the agile team roadmap and the program PS related integrated master schedule key events occur to ensure the program maintains cost, performance, and schedule requirements. The PM and PSM are encouraged to build flexibility in all program areas through transparency and communication.

7.4. Performance Based Product Support Planning

The PM and PSM, with support of the lead software developer, need to conduct a software PSBCA to determine the best mix of early organic software development, adapted to the particulars of the software development effort. Early engagement increases proficiency between the Government and industry to reduce risk to the continuous software development effort and to

support seamlessly transitioning to an alternate software developer if the OEM does not continue the software development effort.

7.4.1 Initial Software Product Support Business Case Analysis Development

1) PSSs derive from the initial software PSBCA. In support of the PM, the PSM should ensure the software PSBCA considers agile performance metrics unique to the software development effort to measure performance of selected product support arrangements and agreements between public and private entities as authorized by Sections 4246, previously 2368 and 2474 of Title 10, U.S.C.
2) Development of the initial software PSBCA should begin during the planning phase, using like system data and initial life cycle cost estimates along with input from the lead software developer, PSM, organic software engineer, cost analyst, and business financial manager. The cross-functional team of SMEs should determine cost and risks unique to the software effort. Ideally, updates to the modeling and analyses used to develop the initial software PSBCA should occur iteratively and incrementally to align with the pace of the agile software deliveries. PSMs should document changes to the PS approach in the software PSS.

7.4.2 Development Environments

Product support strategies may support a continuous authority to operate (ATO), if applicable, or a specific DevSecOps approach and environment to enable streamlined transition to another software development provider, if recommended, based on the software PSBCA. Maintaining or ensuring the security of the DevSecOps factory should be considered as part of the PSBCA.

7.4.3 Agile Metrics

The software development team coordinates with the PM and the PSM to determine the metrics appropriate for the software development effort that translate to reliability and maintainability. The software PSBCA drive the performance metrics tied to a performance-based PS arrangement, contract, or agreement.[36]

7.5. Product Support Requirements in the Execution Phase

An agile PSS factors in risk, cost, and benefits based on assumptions of frequent changes to PS elements due to the nature of technology advancements, evolving cyberspace threats, and operational environment and employment changes. To achieve a PSS that can support frequent changes, the PSM, on behalf of the PM, coordinate with the lead software developer and cross-functional team of user and stakeholders to track and incentivize PSP and PSI performance; monitor, measure, and track impacts to PS elements; and plan PSPs and PSIs. Incorporation of user feedback and trend analysis ensures concerns (e.g., Design Interface) are addressed for future software updates. The PSM also ensures the product support solution plans for system disposal costs at retirement of the system.

[36] See the IT/Software CoP maintained by DAU at https://www.dau.edu/cop/it/Pages/Default.aspx

7.5.1 Software Product Support Business Case Analysis Requirements within the PSS

On behalf of the PM, the PSM coordinates with the lead software developer, and cross-functional team of SMEs to implement the COA recommended by the software PSBCA and document the plan to track and incentivize PSP and PSI performance over the software development and delivery cycles. The PSM coordinates cost and budgeting estimates associated with PSP and PSI arrangements with the business financial manager. The PM, through their PSM, develops PS related risk mitigation strategies with the lead software developer to address continuous development and delivery cost impacts to the logistics products (e.g., training, TM, and provisioning updates to impacted parts), user assessments and test events, and document all in the software PSS.

7.5.1.1 Software Product Support Business Case Analysis Validation

Enough data should be available to update and validate the software PSBCA not later than 90 days after the first minimum viable product (MVP). The PM and PSM, with support from the lead software developer and stakeholders, update the initial software PSBCA, to detail cost, benefits, risks, assumptions, and sensitivity analysis that determined the best value PSS. The PM, through their PSM, detail any contract, arrangements, or agreements required for the PSI or PSP to implement the PS approach and then inform the POM process two years before transition activities start, in order to ensure the PSP(s) and PSI(s) are funded to execute activities.

7.5.1.2 Software Product Support Business Case Analysis Approval

The decision authority (DA) or designee is the approving authority for all software PSBCA recommended COAs in accordance with DoD and service policy. The approved PSBCA informs the software PSS within the acquisition strategy, which informs the PMs and customer's POM inputs.

7.5.2 Software Product Support Strategies

Results of the initial software PSBCA drives the development of the best value PS approach for the software development effort. The software PSS should detail integration between the overarching pathway PSS as applicable, including hardware and software key test and evaluation events for system of systems and interoperability between systems, in time to meet software release and deployment timelines. The software PSS details PS arrangements, recommended PSIs and PSP agreements, and the software disposal strategy. The life cycle product support strategy details product support arrangements recommended PSIs and PSP agreements and detail the software disposal strategy.

7.5.2.1 Software Development Team and Product Support Manager Team Alignment

Advance and ongoing coordination and alignment between the lead software development team, the program roadmap, and PS related integrated master schedule key events occur monthly in order to ensure the program maintains PS cost, performance, and schedule requirements, and report the status to the PM. This process enables flexibility within all areas through transparency and communication. Advance and ongoing coordination throughout the product lifecycle should occur between the user, the product owner and the PSM, to identify product support implications from evolving software. As a best practice, if organic software support is contemplated, include in the development contract a provision for Government software engineer(s) from the program management office and/or software sustainment activity to work in the OEM's software

development workspace (e.g., as a member of the team and in the same facility) to gain early insights into the software development methodology and other aspects of the software to ensure a smooth transition to support.

7.5.2.2 Product Support Element Security Requirements

1) The PM is responsible for implementing security in the program; however, the PSM should be aware of the impact security has on PS product support-related documents, assessments, and verification events, and keep the PM informed. As such, PMs and PSMs through their considerations should coordinate with the ISSM and lead software developer and lead systems engineer to track security impacts of PSIs and PSPs in follow-on contracts.
2) The PM, through their PSM, coordinates with the lead software developer and cross-functional team of stakeholders to track PS alignment to the program's Program Protection Plan (in accordance with DoDI 5000.83) and cybersecurity strategy (in accordance with DoDI 8580.1), to include Cybersecurity Maturity Model Certification planning, and cybersecurity SCRM and illumination for all initial and follow-on contracts and PS arrangements, and inform the PM, in order to identify and mitigate any associated risk. Additional SCRM actions by risk tolerance level guidance found in DoDI 5000.90.
3) PSMs coordinates with cybersecurity SMEs to understand impacts for ongoing and continuous safety (e.g., impacts based on product support implications and support continuous authority to operate, and risk management framework) and PS elements required to meet material release/support decision requirements at minimum viable product and minimum viable capability release.

7.5.2.3 Information Technology Service Management

The PSM, in support of the PM, should detail the Information Technology Service Management (ITSM) process and, tools within the software PSS. ITSM and help desk support informs service quality, and performance measures and metrics and information technology performance management measures and metrics.

7.5.2.4 Product Support Assessments and Reviews

The DA reviews and assesses annual user value assessments, which are independent assessments of software quality and value. The DA uses these assessments to determine whether a program is meeting operational requirements. The DA assesses PS through the simplified software PSBCA that is updated as required, to remain relevant with software development and deployment requirements.

7.5.2.5 Software Inventory

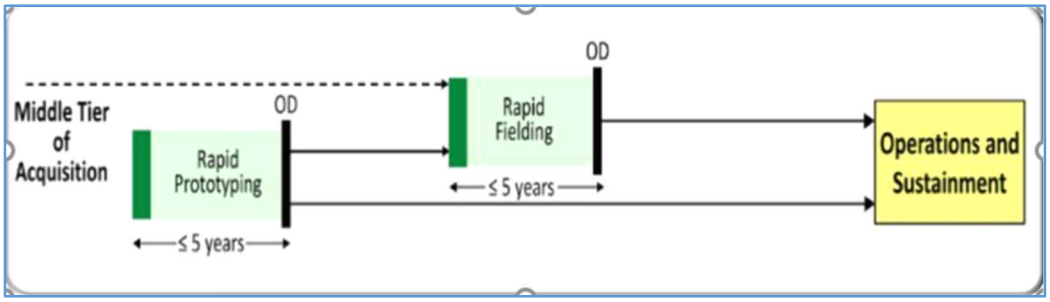
Software Inventory related to software (e.g., Service Desk) within the product support strategy leveraging DoDI 8440.01 and the DoD Enterprise Service Management Framework (DESMF) as it applies to the nuances of their program.

To support software version visibility, PSMs assess what data rights are necessary for the DLA or the Service Life Cycle Management Command (LCMC) Item Manager (IM) or provisioner to implement software version cataloging using the Federal Supply Class for software. The PM, through their PSM, or life cycle logistician coordinates with their Service LCMC to identify and ensure procurement of data required to enable software version cataloging. This provides DoD

wide asset visibility to triage vulnerable or impacted software versions and support planning for future software updates and delivery cycles.

Section 8: PS Management for the AAF - General Procedures for the MTA Pathway

Figure 17: Middle Tier of Acquisition Pathway



8.1 Overview

This section describes the application of product support planning, best practices and procedures to provide supportability and sustainment applicable to the Middle Tier of Acquisition pathway in accordance with DoDI 5000.80. The PSM may also refer to the Engineering of Defense Systems Guidebook for AAF pathway specific R&M engineering activities related to product support.

8.2 General Guidance

Table 16: Middle Tier of Acquisition Entrance Deliverables

	Major System[1]	Non-Major System[2]
Rapid Prototyping	• ADM signed by the DA • Approved Requirement[3] • Acquisition Strategy[4] • Cost Estimate	• ADM signed by the DA
Rapid Fielding	• ADM signed by the DA • Approved Requirement[3] • Acquisition Strategy[5] • Cost Estimate • Lifecycle sustainment plan	• ADM signed by the DA

1. Above threshold as defined pursuant to Section 2302d of Title 10, U.S.C.
2. Equal to or below threshold as defined pursuant to Section 2302d of Title 10, U.S.C.
3. CAEs will ensure the approved requirement document is available in the Knowledge Management and Decision Support system.
4. Rapid prototyping acquisition strategies will include security, schedule and technical risks; a test strategy or an assessment of test results; and a transition plan that includes a timeline for completion within 2 years of all necessary documentation required for transition, as determined by the DA, after MTA program start.
5. Rapid fielding acquisition strategies will include security, schedule, and production risks; either a test strategy or an assessment of test results; and a transition plan that includes a timeline for completion within 2 years of all necessary documentation required for transition, as determined by the DA, after MTA program start.

Middle Tier programs meeting "covered system" funding thresholds must comply with all covered system requirements in 10 U.S.C 4324, previously 2337 and 10 U.S.C. 4323 previously 2441. IAW DoDI 5000.80, PMs, with the support of the PSM, develop and implement sustainment programs addressing each of the integrated product support elements to deliver affordable readiness. IAW DoDI 5000.91, an LCSP is required prior to transition from Rapid Prototype to Rapid Fielding; and upon initiation for Rapid Fielding. Also consider the following:

- PSMs must track MTAs closely, and initiate concepts of supportability, sustainment planning and appropriate sustainment packages. Though MTA programs do not follow JCIDS, these systems, once crossing the MDAP threshold, will be treated as MDAP programs but will not have had the benefit of mandatory sustainment requirements.
- While the rapid prototype and rapid fielding alternatives bring speed to the acquisition system, the PSMs needs ensure appropriate sustainment planning and deliverables to support the potential for future organic or competed industry support.
- MTA systems are required to track and report the same sustainment data metrics and report in the Advana Executive Analytics Sustainment tier by the end of FY22. This will be aided by utilizing the same sustainment requirements during design.

Additional Middle Tier of Acquisition guidance from DoDI 5000.91, Section 6 includes the following direction:

- PSM will provide data to support and inform designing for supportability
- PSM will influence design through coordination with users to assess models or physical prototypes to ensure maintainability in an operational environment
- PSM will work with CON to incentivize suitability attributes
- PSM will use Supportability Analyses to inform PSS
- PSM will track and measure trends for reliability and maintainability
- PSM will conduct PS risk management
- PSM will develop cost estimates for IPS elements
- PSM will work with PM and BFM to plan/program for PSI and PSP activities
- PSM must provide PSBCA analysis to support the transition from Rapid Fielding

8.3 Tips

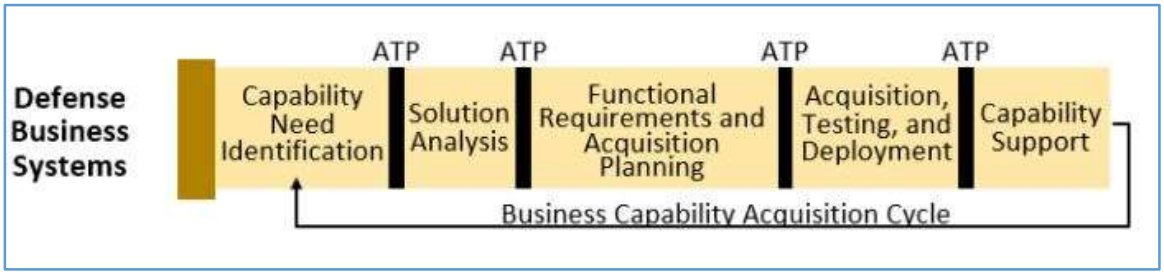
Tips are pulled from https://aaf.dau.edu/aaf/mta/tips/

- Pursue outcomes, not KPPs – Middle Tier Acquisitions support changing requirements and need continuous user involvement/feedback
- Iterate often
- Tailor in – after meeting statutory requirements, tailor in regulatory documentation
- Have a contingency plan – if there is potential for a successful prototype being scaled to production, consider Other Transaction (OT) vehicles to enable award without further competition

NOTE: Future updates to the PSM Guidebook will include additional information on the MTA pathway

Section 9: PS Management for the AAF - General Procedures for the Defense Business System Acquisition Pathway

Figure 18: Defense Business System Acquisition Pathway



9.1. Overview

This section describes the application capability support (i.e., product support) for covered Defense Business Systems (DBS) pursuant to DoDI 5000.75. The PSM may also refer to the Engineering of Defense Systems Guidebook for AAF pathway specific R&M activities related to product support.

1) Product support management for covered DBS system is the joint responsibility of the PSM, the LCL, or designee (typically referred to as the functional lead) and the PM. The functional sponsor designates a functional lead to collaborate with the PM to manage the delivery of the capability and capability support activities. PSMs seek guidance and support from the appropriate service Chief Management Officer (CMO) (or DoD CMO replacement).[37]
2) The functional lead supports the PM to identify, document, and manage capability support activities in acquisition documentation throughout all phases of the business capability acquisition cycle, including an acquisition strategy, a capability implementation plan (CIP), a cybersecurity strategy, a technical management approach, and a capability support plan (CSP).
3) **Table 17** outlines routine product support management and capability support activities during each business capability acquisition cycle phase.

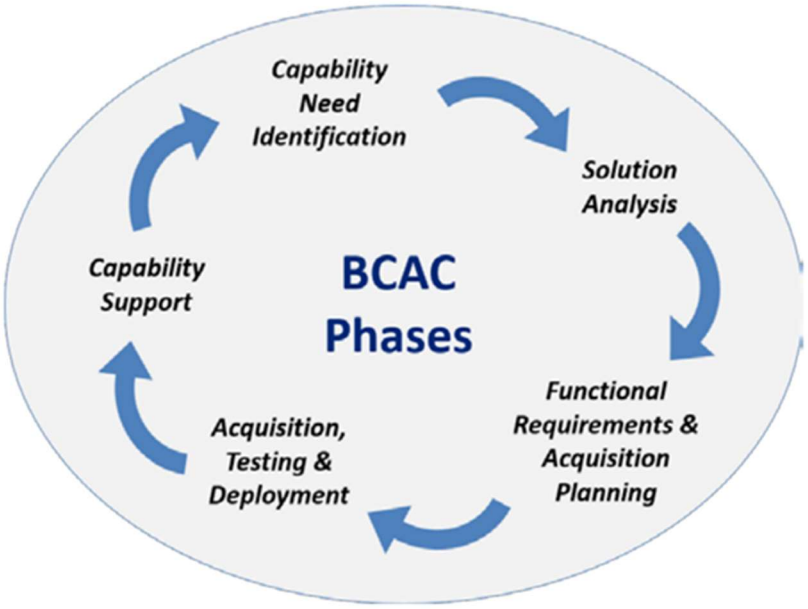
[37] Deputy Secretary of Defense Memorandum, "Disestablishment of the Chief Management Officer, Realignment of Functions and Responsibilities, and Related Issues", September 1, 2021

Table 17: Overview of PSM Activities in the Business Capability Acquisition Cycle Process

Phase	Functional Lead Activity
Capability Need Identification	Conduct historical and operational data analysis to inform business capability requirements – business problem or opportunity.
Solution Analysis	Conduct historical and operational data analysis to inform RAM costs, economic analysis, schedule, resource planning, initial acquisition strategy, CIP, and cybersecurity strategy.
Functional Requirements and Acquisition Planning	Conduct historical and operational data analysis to develop the initial CSP, market research analysis, and draft request for proposal. Refine input into the acquisition strategy, cybersecurity strategy, and CIP.
Acquisition Testing and Deployment	Refine input into the acquisition strategy, cost documentation(s), technical management requirements (test, systems engineering, data management), and CSP (transition training and sustainment).
Capability Support	Conduct historical and operational data analysis to develop the initial CSP, market research analysis, and draft request for proposal. Refine input into the acquisition strategy, cybersecurity strategy, and CIP.

9.2. Business Capability Analysis Cycle Phases

Figure 19: Defense BCAC Phases



9.2.1 Capability Need Identification

The capability need identification phase is led by the functional sponsor. The functional lead works with the PM to insert life cycle inputs into the business capability requirements, including:

1) Describing the business problem(s)
2) Defining the capability need
3) Capability performance measures
4) Desired end state for the capability (material and/or non-material)
5) Future capabilities

9.2.2 Solution Analysis

1) The functional lead supports the PM and the functional sponsor by influencing sustainment capability performance parameter development using historical and operational data from legacy or like systems to develop initial cost estimates and requirements thresholds and objectives. Operational data should be used to develop an initial economic analysis (e.g., PSBCA).
2) The functional lead supports the PM and contracting officer in developing the PS contract requirements. The functional lead works with the PM and contracting officer to determine the PS data required to develop PS inputs into the IP strategy to be priced during the competition process and support development of training as well as support possible transition to another source of development. The functional lead assesses sustainability factors for each of the potential offerors and provide risk assessment to the PM or functional sponsor.
3) The PM coordinates with the functional lead to tailor the IP strategy to account for the nature of the DBS (e.g., COTS, modified commercial, NDI, and GOTS). The IP strategy should be updated throughout the program's life cycle in accordance with DoDI 5010.44 and Paragraph 4.1.d of DoDI 5000.75.

9.2.3 Functional Requirements and Acquisition Planning

1) The functional lead supports the PM in assessing the overall solution approach (e.g., COTS, GOTS, legacy modernization, new development) and tailor the PS IP strategy to the selected solution approach, identify data required to develop or update training and support transition to another source of development, and then document this data within the IP and acquisition strategies and the CIP. In support of the PM, the functional lead incorporates PS considerations into the source selection process and work with the contracting team to conduct past performance review of training when evaluating proposals.
2) The PM and functional sponsor(s) ensure the functional lead's input is used to develop quality reviews of PS related deliverables in the contract to provide samples of contractor's previous work to review. The functional lead coordinates with the functional support team (cross-functional team of SMEs), acquisition and sustainment community engineers, business financial manager, and cost analyst to conduct an economic analysis to determine the best value PS strategy over the program life cycle.
3) The functional lead documents the support package within the system CSP. The PM and functional lead determines the timeline to implement the PSBCA recommended COA and validate the PS inputs into an economic analysis. The functional sponsor may act as a PSI or PSP as determined by the economic analysis.

4) The functional lead works with the functional sponsor as well as any PSI or PSP to collect relevant data through enterprise ITSM solutions, in order to continuously track and monitor performance of the support package, on behalf of the PM.

9.2.4 Acquisition, Testing, and Deployment

1) The functional lead supports the PM in tracking PS contract deliverables' quality and ensure training documentation meets deployment requirements.
2) The functional lead coordinates with any PSIs or PSPs to ensure test performance data is factored into quality assessments and reviews.
3) The functional lead tracks PS capability performance measures for trend analysis and incorporate any corrective actions into training documentation and procedures to meet limited and full deployment timelines.
4) The functional lead coordinates with the PSI or PSP in capturing data through ITSM for trend analysis. The functional lead uses performance data to develop updates to the economic analysis, if required, to reflect any major changes in the support package (contracts, arrangements or agreements and PSI or PSP relationships) and update any changes within the CSP.

9.2.5 Capability Support

1) The functional lead, on behalf of the PM, should include sustainment considerations in the CSP to meet the instruction in Appendix 4B of DoDI 5000.75.
2) The functional lead tracks performance of any PSIs or PSPs conducting software development over the life cycle and adjust PSI or PSP arrangements, as required, to meet cost and performance objectives.
3) The functional lead and program manager continue periodic assessments of opportunities available in the marketplace to determine changes necessary to reduce costs and/or improve efficiencies to maintain the relevance of the capability and the business system.[38]
4) Effective PS requires continuous monitoring to ensure investments are maintained at the right size, cost, and condition, including vulnerability management to support warfighter and business missions and objectives. SR equivalents in the business systems acquisition pathway are capability support reviews and include performance and customer satisfaction metrics. Each DoD Component determines the frequency, content, and format of these reviews and outlines these details in the CSP.

[38] DoDI 5000.75, 4.2e(1)(c)) Business Systems Requirements and Acquisition, February 2, 2017

Section 10: PS Management for the AAF - General Procedures for the Services Acquisition Pathway

10.1. Overview

This section describes the application of product support planning, policies, and procedures to provide supportability and sustainment in the acquisition of services, consistent with the Defense Acquisition of Services pathway, DoDI 5000.74, which emphasizes collaboration of stakeholders as early and often as possible across functional areas.

Figure 20: Seven Steps to the Services Acquisition Process

PSMs should:

1) Work with a cross-functional team that includes IP SMEs to review sustainment deliverables and IP strategy requirements IAW DoDI 5010.44.
2) Review the initial acquisition strategy and PSS while identifying appropriate sustainment metrics, data quality standards, deliverables and deliverable schedules, and user assessments of delivered logistics products.
3) Perform market research on relevant sustainment performance metrics and delivery of service alternatives and detail risk management of product support equities.
4) Define sustainment requirements and ensure they are included in the performance work statement and quality assurance surveillance plan (QASP).
5) Support the PM in developing the product support related areas of the acquisition strategy, ensuring proper timing and receipt of services, as well preserving the ability to transition to other service providers as needed.
6) Support the acquisition strategy's execution and participate in the source selection (if possible) to ensure offerors address product support-related deliverables for quality and performance requirements as part of the proposed technical service solution.
7) Support the contracting officer in conducting sustainment related performance management considerations including performance against sustainment requirements, quality assurance assessments, and identifying the root cause of failures.

10.2. Tips

1) Refer to Services Acquisition Mall (SAM), https://www.dau.edu/tools/t/Service-Acquisition-Mall
2) Refer to Acquisition Requirements Roadmap Tool (ARRT), https://www.dau.edu/tools/t/Acquisition-Requirements-Roadmap-Tool-(ARRT)-Suite

DAU conducts Services Acquisition Workshops (SAWs) to assist programs in preparing to execute services acquisitions.

Appendix A: Integrated Product Support Elements

The IPSE Guidebook takes **Table 18** one step further by:

- Breaking down the IPS Element sub-topics into their individual products and processes;
- Explaining the who, what, where, when, how and why for the major deliverables of each IPS Element by life cycle acquisition phase;
- Highlighting the importance of full integration among the Elements;
- Providing sources for additional training, communities of practice and references for each IPS Element.

Note: For additional details regarding items in the below outline please refer to The Integrated Product Support Element Guidebook

Table 18: IPS Elements Major Activities

IPS Element	Activities
1. Product Support Management	1.1. Warfighter and Maintainer Requirements Capture 1.2. Alliance Management 1.2.1. PPP/Third Party Logistics (3PL) Management 1.2.2. International Partners 1.2.3. Foreign Military Sales (FMS) 1.3. Contract Development and Management 1.3.1. Develop and Maintain a PSA with the Warfighter 1.3.2. Develop and Maintain PSAs with the PSIs 1.4. Supportability Test and Evaluation 1.5. Development and Maintenance of Sustainment BCAs 1.6. Logistics Trade Studies 1.7. Product Support Performance Management 1.7.1. Manage Balanced Performance Metrics 1.7.2. Sustainment Metrics Reporting 1.8. Product Support Budgeting and Funding 1.8.1. Budget Execution 1.8.2. Budget Management 1.8.3. Mid-Year Review Justification 1.9. TOC Management 1.10. Planning Management 1.10.1. IPT Management 1.10.2. ILA Management 1.10.3. LSCP Development and Management 1.10.4. Milestone Gate Review Management 1.11. Portfolio Transfer Planning and Transfer Execution 1.12. Logistics Policy Implementation 1.13. Configuration Management 1.13.1. Configuration Identification and Baseline Maintenance 1.13.2. Configuration Control 1.13.3. Configuration Status Accounting 1.13.4. Configuration Auditing 1.14. Performance-Based Life Cycle Product Support (i.e., PBL) 1.15. Continuous Process Improvement (Lean Six Sigma, Theory of Constraints, etc.)

IPS Element	Activities
2. Design Interface	2.1. Standardization and Interoperability 2.2. Engineering Data Analysis 2.3. Net-Centric Capability Management 2.4. RAM Design 2.5. Producibility 2.6. Supportability/Sustainability 2.7. Deployability Management 2.8. HSI 2.8.1. Manpower 2.8.2 Human Factors Engineering 2.8.3 Personnel 2.8.4 Training 2.8.5. Habitability 2.8.6. Force Protection and Survivability 2.8.7. Safety and Occupational Health 2.9. Environmental Management 2.10. Warfighter/Machine/Software/Interface/Usability Management 2.11. Survivability and Vulnerability Management 2.12. Affordability 2.13. Modular and Open Systems Approach (MOSA) 2.14. Corrosion Control and Prevention 2.15. Non-destructive Inspection 2.16. Hazardous Material Management 2.17. Energy Management
3. Sustaining Engineering	3.1. Post deployment ongoing operational data analyses 3.2. Engineering considerations 3.2.1. Relation to Systems Engineering 3.2.2. Engineering and Technical Support 3.3. Analyses 3.3.1. Safety Hazard Analysis 3.3.2. Failure causes and effects 3.3.3. Reliability and maintainability trends 3.3.4. Operational usage profiles changes 3.4. Root cause analysis of in-service problems such as: 3.4.1. Operational hazards 3.4.2. Corrosion effects 3.4.3. Reliability degradation 3.4.4. Special Considerations for Software Sustainment Engineering 3.5. Development of required design changes to resolve operational issues 3.6. Materiel Improvement Plan (MIP) review boards 3.7. DMSMS mitigation 3.7.1. Parts obsolescence 3.7.2. Technology Refresh 3.7.3. Technology insertion 3.8. Engineering dispositions 3.9. Technical manual and technical order updates 3.10. Repair or upgrade vs. disposal or retirement 3.11. Maintenance evaluation automation

IPS Element	Activities
	3.12. Failure Reporting, Analysis and Corrective Action System (FRACAS) 3.13. System Safety
4. Supply Support	4.1. Initial provisioning 4.2. Routine replenishment management, including buffer and safety stock management 4.3. Demand forecasting and Readiness Based Sparing (RBS) 4.4. Bills of Material management and maintenance 4.5. Support equipment initial provisioning 4.6. Support equipment routine replenishment provisioning 4.7. Reparable, repair part, and consumable procurement 4.8. Cataloging 4.9. Receiving 4.10. Storage 4.11. Inventory management 4.12. Transfer 4.13. Issuance 4.14. Redistribution 4.15. Disposal 4.16. Material pricing 4.17. Total Asset Visibility/AIT 4.17.1. Serialized Item Management (SIM) 4.17.2. Item Unique Identification (IUID) 4.17.3. Radio Frequency Identification (RFID) 4.18. Shelf Life Management 4.19. Buffer Management 4.20. Warranty Management 4.21. Supply Chain Assurance 4.21.1. Counterfeit material prevention 4.21.2. Malicious hardware and software prevention 4.21.3. Unauthorized technology transfer prevention
5. Maintenance Planning & Management	5.1. Maintenance Concept Design 5.2. Core capability analysis 5.3. Title X 50/50 reporting 5.4. Public-Private Partnerships 5.5. Maintenance execution 5.6. Level of repair analysis – hardware 5.7. Level of repair analysis – software 5.8. Failure Modes Effects and Criticality Analysis (FMECA) 5.9. OPTEMPO variance management 5.10. Routine versus battle-damage repair management 5.11. Built-in and manual testability management 5.12. Inter-service, organic, and contractor mix of repair responsibilities 5.13. Condition Based Maintenance Plus (CBM+); Diagnostics, Prognostics & Health Management 5.14. Reliability Centered Maintenance (RCM) 5.15. Depot Workload Allocation, Planning, Activation, and Execution
6. Packaging, Handling, Storage &	6.1. Short- and long-term preservation 6.2. Packaging requirements determination 6.3. Containerization requirements determination

IPS Element	Activities
Transportation (PHS&T)	6.4. Shelf life requirements determination 6.5. Handling requirements determination 6.6. Transportation requirements determination 6.7. Environmental control requirements determination 6.8. Physical shock control requirements determination 6.9. Static shock control requirements determination 6.10. Security classification requirements determination 6.11. Container Reutilization 6.12. Marking
7. Technical Data	7.1. Engineering data maintenance 7.2. Specifications determination 7.3. Standards management 7.4. Data Item Descriptions (DID) management 7.5. Technical standards development and management 7.6. Embedded Technical Data Systems 7.7. Technical manuals (TMs) including Interactive Electronic Technical Manuals (IETMs) management 7.7.1. S1000D Implementation 7.8. Engineering drawings management 7.9. Data rights management 7.10. Data delivery 7.11. Proprietary data management 7.12. Data validation 7.13. Data storage and backup
8. Support Equipment	8.1. Manual and automatic test equipment management 8.2. Equipment design and support equipment requirements definition* 8.3. Equipment commonality management 8.4. Maintenance concept integration 8.5. Ground handling and maintenance equipment management 8.6. Equipment capacity determination 8.7. Air conditioners requirement determination and management 8.8. Generators requirement determination and management 8.9. Tools requirement determination and management 8.10. Metrology and calibration equipment requirement determination and management 8.11. Deployability requirement determination management 8.12. Automatic Test Systems 8.13. Support Equipment Integrated Product Support
9. Training & Training Support	9.1. Initial, formal, informal, and On the Job Training (OJT) individual, crew, and unit New Equipment Training (NET) 9.2. Initial, formal, informal, and OJT individual, crew, and unit Institutional training 9.3. Initial, formal, informal, and OJT individual, crew, and unit Sustainment training 9.4. Initial, formal, informal, and OJT individual, crew, and unit Displaced Equipment Training (DET) 9.5. Embedded training insertion and management 9.6. Computer Based Training 9.7. Distance Learning 9.8. Training Equipment

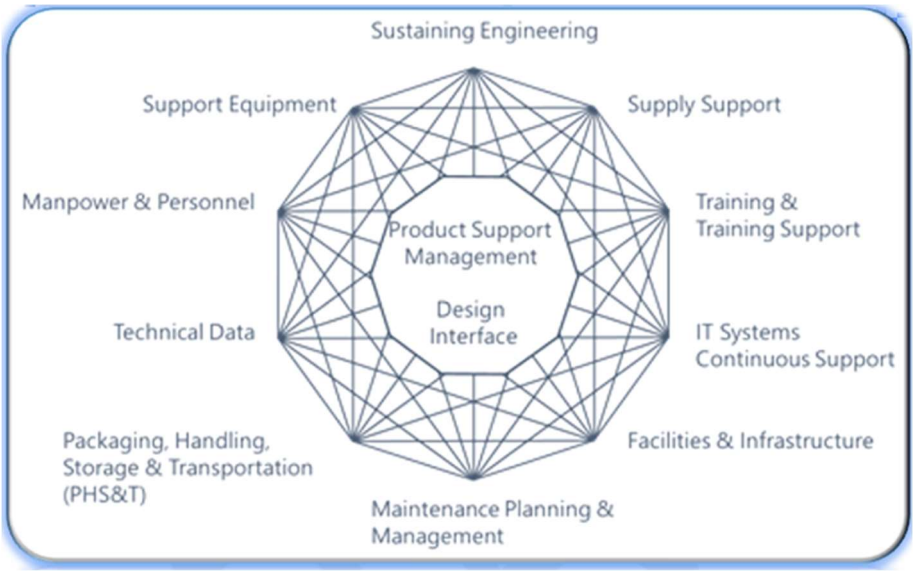
IPS Element	Activities
	9.9. Train the Trainer 9.10. Simulator Sustainment
10. Manpower & Personnel	10.1. Identification and acquisition of required numbers of active and reserve military officers and enlisted personnel as well as civilian personnel with the skills and grades required for system operation 10.2. Identification and acquisition of required numbers of active and reserve military officers and enlisted personnel as well as civilian personnel with the skills and grades required for system maintenance 10.3. Identification and acquisition of required numbers of active and reserve military officers and enlisted personnel as well as civilian personnel with the skills and grades required for system support 10.4. Wartime versus peacetime personnel requirements determination and management 10.5. Additional personnel identification and justification process management
11. Facilities & Infrastructure	11.1. Facilities Plan Management 11.1.1. Facilities and facility improvement studies design and execution for every IPS Element (i.e., Maintenance Planning and Management, Information Technology (IT) Systems Continuous Support, Training & Training Support, etc.) 11.1.2. Location selection 11.1.3. Space requirements determination 11.1.4. Environmental requirements determination 11.1.5. Security requirements determination 11.1.6. Utilities requirements determination 11.1.7. Storage requirements determination 11.1.8. Equipment requirements determination 11.1.9. Existing versus new facilities determination 11.2. Site activation
12. Information Technology (IT) Systems Continuous Support	12.1. Life Cycle Sustainment Planning and Management 12.1.1 Pathway specific requirements (e.g., KPPs, KSAs, or for the Software Acquisition Pathway, the Capability Needs Statement) 12.1.2. Identify pathway specific IT requirements 12.1.3. Life Cycle Sustainment Plan (LCSP) inputs and reporting requirements 12.1.4. COTS/NDI/GOTs factors 12.1.6. Hardware/software operation and support 12.1.7. Disaster recovery planning and execution 12.1.8. Working group standup and management 12.1.9. Product Support Management considerations within agile software development 12.1.10. Product Support Management considerations within Development Security Operations (DevSecOps) 12.1.11. Software configuration management 12.1.12. Software continuous engineering capabilities (Software Transition Plan (STP) to include disposal) 12.1.13. Software product support integration planning 12.1.14. Software reuse including use of COTS and open source software

IPS Element	Activities
	12.1.15. Software life cycle cost estimation 12.1.16. Software licenses management 12.1.17. Software deployment planning 12.1.18. Information Support Plan (PSM coordinates with the Systems and Software Engineers to ensure the ISP is tied back to the Service overarching communications ISP in order to reduce duplication, ensure backwards capability and interoperability). 12.1.19. Obsolescence/Diminishing Manufacturing Sources and Material Shortages (DMSMS) 12.1.20. Technology refreshment (or for the Software Acquisition Pathway this is now minimum viable product and minimum viable capability release). 12.1.21. Government-Industry Data Exchange Program (GIDEP) 12.1.22. Cloud computing sustainment considerations 12.1.23. Post Production Software Sustainment considerations (or post minimum viable capability release for the Software Acquisition Pathway) 12.1.24. Automated Identification Technology (AIT) management 12.1.25. Logistics Information Systems 12.1.26. Item Unique Identification (IUID) 12.1.27. IT Asset Management for hardware and tactical software tracking and accountability 12.1.28. Electronic Data Interchange (EDI) management 12.1.29. Interface management 12.1.30. Modular Open System Architectures 12.1.31. Deficiency reporting and tracking 12.1.32 Joint Deficiency reporting and tracking 12.1.33. Software and software intensive support equipment 12.2. Program Protection Plan 12.2.1. Cybersecurity 12.2.1.1. Vulnerability Identification and Management 12.2.1.2. Continuous Monitoring 12.1.2.2.1. Software Bill of Materials 12.2.1.3. Cybersecurity Supply Chain Risk Management (SCRM) 12.2.1.4. Cybersecurity Maturity Model Certification (CMMC) 12.2.1.5. Periodic Vulnerability Assessments, Threat Hunting 12.2.1.6. Maintenance 12.2.1.6.1. Built-In Test 12.2.1.6.2. Third Party Maintenance Devices 12.2.2. Standards for Software development, validation and verification 12.2.3. Anti-Tamper 12.2.3.1. Data Protection 12.2.3.2. Software Assurance. 12.3. Testing, assessment, and certification 12.3.1. Capability Maturity Model Integration 12.3.2. DT&E and OT&E Test Planning

IPS Element	Activities
	12.3.2.1. Cyber T&E Planning (Contractor & Government) 12.3.2.2. Security Control Assessment 12.3.2.3. ATO or Interim Authority to Operate 12.3.4. Test driven development 12.4. Defense Business Systems (DBS) 12.4.1. Business Capability Acquisition Cycle (BCAC) 12.4.2. Capability Support Plan (CSP) 12.5. Information Technology Service Management (ITSM) 12.5.1. Enterprise level ITSM strategy development 12.5.2. Help desk support and trend analysis 12.5.3. Service Quality Management measures and metrics 12.5.4. IT Performance Management measures and metrics 12.5.5. DOD Enterprise Service Management Framework (DESMF) 12.5.6. Service Level Agreements (SLAs) and Interface Control Agreements (ICA) management

Product support is scoped by the IPS Elements, which provide a structured and integrated framework for managing product support. **Figure 21** depicts the integrated nature of the elements, which are considered during the development of the Product Support Strategy and continuously assessed throughout the system life cycle.

Figure 21: Integrated Product Support (IPS) Elements



Specific synergies and requisite tradeoffs are identified through analysis and management of the IPS Elements. Integration of all elements is critical. PSMs may be tempted to think of the IPS Elements as a set of discrete functions that are each individually accomplished to manage sustainment, as has often been the case in the past under traditional integrated logistics support management. The PSM need to understand how each element is affected by and linked with the others and as such, adjust them in an integrated fashion to reach the goal of balancing Warfighter requirements for suitability and affordability. For example, if the PSM recognizes that a system is down more often than predicted and, upon further analysis, determines that a key part is wearing

out faster than its designed life would indicate, that maintenance personnel are properly trained, and that there is no other subsystem that is causing early part failure, the PSM examines solution alternatives and/or combinations of alternatives, including:

- Buy additional parts
- In consultation with the design/engineering community, redesign the part or source an alternative part that is to be more reliable or durable; or change the maintenance procedures to inspect the part more frequently and replace it earlier in its life; or overhaul the unit rather than conduct spot repairs if the investment in overhaul results in a positive return on investment

Additionally, other approaches may apply:

- If commercially repaired units are more reliable than organically repaired units, investigate whether commercial practices or a teaming arrangement can be applied to the organic Depot
- If a lack of training is resulting in more frequent removals, develop (as necessary) and deploy training
- If new or better test and repair equipment is available, and there is a positive return on investment, field improved equipment

Each of these alternatives have a different impact on the program and should be evaluated for system availability, reliability, and cost across each IPS Element.

A.1 Product Support Management

Objective. Plan and manage cost and performance across the product support value chain, from design through disposal.

Description. This Product Support Management Integrated Product Support Element should, through the Product Support Manager, provide continuous product support leadership throughout the weapon system's life cycle, reporting to senior leadership of status of program key metrics and product support activities, and providing senior program subject matter expertise in all areas of life cycle product support.

Product support management is the development and implementation of product support strategies to ensure supportability is considered throughout the system life cycle through the optimization of the key performance outcomes of reliability, availability, maintainability, and reduction of total ownership costs. The scope of product support management planning and execution includes the enterprise level integration of all twelve integrated product support elements throughout the lifecycle commensurate with the roles and responsibilities of the Product Support Manager position created under Public Law 111-84, Section 805.

A.2 Design Interface

Objective. Participate in the SE process to impact the design from its inception throughout the life cycle, facilitating supportability to maximize the availability, effectiveness and capability of the system at the lowest TOC.

Description. Design interface is the integration of the quantitative design characteristics of SE (reliability, maintainability, etc.) with the functional logistics elements (i.e., IPS Elements). Design interface reflects the driving relationship of system design parameters to product support resource requirements. Design interface analysis is based on digital system models and related

digital product data that form the system's Authoritative Source of Truth. These design parameters are expressed in operational terms rather than as inherent values and specifically relate to system requirements. Thus, product support requirements are derived to ensure the system meets its availability goals and design costs and support costs of the system are effectively balanced. The basic items that need to be considered as part of design interface include:

- Reliability
- Maintainability
- Supportability
- Testability requirements
- Support equipment needs in accordance with MIL-STD-1839
- Diagnostics/prognostics and health management
- IPS Elements
- Affordability
- Configuration Management
- Safety requirements
- Environmental and HAZMAT Requirements
- Corrosion Prevention and Control
- HSI (e.g., Human Engineering Design Approach Document-Maintenance, HEDAD-M)
- Anti-Tamper
- Habitability
- Disposal
- Legal Requirements

A.3 Sustaining Engineering

Objective. Support in-service systems in their operational environments.

Description. Sustaining engineering spans those technical tasks (engineering and logistics investigations and analyses) to ensure continued operation and maintenance of a system with managed (i.e., known) risk. Sustaining engineering involves the identification, review, assessment, and resolution of deficiencies throughout a system's life cycle. Sustaining engineering returns a system to its baseline configuration and capability and identifies opportunities for performance and capability enhancement. It includes the measurement, identification and verification of system technical and supportability deficiencies, associated root cause analyses, evaluation of the potential for deficiency correction and the development of a range of corrective action options. Typically, BCA and/or life cycle economic analysis are performed to determine the relative costs and risks associated with the implementation of various corrective action options. Sustaining engineering also includes the implementation of selected corrective actions to include configuration or maintenance processes and the monitoring of sustainment health metrics.

- Collection and triage of all service use and maintenance data
- Analysis of environmental and safety hazards, failure causes and effects, R&M trends, and operational usage profiles changes
- Root cause analysis of in-service problems (including operational hazards, deficiency reports, parts obsolescence, corrosion effects, and reliability degradation)
- The development of required design changes to resolve operational issues

- Other activities necessary to ensure cost-effective support to achieve peacetime and wartime readiness and performance requirements over a system's life cycle

Technical surveillance of critical safety items, approved sources for these items, and the oversight of the design configuration baselines (basic design engineering responsibility for the overall configuration including design packages, maintenance procedures, and usage profiles) for the fielded system to ensure continued certification compliance are also part of the sustaining engineering effort. Periodic technical review of the in-service system performance against baseline requirements, analysis of trends, and development of management options and resource requirements for resolution of operational issues should be part of the sustaining effort.

A.4 Supply Support

Objective. Identify, plan for, resource, and implement management actions to acquire repair parts, spares, and all classes of supply to ensure the best equipment/ capability is available to support the Warfighter/maintainer when needed, at the lowest possible TOC.

Description. Supply support consists of all management actions, procedures, and techniques necessary to determine requirements to acquire, catalog, receive, store, transfer, issue and dispose of spares, repair parts, and supplies. This means having the right spares, repair parts, and all classes of supplies available, in the right quantities, at the right place, at the right time, at the right price. The process includes provisioning for initial support, as well as acquiring, distributing, and replenishing inventories. The process also includes identifying and managing supply chain risks to ensure a resilient supply chain that is capable of meeting Warfighter performance objectives.

A.5 Maintenance Planning & Management

Objective. Identify, plan, resource, and implement maintenance concepts and requirements to ensure the best possible equipment/capability is available when the Warfighter needs it at the lowest possible TOC. Maintenance programs for DoD materiel shall be structured and managed to achieve inherent performance, safety and reliability levels of the materiel. Maintenance tasks restore safety and reliability to their inherent levels when deterioration has occurred. Maintenance programs are structured for meeting readiness and sustainability objectives (including mobilization and surge capabilities) of national defense strategic and contingency requirements.[39]

Description. Maintenance planning and management establishes maintenance concepts and requirements for the life of the system, for hardware and software, including:

- Level of repair analysis
- Depot Source of Repair
- Repair time
- Testability requirements
- Support equipment needs
- Training and Training Aids, Devices, Simulators, and Simulations (TADSS)
- Manpower skills
- Facilities
- Inter-service, organic and contractor mix of repair responsibility
- Deployment planning/site activation

[39] DoDD 4151.18 para 3.1

- Development of preventive maintenance programs using RCM
- Condition-Based Maintenance Plus (CBM+)
- Diagnostics/prognostics and health management
- Sustainment
- PBL planning
- Post-production software support

A.6 Packaging, Handling, Storage & Transportation

Objective. Identify, plan, resource, and acquire PHST requirements to maximize availability and usability of the materiel to include support items whenever they are needed for training or mission.

Description. PHS&T is the combination of resources, processes, procedures, design, considerations, and methods to ensure that all system, equipment, and support items are preserved, packaged, handled, and transported properly, including environmental considerations, location dependent environmental severity on corrosion (including mold, mildew, rot, etc.), equipment preservation for the short and long storage, and transportability. Some items require special environmentally controlled, shock isolated containers for transport to and from repair and storage facilities via all modes of transportation (road, rail, air, and sea).

A.7 Technical Data

Objective. Identify, plan, resource and implement management actions to develop and acquire information to:

- Install, operate, maintain, and train to maximize equipment effectiveness/availability
- Effectively catalog and acquire spare/repair parts, support equipment, and supply
- Define the configuration baseline of the system (hardware and software) to effectively support the Warfighter with the best capability at the time it is needed

Description. Technical data consists of recorded information of scientific or technical nature, regardless of form or character (such as equipment TMs and engineering drawings), engineering data, specifications, standards and Data Item Descriptions (DIDs). TMs, including Interactive Electronic Technical Manuals (IETMs) and engineering models or drawings, are the most expensive and probably the most important data acquisitions made in support of a system. TMs and IETMs provide the instructions for operation and maintenance of a system. IETMs also provide integrated training and diagnostic fault isolation procedures. Address data rights and data delivery as well as use of any proprietary data as part of this element. Establish a data management system within the IDE that allows every activity involved with the program to cost-effectively create, store, access, manipulate, and exchange digital data. This includes, at minimum, the data management needs of the SE process, modeling and simulation activities, test and evaluation strategy, support strategy, and other periodic reporting requirements. If a model-based engineering designed system, all Technical Data and derivative products should align to the ASoT managed in the IDE or PLM or equivalent system.

Also includes as maintained bills of material and system configuration by individual system identification code or “tail number.”

A.8 Support Equipment

Objective. Identify, plan, resource and implement management actions to acquire and support the equipment (mobile or fixed) required to sustain the operation and maintenance of the system to ensure that the system is available to the Warfighter when it is needed at the lowest TOC.

Description. Consists of all equipment (mobile or fixed) required to support the operation and maintenance of a system. This includes but is not limited to ground handling and maintenance equipment, trucks, air conditioners, generators, tools, Test, Measurement and Diagnostic Equipment (TMDE), metrology and calibration equipment, and manual and automatic test equipment. During the acquisition of systems, PMs are expected to decrease the proliferation of peculiar support equipment into the inventory by minimizing the development of new support equipment and giving more attention to the use of existing Government or commercial equipment. They should also ensure support equipment is ready (vetted against measurement requirement) and available (procurable) to support Fleet operation and maintenance requirements. More information on Support Equipment documentation, including Calibration Measurement Requirements Summary (CMRS) and Calibration Requirements List (CRL) can be found in the IPSE Guidebook.

A.9 Training & Training Support

Objective. Plan, resource, and implement a cohesive integrated strategy early in the development process to train military and civilian personnel to maximize the effectiveness of the doctrine, manpower and personnel, to fight, operate, and maintain the equipment throughout the life cycle. As part of the strategy, plan, resource, and implement management actions to identify, develop, and acquire TADSS to maximize the effectiveness of the manpower and personnel to fight, operate, and sustain equipment at the lowest TOC.

Description. Training and training support consists of the policy, processes, procedures, techniques, TADSS, planning and provisioning for the training base including equipment used to train civilian and military personnel to acquire, operate, maintain, and support a system. This includes New Equipment Training (NET), institutional, sustainment training and Displaced Equipment Training (DET) for the individual, crew, unit, collective, and maintenance through initial, formal, informal, on the job training (OJT), and sustainment proficiency training. Significant efforts are focused on NET which in conjunction with the overall training strategy is validated during system evaluation and test at the individual-, crew-, and unit-levels. The PSM and HSI-domain level SMEs and practitioners should collaborate on training planning and training cost estimates and document them in the LCSP and CARD.

A.10 Manpower & Personnel

Objective. Identify, plan, resource and acquire personnel, civilian and military, with the grades and skills required a) to operate equipment, to complete the missions, to effectively fight or support the fight, to win our nation's wars; b) to effectively support the warfighter, and to ensure the best capability is available for the Warfighter when needed.

Description. It is essential to identify and acquire personnel (military and civilian) with the skills and grades required to operate, maintain, and support systems over their lifetime. Early identification is essential. If the needed manpower is an additive requirement to existing manpower levels of an organization, a formalized process of identification and justification must be made to higher authority.

A.11 Facilities & Infrastructure

Objective. Identify, plan, resource, and acquire facilities to enable training, maintenance and storage to maximize effectiveness of system operation and the logistic support system at the lowest TOC. Identify and prepare plans for the acquisition of facilities and site activation to enable responsive support for the Warfighter.

Description. Facilities and infrastructure are the permanent and semi-permanent real property assets required to support a system, including studies to define types of facilities or facility improvements, location, space needs, environmental and security requirements, and equipment. It includes facilities for training, equipment storage, maintenance, supply storage, ammunition storage, and so forth.

A.12 Information Technology (IT) Systems Continuous Support

Objective. Identify, plan, resource, and acquire facilities, hardware, software, firmware, documentation, manpower and personnel necessary for planning and management of mission critical computer hardware and software systems. Coordinate and implement agreements necessary to manage technical interfaces, and to manage work performed by continuous software engineering activities. Establish and update plans for automated and continuous test and certification activities required throughout the life cycle.

Description. Information technology systems continuous support encompasses the facilities, hardware, software, firmware, documentation, manpower, and personnel needed to operate and support mission critical information technology systems hardware/software systems. As the primary end item, support equipment, and training devices increase in complexity, more and more software is being used. The expense associated with the design and maintenance of software programs is so high that one cannot afford not to manage this process effectively and proactively.

It needs to become standard practice for the program manager (PM) and product support manager (PSM) to participate in the engineering and continuous development process from program inception to ensure software engineers, systems engineers, users, and product support managers are integrated and collaborating continuously. This helps to ensure the necessary planning and management of IT systems continuous support including management of weapon system information assurance across the system life cycle.

Information systems, electronics, and software are often part of the technical data that defines the current and future configuration baseline of the system necessary to develop safe and effective procedures for continued operation of the system. Software technical data comes in many forms to include, but not limited to, specifications, flow/logic diagrams, Computer Software Configuration Item (CSCI) definitions, test descriptions, operating environments, user/maintainer manuals, and computer code. IT systems interface with the Global Information Grid (GIG) via the Defense Information Switch Network (DISN) or other network connectivity identified, managed, and actively coordinated throughout the life cycle to assure mission critical connectivity.

Electromagnetic Compatibility/Interference (EMC/EMI) requirements are periodically evaluated and tested as weapon systems and mission scenarios evolve. Electromagnetic Pulse (EMP) and other survivability requirements are evaluated and tested at specific intervals over the Life Cycle.

System cybersecurity is a total Life Cycle management issue, driven by a constantly evolving cyber threat. Perform cybersecurity operational mission risk assessments and maintain supply chain risk management practices throughout the lifecycle to mitigate or remediate vulnerabilities to manage the system's cyber risk posture. Disaster recovery planning and execution is a

requirement for mission critical systems and should be driven by continuity of operations plans of the using organizations. Automated Identification Technology should be a significant consideration for systems that deploy or components that are transported through standard supply channels for distribution, maintenance and repair.

Electronic Data Interchange (EDI) can be a constant management challenge as commercial methods and standards change many times during the operational life of a weapon system. PMs, through the PSM, need to coordinate, at program inception, with an organic software engineering entity to identify intellectual property and data rights for inclusion in subsequent contracts. PSMs should collaborate with the software engineers to tailor data/license rights acquisition and ensure it is aligned with the acquisition and product support strategies. The PSM should also ensure the data rights and license management strategies are documented within the IP strategy[40]. The PSM should coordinate with the software engineer to develop a holistic business case analysis to determine a best value product support strategy that considers all aspects of hardware and software.

[40] *Technical Data Management & Intellectual Property Guidebook Suite* - https://www.dau.edu/tools/p/Tech-Data-and-IP-Guidebook-Suite

Appendix B: Typical Supporting Performance Metrics

Listed below are some select performance and cost attributes that have been shown to lead to improved Warfighter outcomes when managed, and which can support achievement of the overarching required sustainment metrics. As stated, the required sustainment metrics are the A_m and A_o (KPP), reliability (KSA or APA), maintainability (KSA or APA), and O&S Cost (KSA or APA). A more comprehensive list with definitions may be found in the JCIDS Manual and the *PBL Guidebook (*https://www.dau.edu/tools/t/Performance-Based-Logistics-(PBL)-Guidebook).

- **Reliability.** Mission reliability (e.g., Mean Time Between Mission Critical Failure, Mean Time Between Abort, Mean Time Between Operational Mission failure, Mission Completion Rate, etc.) and Logistics Reliability (e.g., Mean Time Between Failure, Mean Time Between Unscheduled Maintenance Action, etc.)
- **Availability/Readiness.** Not Mission Capable Rate, Not Mission Capable Maintenance (NMCM), Not Mission Capable Supply (NMCS), Fully Mission Capable Rate, Mission Capable Rates, Time on Wing, Ready for Tasking, Operational Availability, Sortie Generation Rates, and Materiel Availability.
- **Maintainability.** Corrective Maintenance (e.g., Mean Time to Repair, Mean Corrective Maintenance Time, etc.), NMCM, Maintenance Support (e.g., Maintenance Man-Hours per Operating Hour, Depot Maintenance Man-Hours, etc.) and Diagnostics (e.g., Fault Detection, Fault Isolation, cannot duplicate discrepancies, False Alarms Per Operating Hour, etc.)
- **Supply.** Logistics Response Time (LRT), Customer Wait Time (CWT), Issue Effectiveness, NMCS, Backorders, Requisition Fill Rate, Order Cycle Time, Perfect Order Fulfillment, Mean Logistics Delay Time, Logistics Response Time, Cannibalization Rate, Back Order Rate[41]
- **Transportation.** Delivery Time for high/medium/low priority items, Percent In-Transit Visibility, Retrograde Time, Shopping Time, Delivery Accuracy, Damage in Transit, Mean Logistics Delay Time
- **Cost.** Dollar per-unit of operation (e.g., flying hour); reduction in O&S cost, Annual Cost Per System, Total O&S Costs, and Cost per Day of Availability

These metrics are mathematically and qualitatively described. They also should be:

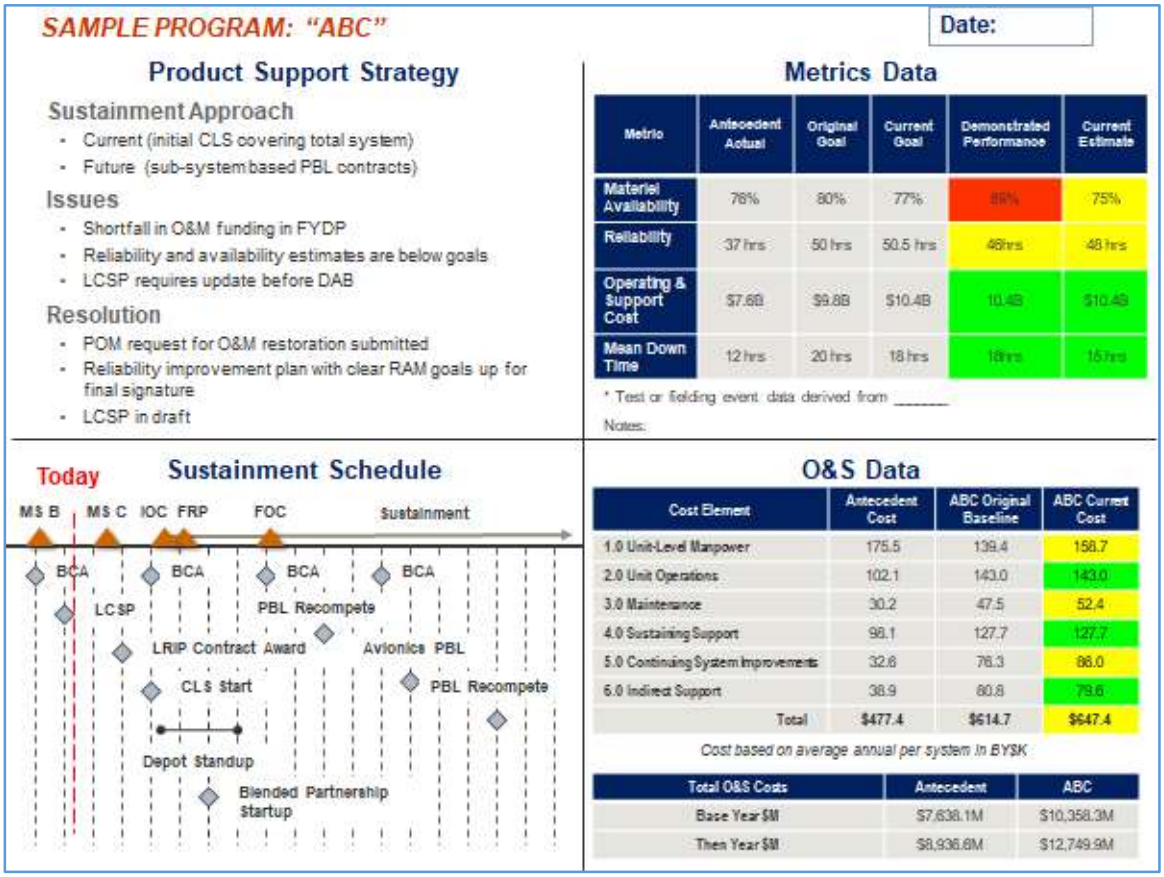
- Linked to system level required sustainment metrics objectives
- Appropriate to scope and responsibility
- Specific in units of measure
- Specific in acceptable ranges or thresholds
- Selected to motivate desired long-term behaviors
- Understood and accepted
- Easy to collect and verify
- Readily accessible
- Analyzed to provide timely feedback

[41] DoD Supply Chain Metrics Reference Guide

Appendix C: Sustainment Chart & Instructions

The Sustainment Quad Chart helps explain program status at decision points and executive reviews. ***(Note: an MCA Pathway program is depicted)***

Figure 22: Sustainment Quad Chart



C.1 Sustainment Quad Chart Instructions

The Sustainment Quad Chart is a tool used to provide management insight into critical logistics and materiel readiness requirements, strategy, cost and affordability aspects of the program acquisition and life cycle sustainment strategy. The chart also informs various program life cycle decisions. Programs generate a sustainment quad chart for all Defense Acquisition Executive Summary (DAES) reviews, Overarching Integrated Product Teams (OIPTs), Defense Acquisition Boards (DABs) and other program reviews, driving focus on better buying power in sustainment decisions.

Note: The template shown in Figure 22 uses a notional program labeled "ABC" and includes reference to its antecedent (predecessor) program. Replace ABC and antecedent when using template to build actual chart.

C.1.1 Top Left Quad – Product Support Strategy

Purpose. Programs cite current sustainment approach and any future differences. Define and highlight key product support elements to support an assessment that planning is adequate for

the Life Cycle decision at hand, and sufficient to meet materiel readiness goals throughout the lifecycle. Highlight the key aspects relevant to the specific program life cycle phase. For example, a MS A program should strive to develop a supportable capability, and effective and affordable support.

Fields:

- Sustainment Approach
- Highlight the key support elements; at a minimum include the "Big-Four:"
    - Personnel (military, Government civilian, contractor)
    - Maintenance (field, sustain/Depot, software)
    - Supply (initial and replenishment consumables/repairables)
    - Data (data rights requirements/strategy and data maintenance)
- Define overall performance-based approach and supporting analysis, PSBCA, PSA(s), and contract strategy, along with the results of sustainment-related analysis to date that indicates the chosen strategy is a good deal for all parties including the Warfighter, and taxpayer.
- Issues
- Cite any sustainment issues the program is currently experiencing, along with risks and alternative Course of Actions. Goal is NO unresolved sustainment issues before the OIPT.
- Resolution
- Identify planned resolutions to noted issues.

C.1.2 Bottom Left Quad – Sustainment Schedule

Purpose. Highlight key elements to support an assessment that sustainment schedule is adequate for the life cycle decision at hand, and sufficient to meet materiel readiness goals throughout the lifecycle. Sustainment elements need to be synchronized with the integrated master schedule.

Fields:

- Top Bar (Milestones)
    - Include prior year's completion of significant past sustainment events (e.g., ILA, PSBCA, CLA/SoRA).
    - Future years should cover Future Year Defense Program (FYDP) and post-FYDP significant events:
        - Contracts
        - Major milestones and decision reviews
        - IOC and First Unit Equipped (FUE) dates
        - LCSP/PBL related decision support (e.g., PSBCA updates)
        - ICS/CLS, organic transition dates
        - Sustainment Reviews/Post fielding reviews
    - Include vertical line for current date.
- Events
    - Include key life cycle sustainment events: PSBCAs, PBL decisions, ICS/CLS, organic transitions, Core Logistics determinations/Depot standup, sustainment re-competes.

C.1.3 Top Right Quad – Metrics Data

Purpose. Display current estimates of sustainment performance vs. goals and actuals for antecedent systems. This section highlights and compares key sustainment metrics/requirements, and support an assessment that performance is adequate for the lifecycle decision at hand, and sufficient to meet A_M goals throughout the lifecycle. Metrics data should reflect the most recent sustainment performance and estimates.

Fields:

- Metrics
  - At a minimum include A_M, Materiel Reliability, O&S cost (in $ Base Year) and Mean Down Time, per CJCSI and program DAVE submission. Include other relevant sustainment metrics as needed. ***(Note: this may be updated to reflect the 30 Oct 21 JCIDS Manual Sustainment KPP, KSAs/APAs, and related guidance).***
- Antecedent Actual
  - Antecedent is the system cited in the Selected Acquisition Report (SAR).
  - Include the four metrics for the antecedent system that the MDAP is replacing.
- Original Goal
  - Values for each metric based on the original sustainment requirements or the original Defense Acquisition Management Information Retrieval (DAMIR) system, a legacy system to DAVE, for sustainment metrics submission. For older Covered Systems that did not have the metrics as design requirements, the original goal is the value of their first sustainment metrics submission.
  - Goal is equivalent to threshold for programs with sustainment KPP/KSAs and APAs.
- Current Goal
  - Value for each metric according to the current baseline.
  - Goal is equivalent to threshold for programs with sustainment KPP/KSAs and APAs.
  - Cite rationale for any changes.
- Demonstrated Performance
  - Actual performance to date.
  - PM assigns color rating based on estimate versus current goal:
    - Green means “at or exceeding goal.”
    - Yellow means “<10% adverse delta from goal.”
    - Red means “>10% adverse delta from goal.”
- Current Estimate
  - Projected performance at full fielding for each metric
  - PM assigns color rating based on estimate versus current goal:
    - Green means “at or exceeding goal”
    - Yellow means “<10% adverse delta from goal”
    - Red means “>10% adverse delta from goal”
- Test or Fielding Event Data Derived From
  - Cite events (DT, Limited User Test (LUT), Operations Evaluation (OPEVAL), IOT&E or M&S tools in the current estimate.

Note: Include any relevant or additional information concerning metrics definitions.

C.1.4 Bottom Right Quad – O&S Data

Purpose. Highlight and compare O&S cost (estimates/actuals) and support an assessment that the program is affordable throughout the lifecycle.

Fields: (Reflect the SAR O&S section)

- Cost Element
  - Refer to 1 Sep 2020 Cost Estimate and Program Evaluation (CAPE) Cost Estimating Guide for individual cost elements.
  - These definitions should be consistent with the SAR O&S cost section (which is based on identical definitions). Cost estimating assumptions, constraints, ground rules, limitations, methodologies and results should match the current cost estimate.
- Antecedent Cost
  - Cost of the existing system according to CAPE cost elements
  - Average annual cost per operating unit (per system, or across a fleet)
    - Use the SAR as the basis for determining the unit.
- Program Original Baseline
  - Per CAPE cost elements, according to the first SAR submission
  - Base costs on average annual cost per operating unit (squadron, hull, brigade, etc.)
- Program Current Cost
  - Per CAPE cost elements, according to the most recent estimate (Program Office Estimate, Service Cost Position, Independent Cost Estimate)
  - Base costs on average annual cost per operating unit (squadron, hull, brigade, etc.)
  - PM assigns color rating based on cost growth since the original baseline:
    - Green means “at or below original baseline”
    - Yellow means “<10% adverse delta from goal”
    - Red means “>10% adverse delta from goal”
- Total O&S Cost
  - Comparison of antecedent program vs. current total O&S present cost totals in both TY$ and BY$:
    - Based on most recent O&S estimate, not the last SAR
    - Provide notes explaining any major differences from CAPE estimates

Note: If the quantity of the covered systems being acquired is significantly different than antecedent system, match quantities in O&S totals and notate total quantities of each.

Appendix D: PSM Training, Certification & Experience Requirements

D.1 Background

To successfully achieve the expected product support and life cycle outcomes articulated in statute and policy, DoD and the Components need to have the right people, provided the right authorities, afforded the right resources, and with the right mix of experience, expertise, leadership, training, and education assigned as PSMs. These individuals should understand how acquisition and sustainment intersect, why life cycle management is so critical, and how to design for supportability from program inception.

Although each of the Services (and Defense Agencies, which have PSMs assigned) depicts their notional career roadmap for the PSM position slightly differently, there are many commonalities across the DoD. The notional PSM career path includes progressive leadership growth, with focused education reaching beyond the minimum DAWIA educational and experience requirements to shape and develop the life cycle logistician into PSMs, and when appropriate, into future senior executives with even greater responsibilities. It starts with clearly articulated requirements, and a rigorous commitment to human capital professional development. It continues with clearly understood competencies, a commitment to learning, and a robust and current suite of training and tools that are viewed as opportunities to prepare the individual for rigorous expectations to come. It includes robust mentorship, preparation, and a career roadmap for the individual, as well as an organizational focus on what it takes to ensure programmatic success potentially years into the future.

To ensure both current PSM success and future PSM professional development, it is imperative that DoD, the Components, Major Commands, and individual PEOs and program offices commit to the following five principles: first, build a workforce with expertise, breadth and depth; second, commit to grooming future PSMs through identification, mentoring, and coaching; third, commit to and foster a culture of continuous lifetime learning; fourth, make investing in professional development a priority; fifth, continuously refine the required competency set for LCLs and PSMs

D.2 PSM Position

To facilitate the achievement of program product support goals and responsibilities:

1) PSMs are assigned to every covered system (e.g., ACAT I MDAP and equivalent Middle Tier programs), all ACAT II programs, and are encouraged for all other systems, prior to but no later than program initiation. This includes former ACAT I/II programs that are post-IOC or no longer have PMs reporting to Component Acquisition Executives (CAE).
2) The PSM position is designated in the life cycle logistics functional area.
3) PSM positions for all major weapon systems must be certified at Defense Acquisition Workforce Improvement Act (DAWIA) Advanced Tier in the Life Cycle Logistics career field in accordance with DoD Instruction 5000.66, which includes achievement of general educational, training, and experience requirements.
4) In support of the PM's responsibility required by DoD Directive 5000.01, the PSM has a direct reporting relationship and is accountable to the PM for product support. This does not preclude the PSM from having a dual reporting relationship to a DoD Component logistics or materiel command.

5) For MDAPs (ACAT I), major weapon systems (ACAT II and above), and programs that are post-IOC or no longer have PMs reporting to CAEs, the PSM may have a direct reporting relationship to a DoD Component logistics, sustainment, or materiel command.
6) The terms PSM, Director of Logistics, Assistant PM for Logistics, Deputy PM for Logistics, Program Lead Logistician, System Support Manager and Program Level IPS Manager or Logistics Manager are considered synonymous but "PSM" is the preferred term.
7) The PSM position should be a Key Leadership Position (KLP) for all ACAT I programs, and a Critical Acquisition Position for all ACAT II programs.
8) DAWIA Cross-certification in the Program Management, Engineering and Technical Management, or Business-Financial Management and Cost Estimating career fields should be considered as valued criteria during the selection process.
9) DoD Components are encouraged to establish PSM positions for other acquisition programs not defined as major weapon systems (e.g., Acquisition Category (ACAT) III and below programs). Dependent on Service policy, for acquisition programs not defined as major weapon systems, a single individual may serve as the PSM for multiple systems and products where the PEO (for portfolio PSMs at the PEO level) or PM determines such assignment is effective.
10) PEOs may use matrix support personnel from a materiel or systems command (via a MOA for positions in support of the PM/PSM) but should not fill core PSM positions with matrix personnel.
11) Assigned PSMs will be required to complete LOG 465 Executive PSM's Course available from the Defense Acquisition University within 24 months of assignment to a PSM position[42]
12) PSMs assigned to a KLP on an ACAT I MDAP program will also be required to meet established DoD KLP training, education, and experience requirements.
13) Hiring or insourcing PSMs with industry or commercial sector background and possessing commensurate product support-related experience, skills and expertise similar to their Government counterparts is encouraged.

D.3 PSM Career Path

There is no single career path to becoming a PSM. There may be as many successful paths to PSM as there are qualified, experienced, and motivated candidates to fill available positions. Generally, the PSM career path could include the following:

D.3.1 Entering the Life Cycle Logistics (LCL) Workforce

Life Cycle Logistics (LCL) is the planning, development, implementation, and management of effective and affordable product support strategies throughout the life cycle of DoD systems, from concept through disposal. Entrance to the LCL workforce could be from one of several avenues for civilians, veterans, and military personnel. Civilians and veterans have application options using USAJOBS.gov, the official jobsite for the Federal Government. Within USAJOBS,

[42] "DoD Product Support Manager (PSM) Mandatory Training Requirement," (16 Sep 2019), https://www.dau.edu/cop/log/_layouts/15/WopiFrame.aspx?sourcedoc=/cop/log/DAU%20Sponsored%20Documents/DoD%20Product%20Support%20Manager%20(PSM)%20Mandatory%20Training%20Requirement%20Memo.pdf&action=default

applicants are distinguished as external and internal hires. External hires from industry are encouraged where appropriate. Entrance to the LCL workforce may occur at various points in one's career with differing levels of experience and expertise within the larger acquisition and logistics community. By the time one is assigned to PSM positions they must be in the LCL workforce.

While the majority of DoD civilian Life Cycle logisticians are assigned to 0346 Logistics Management Series, internal applicants can cross train by applying for a LCL position from other logistics occupational series such as 0343 Management and Program Analysis, 1670 Equipment Specialist, 2010 Inventory Management Specialist, and others outlined in the DoD Life Cycle Logistics Position Category Description (PCD). Internal applicants also have various Service/Defense Agency-specific career programs that provide opportunities to enter the LCL workforce.

In addition to DoD civilians, PSMs can also come from the ranks of uniformed military personnel. Most DoD logistics officers start their careers in field units for their first four years. After those first four years, a multitude of opportunities are available to officers. To develop LCL experience, Logistics officers can be directly assigned to a LCL coded position by the assignment team. As a Company Grade Officer, military logisticians can also be competitively selected for Logistics Career Broadening Program (LCBP) or equivalent programs. After gaining initial experience and Foundational and Advanced certifications, officers move between operational assignments and LCL positions to ensure career progression and meet the requirements for the LCL experience. Overall, officer development is like civilian LCL development, with the exception of military operational experience.

Members with diverse logistics backgrounds often possess competency sets that allow them to be very competitive for entry positions in the LCL workforce. The 2019 DoD Logistics Human Capital Strategy identified key LCL competencies, with varying levels of proficiency that DoD significantly values. These include:

- Product support management
- Design interface
- Sustaining engineering
- Maintenance planning and management
- Supply support
- Support equipment
- Technical data
- Training and training support
- IT systems continuous support
- Facilities and infrastructure
- Packaging, handling, storage, and transportation
- Manpower and personnel

Additionally, the department and the Components have identified specific attributes that are valued within the LCL workforce:

- Broad depth and breadth of experience, including serving on programs in different phases of the Life Cycle, logistics experience in operational major commands, joint service experience, and Depot operations experience
- Multiple DAWIA certifications

- Exceptional Life Cycle product support and subject matter expertise
- Higher-level educational training, including undergraduate and graduate degrees
- Operational and/or joint operational experience
- Professional logistics certifications desired such as the International Society of Logistics Certified Professional Logistician (CPL) or a SCM certification
- Completion of DAU credentials to provide tailored, on-demand learning in specific functional areas or disciplines (new with 1 Feb 22 “Back to Basics” initiative)

D.3.2 Gaining Breadth & Depth as an LCL

Personnel should focus on gaining not only breadth of experience, but also depth of experience. Breadth means experience across the LCL competency areas listed above, as well as other logistics areas outside of the defense acquisition workforce, including the three other workforce categories identified in the 2019 DoD Logistics Human Capital Strategy (supply management, maintenance support, and deployment/distribution/transportation). Depth means progressively increasing expertise in each of the competency areas.

Expertise in all aspects of product support, both planning and execution, is essential as Life Cycle logisticians progress in their careers. To fully gain breadth and depth of experience, LCLs need to consider opportunities within both traditional acquisition and sustainment organizations, including serving at organic Depot-level maintenance and/or materiel management organizations to develop and maintain a high level of system sustainment expertise. LCLs should work with their supervisors to identify broadening opportunities to enable them to obtain this experience.

D.3.3 Grooming LCLs for Entry into Senior Leadership

Life Cycle Logisticians who have fully achieved the breadth and depth of competencies discussed in the previous section should continue to seek opportunities for professional growth. At this stage in their careers, LCLs should focus on opportunities to obtain broadening in areas outside of the Life Cycle logistics functional stall. Areas of particular importance include SE, business, cost estimating, financial management, contracting, and most importantly, program management. Life Cycle Logisticians are particularly encouraged to seek program management broadening since much LCL work, especially for programs in the O&S phase, can leverage the program management concepts, tools, and training. Additionally, program management expertise may afford personnel career opportunities outside the LCL workforce that may not otherwise be available. Interested individuals should work with their manpower and training organizations to craft a tailored career broadening program that provides personnel opportunities to cross-train and crossflow between the Program Management, SE, or Business/Financial Management communities and the LCL workforce.

D.3.4 Core PSM: Expert Leaders

Experienced Life Cycle logisticians who meet the criteria outlined in this Appendix should have the breadth, depth, and expertise to assume responsibility as a formally assigned, fully qualified DoD PSM.

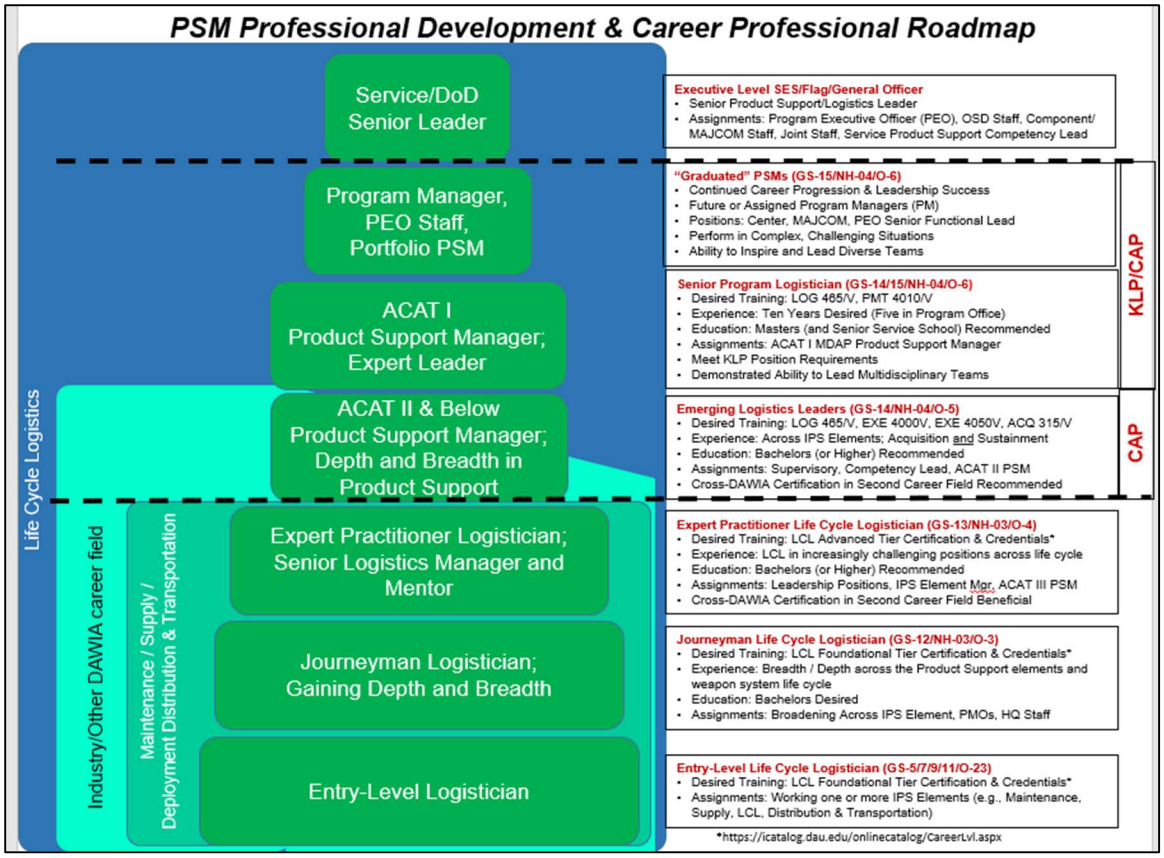
D.3.5 Graduated PSMs

Senior LCLs who have served as a PSM should have the background, experience, and expertise to serve in a variety of other related positions. Examples include becoming the PSM of a highly visible program such as the F-35, serving as APEO (Logistics) on a PEO staff, or assuming a senior leadership role within the broader logistics community at OSD, the Joint Staff, Service

headquarters, or a major command. Senior LCLs may also find opportunities to serve as PMs or even PEOs within the program management community.

Note: The Department's notional PSM career path is shown in Figure 23. Each Service/Agency should tailor to fit their specific needs.

Figure 23: DoD PSM Career Path



As of 1 Feb 22, DAWIA certification changed from three levels to two tiers, Foundational and Advanced. In addition, some DAU courses have been renumbered (consult the DAU iCatalog for the most current listing).

Building the breadth, depth, and expertise necessary to assume responsibility as a formally assigned, fully qualified DoD PSM requires a tailored career roadmap.

Appendix E: Product Support Arrangement Types

Product Support Arrangement is a generic term that includes a wide range of relationships between organizations associated with product support. PSAs encompass the full range of formal agreements, including but not necessarily limited to contracts, MOAs, MOUs, SLAs, and Commercial Services Agreements (CSA). PSAs are used with organic and commercial sources and reflect a range of support levels. PSAs may be transactional or performance-based. When the PSA is tied to system or a subsystem/component level performance that describes measurable service and performance level parameters based on customer requirements and expectations, it is known as a Performance Based Agreement (PBA). The PSA should incorporate the results of the BCA, Supportability Analysis, and other product support planning. The agreement(s) become the execution vehicle for the entire orchestra of stakeholders and is the governing foundation. Strong and clear PSAs are responsible for communicating interpretable terms for successful product support.

PSAs begin with Warfighter (user) defined performance requirements that are initiated through the JCIDS (or equivalent process for non-MCA pathway programs). The PSM, acting on behalf of the PM, incorporates the appropriate needs and constraints in arrangements with PSIs (or with PSPs as applicable). PSIs, in turn, ensure that the necessary performance requirements to meet their arrangements are properly passed to the PSPs. PSAs should ensure that the performance expectations of all product support entities are clearly articulated.

In most cases commercial organizations use their contract as the PSA. For support provided by organic organizations, the PSA typically is an MOA, MOU, or SLA. Discussion of typical PSAs follows.

E.1 Contracts

Contracts are implemented between the DoD and industry, they specify the requirements, parameters of support, deliverables, pricing, incentives, risk mitigation clauses, and the terms and conditions of performance. The preference is for contracts that are performance-based, which inherently incentivize industry to invest in the continual improvement of performance while optimizing support cost (reducing the rate of cost growth, reducing overall support cost). Though specific application of these practices may vary based on the specific requirements of an individual program, analysis of performance-based contracts and lessons learned have shown a preferred contracting approach that characterizes the contract conditions and terms which best motivate this contractor behavior.

- Long-term contractual relationships enable contractor investment with confidence of achieving a return on that investment.
- Stable cash flow, usually enabled by Fixed Price contracts (e.g., Fixed Price Per Flying Hour), enables confidence and motivates contractor investment.
- Performance incentives encourage contractors to meet specified objective and subjective outcome metrics, resulting in explicit (e.g., incentive fee, award fee, award term) or implicit (e.g., fixed price contracts) financial benefits to industry.
- The alignment of authority for product support functions and providers under the PSI is sufficient to enable achievement of the specified metrics by the PSI.

E.2 Memorandums of Agreement

MOAs are agreements in which there is a reciprocal relationship in which the actions of both parties are dependent on actions by the other party; example: an organic repair function is dependent on a contractor for the timely delivery of spares needed to accomplish the repairs.

E.3 Memorandums of Understanding

MOUs are agreements in which there is no dependency on the other party, but recognition of their separate roles and responsibilities is required; example: an organic and commercial repair line is established in which one party accomplishes repair on one of the Shop Repairable Units (SRUs) on the end item while the other party accomplishes repair on another SRU. The MOU documents the understanding that both parties are working on the same end item but have no dependency on each other beyond the understanding.

E.4 Service Level Agreements (SLAs)

SLAs are agreements to achieve a specified level of service; for example, a Depot makes a commitment to repair a specified number of items per time period.

E.5 Commercial Services Agreements (CSAs)

CSAs are agreements used to implement a Direct Sales PPP, in which the organic Government agency (e.g., the Depot) acts as a subcontractor to a contractor and authorizes the sale of goods/services from the Government to the contractor.

E.6 Performance Based Agreement Incentives & Considerations

One of the key characteristics of performance-based product support strategies and their supporting PSAs is that they are based on a private sector business model—paying for performance. As is often done in commercial contracts, incentives are included to motivate support provider behavior. It is not uncommon for contractors engaged in product support contracts to have most or all of their profit tied to meeting performance metrics. Organic PSPs (repair and maintenance Depots) may also have future workload and investment tied to meeting performance outcomes. Organic and commercial providers both need well-defined, documented performance metrics and incentives.

E.6.1 Performance Based Agreement Incentives

- Award fee earned based on subjective assessment by Government on how well contractor meets/exceeds performance standards
- Incentive fee based upon the control of costs in the performance of a cost-plus-incentive-fee contract
- Award additional periods of performance-based on contractor performance
- Expand range of workload, award additional current-year workload, or award additional following-year workload
- Shared savings (implemented within an Award Fee or Incentive Fee structure) whereby contractor and Government share in any savings reductions achieved by the contractor resulting from cost or other efficiencies, design improvements, or performance/producibility enhancements
- Firm-fixed price contracts may be structured to provide an inherent profit incentive for a PSP to lower operating costs by achieving higher product reliability and to retain all or a portion of the savings achieved as a result of providing a better product

- Positive past performance ratings (Contractor Performance Assessment Reports or other inputs such as questionnaires provided to source selection Past Performance Evaluation Teams), which increase the chances of being awarded competitive contracts or follow-on efforts
- Investment by the industry prime in technical infrastructure that enhances the public partner's ability to perform (e.g., applications, computers, network services, tooling)
- Encouraging investment in training, certification, education
- Encouraging investment in R&M enhancements
- Encouraging investment in proactive DMSMS/obsolescence mitigation
- Encouraging investment in best business practices such as continuous process improvement and continuous modernization principles
- The award of additional business

E.6.2 Considerations for Non-Performance under Performance Based Agreements

- Losing award-term points, which may, in turn, lead to loss of contract performance years in accordance with award term contract provisions
- Collaborate with the contracting officer for mechanisms to remedy non-performance
- Exercise pre-planned Award Term Off Ramp if performance goals are not met
- Unfavorable Contractor Performance Assessment Report (CPAR) ratings that become part of the contractor's past performance formal record located at CPARS.gov.

E.6.3 Considerations for Non-Performance by Organic PSPs

- Requiring the organic provider to perform services at no additional cost until performance metrics are met
- Reducing the price
- Discounting cost-reimbursement payments as a result of non-performance within established metric time frame
- Exercise pre-planned award term off-ramp if performance goals are not met
- Terminating the arrangement without losing provider termination fees
- Terminating the arrangements and transitioning the effort to an alternate provider
- Transition to be performed at the expense of the default organization

Appendix F: Using the ILA Criteria as a Product Support Management Tool

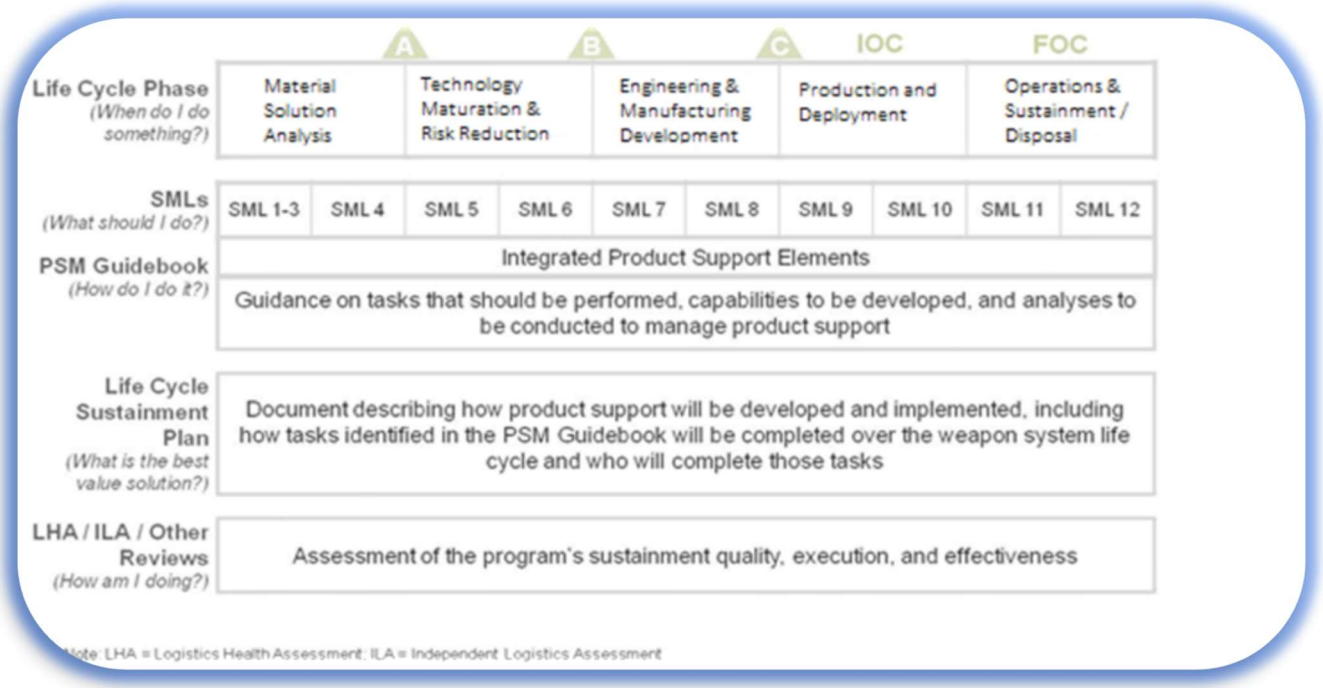
The PSM should use the ILA criteria as a step-by-step guide to maximize the likelihood that the product support organization should achieve the Warfighter-required outcomes. Each row of the criteria is phrased as a leading statement to inspire further thought and investigation and is not intended to simply be a compliance statement. For more detailed information, see the Logistics Assessment Guidebook located at: https://www.dau.edu/tools/t/Logistics-Assessment-Guidebook."

Note: The ILA aligns with the IPS Elements except that Program Support Budgeting and Funding and ESOH are broken out separately. Budgeting and funding is aligned with IPS Element "Product Support Management," and ESOH is aligned with "Environmental Management" and "Safety and Occupational Health" in the "Design Interface" IPS Element of the DoD Product Support Manager Guidebook; however, they are broken out as individual IPS Elements in this handbook since they typically require a SME specific to that area.

The IPS Element Assessment Tables provide standard assessment criteria applicable to all the Service's systems. These criteria are neither platform nor system specific; rather, they are critical evaluation factors, which may be further defined in the respective Services' guides to identify Service specific or platform-unique requirements. For the purposes of the PSM, these criteria translate into a red, yellow, or green rating for each IPS Element, with red indicating an unsatisfactory status for an IPS Element, yellow indicating that work is needed to improve that IPS Element, and green indicating that the IPS Element is addressed satisfactorily for that phase of the system Life Cycle.

Appendix G: Sustainment Maturity Levels

Figure 24: Sustainment Maturity Levels



G.1 Introduction

The SML concept is a method that may be used by a PSM to help identify and think through the maturity level the support plan should achieve for each milestone and the extent to which a program's product support implementation efforts are "likely to result in the timely delivery of a level of capability to the Warfighter."[43] Achieving the levels should help the PSM evolve the program's product support approach to achieve the best value support solution. The SMLs provide a uniform way to measure and communicate the expected Life Cycle sustainment maturity as well as provide the basis for root cause analysis when risks are identified and support OSD's governance responsibilities during MDAP program reviews. Focus is on assessing the sustainment strategy development and implementation status towards achieving Full Operational Capability and, where applicable, determining the risk associated with achieving the sustainment KPP.

The SMLs were crafted to address the full range of support options, from traditional organic based to full commercial based product support. They provide a standard way of documenting the product support implementation status that can be traced back to Life Cycle product support policy and guidance without prescribing a specific solution. SMLs provide the PSM a methodology for assessing program performance-based product support implementation status and is compatible with the design evolution of the system being supported.

[43] PL 111-23

G.1.1 Overview

The logistics community has the challenge of assessing risks associated with achieving and maintaining full operational capability as programs advance through the design, production, deployment and O&S phases. The SMLs were developed to provide a guidepost for the PSM as he/she matures the LCSP. SMLs are tailorable to any of the pathways within the AAF. They also assist in assessing sustainment strategy implementation status across programs in a consistent manner.

The product support package cannot fully evolve to maturity until the operational environment is defined, the sustainment requirements established, and the design is stable. The SML definitions are developed to take into account a nominal level of design stability as a prerequisite for the levels. Consequently, SMLs can be a powerful tool for the PSM in determining the appropriate sustainment concept based on the system's design stability and the immediacy of the required support.

G.2 Outcomes

Table 19, below, describes key sustainment outcomes necessary to achieve the requisite criteria for each SML. The description is focused on broad "outcomes" or accomplishments, not intent or plans. The outcomes identified in Table 19 are important because they are critical in achieving the end-state sustainment concept and convincingly demonstrating maturity in the implementation process.

Table 19 is not meant to imply the various functional area levels are reached at a specific point in time. However, following the product support principles in DoDI 5000.91, the levels would typically be expected to be achieved in the corresponding Life Cycle phase and by the indicated events. By the same token, just because a program reaches a specific milestone or event does not mean that the specific SML has been reached (or can be). Achievement is based on specific accomplishments at the time determined appropriate by the PSM vs. specific milestone events.

Implementing a plan to achieve the SMLs help the PSM to develop and field the best value support solution making the program more affordable. Up front it should help in designing out support degraders that contribute to system downtime and to reduce TOC. During the testing and operations phases achieving the SMLs should ensure continual process improvements and design changes are made based on actual experience.

This outcome-based approach also makes it easier to articulate risks when various levels are not achieved by specific milestones, as well as form the foundation for root cause analysis. In the event they are not reached, understanding and mitigating the associated risks greatly increases the probability of fielding mitigation strategies to provide the Warfighter suitable product support. In addition, by identifying the risk area(s) early, the program can formulate and execute mitigation strategies before risks are realized and adversely affect the Warfighter.

G.3 Program Reviews

The SMLs are not intended to create additional work for programs or the DoD Components. OSD uses required program documents identified in DoDI 5000-series instructions when assessing product support solution progress at program reviews. These documents include the AoA, SEP, TEMP, Acquisition Strategy, APB, and the LCSP. The PM / PSM should be able to clearly articulate why the product support solution / sustainment maturity reflected in the LCSP and other program documents is appropriate for their program at that point in time.

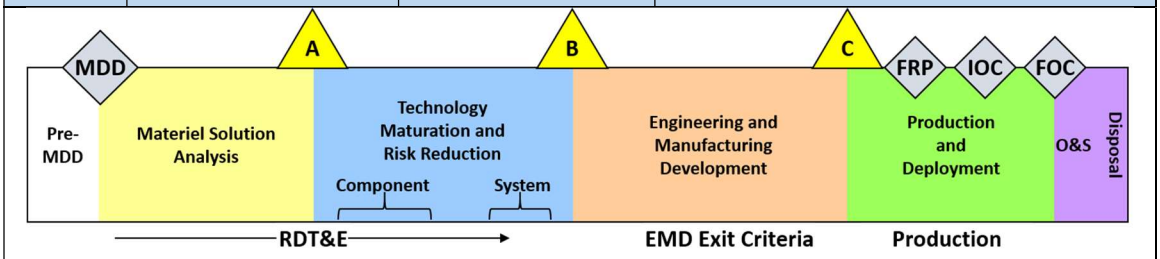
G.4 Assessing Levels

Rarely do all IPS elements in the product support package for a system's sub-systems or components mature at the same time. For example, the design maturity for a specific sub-system may be lagging the others. Some components may be off-the-shelf, standard hardware, or made with well-established materials and processes from reliable suppliers, thus demonstrating a stable, mature design. Other components may incorporate new design elements that move well beyond the proven capabilities of a key technology resulting in a still evolving design.

Using the lowest common denominator, a system would receive an overall maturity level that reflects the element of the system with the lowest level of maturity. In many instances, this can be effective for the simple system, but for more complex systems this approach could be misleading and give the impression of an overall level of risk greater than the actual situation. Consequently, for assessments of more complex systems, assigning a single SML to an entire system may have little value. It may be more useful to address SML by major sub-systems. A determination should still be made on the overall maturity of the support solution and LCSP development.

PSMs can use the SML model to assess and identify the appropriate level of logistics maturity of the program. The SMLs provide a uniform metric to measure and communicate the expected Life Cycle sustainment maturity as well as provide the basis for root cause analysis when risks are identified and support OSD's governance responsibilities during MDAP program reviews. There are 12 SMLs, as described in **Table 19**, aligned to the major phases of the MCA pathway. Mapping to other pathway life cycle phases may be undertaken in the future.

Table 19: SML Descriptions

Level	Program Assessment Phase	SML Overview	SML Description
			
1	MSA (Pre-Milestone A)	Supportability and sustainment options identified.	Basic supportability and sustainment options identified based on War fighter requirements and operational concept Potential support and maintenance challenges due to anticipated technology or operational environment identified.
2	MSA (Pre-Milestone A)	Notional product support and maintenance concept identified.	Potential product support and maintenance concept alternatives evaluated and notional concept identified as part of the AoA User needs and environmental constraints impacting sustainment are identified.

Level	Program Assessment Phase	SML Overview	SML Description
3	MSA (Pre-Milestone A)	Notional product support, sustainment, and supportability requirements defined and documented to support the notional concept. (Occurs in the AoA)	Basic product support, sustainment, and required supportability capabilities identified and documented in programmatic documentation including, but not limited to AoA, Acquisition Strategy, Initial Capabilities Document (ICD), and Test & Evaluation Strategy. LCC estimates are used to assess affordability.
4	MSA (Pre-Milestone A)	Supportability objectives and KPP/KSA requirements defined. New or better technology required for system or supply chain identified (Occurs at ASR)	Preliminary sustainment planning, supportability analysis, RAM analysis, used to identify required developmental efforts. T&E strategy addresses how required enabling technology and KPP/KSAs and APAs are verified.
5	Technology Maturation and Risk Reduction (Pre-Milestone B)	Supportability design features required to achieve KPP/KSA incorporated in Design Requirements (Occurs at SRR)	Initial system capabilities have been analyzed and initial supportability objectives/requirements, and initial RAM strategy have been formulated and integrated with the SE process via SE Plan and LCSP. Design features to achieve the product support strategy, including diagnostics and prognostics, are incorporated into system performance specifications. Test & Evaluation Master Plan addresses when and how required sustainment related design features and KPP/KSAs and APAs are verified.
6	Technology Maturation and Risk Reduction (Pre-milestone B)	Maintenance concepts and sustainment strategy complete. LCSP approved. (Occurs at PDR)	LCSP written and approved documenting the Product Support Sustainment Strategy. Supply Chain performance requirements identified and documented in the LCSP. Logistics risks identified and risk mitigation strategies identified and documented in the LCSP. Preliminary Support Strategy leveraging a best value mix of organic and contractor support and associated logistics processes, products, and deliverables identified and documented in the LCSP. Sustainment contracting strategy, including the extent PBL Contracts should be used, documented in the Acquisition Strategy.

Level	Program Assessment Phase	SML Overview	SML Description
7	Engineering & Manufacturing Development (EMD) (Pre-Milestone C)	Supportability features embedded in design. Supportability and Subsystem MTA complete. (Occurs at CDR)	Product Support Package element requirements are integrated, finalized and consistent with the approved system design and Product Support Strategy. Validation that the design conforms to support requirements. Sustainment metrics are predicted based on CDR results, the approved Product Support Package element requirements and projected Supply Chain performance.
8	Engineering & Manufacturing Development (EMD) (Pre-Milestone C)	Product Support capabilities demonstrated and SCM approach validated	Sustainment and product support planning complete identifying the sustainment strategy roles, responsibilities, and partnerships that are implemented. Sustainment and product support capabilities (including associated logistics processes and products) tested and demonstrated. Supply Chain performance validated. Budget requirements are adjusted based on the design and test results
9	Production & Deployment (Post-Milestone C)	Product Support Package demonstrated in operational environment (Occurs at IOT&E)	Representative Product Support Package fielded to support operational tests. Sustainment and product support capabilities (including associated logistics processes and products) demonstrated through successful tests and demonstrations in an op. environment. Plans are developed and implemented to address any issues or deficiencies identified in IOT&E
10	Production & Deployment (Post-Milestone C)	Initial Product Support Package fielded at operational sites. Performance measured against availability, reliability and cost metrics. (Occurs at IOC)	Support systems and services delivered to each category of operational site. Sustainment and product support capabilities (including associated logistics processes and products) proven in an operational environment. Sustainment and product support measured against planned A_M, Materiel Reliability, Operating and Support cost and other sustainment metrics important to the War fighter. Needed improvement actions are taken based on performance data.
11	Production & Deployment (Post-Milestone C) and Operations & Support	Sustainment performance measured against operational needs. Product support improved through	Sustainment and product support performance regularly measured against sustainment metrics and corrective actions taken. Product support package and sustainment processes are refined and adjusted based

Level	Program Assessment Phase	SML Overview	SML Description
		continual process improvement	on performance and evolving operational needs. Initiatives to implement affordable system operational effectiveness are implemented.
12	Production & Deployment (Post-Milestone C) and Operations & Support	Product Support Package fully in place including Depot repair capability. (Occurs at FOC)	Support systems and services delivered and fully integrated into the operational environment. Depot maintenance performed. Sustainment and product support performance regularly measured against sustainment metrics and corrective actions taken. Product improvement, modifications, upgrades planned. The support strategy is refined leveraging the best value mix of organic and contractor support for logistics processes, services and products. Equipment retirement/disposal planning is implemented as required.

SMLs provide a uniform set of product support performance metrics and help to analyze risks during program reviews.

Appendix H: Product Support Strategy "Fold-Out"

Figure 25: Product Support Strategy Overview.

The Product Support Strategy balances two objectives: 1) the supported asset affordably deliver the required warfighting capability; and 2) the product support solution reduces support demands while meeting Warfighter requirements.

Additional details are available in the DoD Product Support Business Model (PSBM) (https://www.dau.edu/tools/t/Product-Support-Business-Model), the DoD Performance Based Logistics (PBL) Guidebook (https://www.dau.edu/tools/t/Performance-Based-Logistics-(PBL)-Guidebook) and DAU's Product Support Strategy Development Tool (https://www.dau.edu/tools/t/Product-Support-Strategy-Development-Tool).

H.1 Integrate Warfighter Requirements & Support

Starting at the 12 o'clock position in **Figure 25**, the first objective of Product Support is to develop, enable, and execute a sustainment strategy that delivers optimum operational readiness to the Warfighter, consistent with Warfighter requirements, at an affordable, best value cost. Warfighter requirements are expressed in operational terms. Those requirements are interpreted

and translated if/as necessary into sustainment objectives that drive the achievement of those outcomes.

H.2 Form the Product Support Management IPT

Form the PSM team that develops, implements, and manages the Product Support. The PSM is charged with the responsibility to plan, develop, implement, and execute the product support strategy. Product support encompasses a range of disciplines including, but not limited to, logistics, requirements, operational mission planning, financial, contracts, legal, and IPS Elements functional SMEs.

H.3 Baseline the System

Collect the data (or begin data collection for new systems) needed to assess and analyze support decisions, including inputs from Supportability Analysis (e.g., FMECA, FRACAS, LORA, MTA, RCM, and other key maintenance planning tasks), as well as RAM and LCC analyses

H.4 Identify/Refine Performance Outcomes

Using your product support criteria, develop a process for identifying critical product support outcomes and how you measure success. Identify the critical behaviors that can be influenced by your metrics to achieve your product support strategy outcomes. The starting points for metrics identification are Warfighter outcomes and DoD's specified top-level weapon system metrics. Each PSS, as it evolves, is tailored consistent with the maturity of data and existence of in-place support infrastructure and capabilities. The metrics defined as accountable outcomes are tailored accordingly, with an objective to maintain a close correlation with, and enable the achievement of, the Warfighter and DoD top-level outcomes.

H.5 PS Business Case Analysis (PSBCA)

Assess the cost, competencies, capabilities, and process efficiencies to identify the optimum best value product support solution.

H.6 Product Support Value Analysis

Best Value analysis to optimize long-term LCC and benefits. This would include Optimum level of support (System, Sub-system, or component level), evaluation of product support strategy considerations related to the 12 IPS Elements, SCM strategy, workload allocation strategy (including Depot maintenance, Core, 50/50, $3M Rule, and PPP considerations), refinement of program data management strategy (DMS), strategies for continuous modernization and improving system RAM, and proactively addressing DMSMS/obsolescence, and corrosion issues.

H.7 Determine Support Acquisition Method(s)

Determine whether support will be acquired from the PSPs using an outcome-based or transactional based acquisition method. Decision(s) are validated or made using a best value analysis consistent with the BCA.

H.8 Designate PSI(s)

For outcome-based support, identify the PSI(s) who will be delegated the responsibility to integrate support providers to deliver the specified outcomes assigned consistent with the scope of their delegated responsibility. Decision(s) are validated or made using a best value analysis consistent with the PSBCA.

H.9 Designate PSP(s)

Utilizing BCA value analysis as well as PSI discretionary decisions for lower tiered supplier support, select the best mix and blend of sources to perform the product support functions. Decision(s) are validated or made using a best value analysis consistent with the PSBCA.

H.10 Identify/Refine Financial Enablers

Identify the range, types, and amount of funding required to accomplish the required support consistent with the terms, conditions, and objectives of the PSAs.

H.11 Establish/Refine PSAs

Document the implementing support arrangements (contract, MOA, MOU, PBA, CSA, Statement of Objectives (SOO)/Statement of Work for the Performance Work Statement, etc.) that assign and delineate the roles, responsibilities, resourcing, and reciprocal aspects of product support business relationships.

H.12 Implement & Oversight

Implement and manage the product support, including documenting updates to the LCSP, conducting and implementing recommendations from LA, and maturing the SML. Includes the continuous, ongoing assessment of Product Support effectiveness vis-à-vis the established governance mechanisms driving decisions and actions to review, modify, revise, or evolve product support strategies and business arrangements.

Appendix I: Key Product Support Considerations

The following discussion covers other items of interest not addressed in the body of the guidebook, but which the PSM should be familiar.

I.1 Configuration Management

Configuration Management (CM) is a process for establishing and maintaining the consistency of a product's physical and functional attributes with its design and operational information throughout its life.

Configuration management and control are important factors to consider when designing the PBL strategy. In order to create the appropriate support environment and to be responsive to evolving technology and changing Warfighter capabilities, the providers assigned the responsibility for delivering the weapon system capability should have the appropriate level of CM and control. Integral to successful CM is the development of a CM plan. PMs establish and maintain a configuration control program. The PSM and program Life Cycle logisticians are a key participant in the CM process. The approach and activity that have responsibility for maintaining configuration control depends on a number of program-specific factors, such as design rights, design responsibility, support concept, and associated costs and risk. The Government maintains nominal configuration control of the system performance specification, and the contractor(s) perform CM for the design. The Government retains the authority/responsibility for approving any design changes that impact the system's ability to meet specification requirements. The contractor(s) have the authority/responsibility to manage other design changes. The Government maintains the right to access configuration data at any level required to implement planned or potential design changes and support options. Configuration Management of legacy systems should be addressed on a case-by-case basis as design changes are contemplated. The following are key attributes of the CM process:

- **Configuration Identification**: uniquely identifying the functional and physical characteristics of an item
- **Configuration Change Management**: controlling changes to a product using a systematic change process
- **Configuration Status Accounting**: capturing and maintaining metadata about the configuration of an item throughout the Life Cycle
- **Configuration Verification and Audit**: ensuring product design is accurately documented and achieves agreed-upon performance requirements

The PM/PSM should consider both Government and industry standards and best practices, including:

- American National Standards Institute/Electronic Industry Alliance (ANSI/EIA) 649_1A, *Configuration Management,* located on the Society of Automotive Engineers (SAE) Web site, http://www.sae.org.
- International Organization for Standardization (ISO) 10007, Quality Management – Guidelines for CM
- EIA 836B, *Configuration Management Data Exchange and Interoperability,* located on the located on the SAE Web site, http://sae.org.
- Handbook GEIA HB 649A, *Configuration Management*
- MIL-HDBK-61B*, Configuration Management*

I.2 Corrosion Prevention & Control

The impact of corrosion to DoD amounts to over $20 billion dollars annually and significantly reduces material availability. Therefore, corrosion control contributes significantly to the total cost of system ownership and is a key element of system supportability. Corrosion is a long-term issue that usually impacts system operation after the system is procured, but the optimal time to address the impact of corrosion is early in system development. Proper consideration of corrosion in the design phase of a system leads to significant cost savings over the life of the system. Product support strategies should include the tracking, costing, and prevention or control of systems and structures corrosion. PMs/PSMs should concentrate on implementing best practices and best value decisions for corrosion prevention and control in systems and infrastructure acquisition, sustainment, and utilization. All ACAT or equivalent pathway programs are required to conduct Corrosion Prevention and Control (CPC) planning. The PM and PSM should seamlessly integrate CPC planning early with the overall acquisition planning. CPC planning consists of:

- Defining CPC requirements early to ensure inclusion in acquisition RFP
- Documenting CPC planning per references (DoDI 5000.91) and (DoDI 5000.67)
- Establishing the technical considerations and requirements in order to implement an effective CPC strategy throughout the Life Cycle of the system
- Establishing the management structure to be used for the specific system being designed, procured and maintained, including a Corrosion Prevention Team (CPT) and Contractor Corrosion Team (CCT)

Before beginning any CPC program, PMs should consult the Corrosion Prevention and Control Planning Guidebook for Military Systems and Equipment available at https://www.dau.edu/tools/t/CPC-Guidebook for policies regarding corrosion prevention and examples of ways to implement CPC planning.

I.3 Data Management

Data Management (DM) is an important part of Life Cycle management and product support strategy development and should be considered early and throughout in the system Life Cycle. Data systems supporting acquisition and sustainment should be connected, real-time or near real-time, to allow logisticians to address the overall effectiveness of the logistics process in contributing to weapon system availability and LCC factors. Melding acquisition and sustainment data systems into a true total Life Cycle IDE provides the capability needed to reduce the logistics footprint and plan effectively for sustainment, while also ensuring that acquisition planners have accurate information about total LCCs.

Data created during the design, development, and manufacturing of a system have value to both the data provider and the PM. The PM should adopt a performance-based approach to identify the minimum data required to cost-effectively maintain the fielded system and foster source of support competition throughout the life of the fielded system. The PM should determine the system's competition strategy early in the life of the program and determine minimum data needs to support the strategy and a performance-based approach to managing the data over the Life Cycle of the system. Planning should include possible Foreign Military Sales applications including applications after the system is out of the DoD inventory.

If the PM select data access versus delivery, provisions need to be made for future availability of data to support competitive sourcing decisions; maintenance and sustainment analyses; conversion of product configuration technical data to performance specifications when required

for enabling TI to enhance product affordability and prevent product obsolescence; and contract service risk assessments over the life of the system. When future delivery is required, the PM should require final delivery of data in both its native and neutral digital formats. The PM should never require paper or hardcopy delivery of data created in a digital format. Regardless, the program's Data Management Strategy and LCSP should capture the planned approach for product/engineering data management, and how it should be used in product support strategy implementation.

In support of the DoD Digital Engineering Strategy, DoD Data Strategy, and DoDI 5000.88, the PM, PSM, and SE should collaborate to establish a Digital Engineering Ecosystem (also known as an Integrated Data Environment, Integrated Digital Environment, or "tech stack") early in the life cycle to ensure effective and efficient data management and access. This includes the infrastructure (such as a Product Lifecycle Management capability), governance (e.g., business rules), tools, training, and related resources and activities. The objective is to provide an enduring, authoritative source of truth for digital models and product data that enable analysis, use, and distribution of information to authorized users."

Note - see ACQuipedia article https://www.dau.edu/acquipedia/pages/articledetails.aspx#!391 and the DDR&E website https://ac.cto.mil/digital_engineering/

I.4 Intellectual Property Strategy

The IP Strategy is developed in accordance with DoDD 5000.01, DoDI 5010.44, and documented in accordance with Title 10 U.S.C. 2337 (MDAPs) and the pathway being used. Please refer to the IP Guidebook for more information on life cycle planning and implementation of the IP Strategy and IP Data Management Plan.

I.5 Earned Value Management (EVM)

EVM is a program management tool that integrates the functional stovepipes of cost, schedule, and work scope to create an aggregate picture of performance. EVM provides an early warning system for deviations from plan and quantifies technical problems in cost and schedule terms, providing a sound objective basis for considering corrective actions. EVM gives the PM the data necessary to provide accurate estimates of total program cost. Through EVM reporting, the contractor provides cost data as required by the contract to ensure implementation of program objectives and to facilitate PM oversight responsibilities. PMs should ensure earned value data reporting is specified in the contract and in DoDI 5000-series instructions. Requiring an EVM for all firm fixed-price contracts, subcontracts, and other arrangements is a risk-based decision left to the discretion of the PM and requires a BCA.

The PSM should work with the PM, Business Financial Manager, and Contracting Officer to determine what elements of product support should be subject to EVM.

I.6 DMSMS/Obsolescence Mitigation

According to the *SD-22 DMSMS: a Guidebook of Best Practices and Tools for Implementing a DMSMS Management Program (*https://www.dau.edu/tools/t/SD-22-Diminishing-Manufacturing-Sources-and-Material-Shortages-(DMSMS)-Guidebook), DMSMS (i.e., the loss of sources of items or material), surfaces when a source announces the actual or impending discontinuation of a product, or when procurements fail because of product unavailability. DMSMS may endanger the Life Cycle support and viability of the weapon system or equipment. Compared with the commercial electronics sector, the DoD is a minor consumer of electrical and electronic devices.

While the electronic device industry abandons low-demand, older technology products, DoD seeks to prolong the life of weapon systems. These conflicting trends cause DMSMS problems as repair parts or materials disappear before the end of the weapon system Life Cycle. While electronics are most likely to be discontinued, obsolescence of non-electronic and COTS items also poses a significant problem to weapon systems. In short, DMSMS is a threat to system supportability. Managing DMSMS is complex, data intensive, and expensive.

The PM and PSM have two approaches to solving DMSMS in a system: 1) reactive (address DMSMS problems after they surface); and 2) proactive (identify and take steps to mitigate impending DMSMS problems).

Examples of proactive approaches to mitigate DMSMS problems include life of need buys, managing the supplier base in concert with the Prime Contractor, and having technical data and the accompanying data rights available early in the acquisition phase to ensure the ability to re-manufacture items as necessary.

Another example of a proactive approach is a combination of thorough, continuous monitoring of items for obsolescence, forecasting future obsolescence, and performing technology refreshment to delay issues before they actually occur.

I.7 Reliability, Availability & Maintainability (RAM)

The DoD expects to acquire reliable and maintainable products that are of high quality, readily available, and able to satisfy user needs with measurable improvements to mission capability and operational support, in a timely manner, and at a fair and reasonable price. Developers of JCIDS requirements documents (hereafter referred to as combat developers) or equivalent documents for non-MCA pathways and PMs work together in developing mission and sustainment requirements that facilitate achieving this objective throughout the system Life Cycle. Additional information and guidance is available in the *DoD Reliability, Availability, Maintainability, and Cost Rationale (RAM-C) Report Outline* located at https://ac.cto.mil/wp-content/uploads/2019/06/RAMC-Outline-2017-07-07.pdf

Data collection channels to capture FMECA information to improve material reliability should be validated. This helps the PSM reduce learning curve and make reliability improvements earlier in the system's life.

Three key Supportability Analysis activities that support the overall RAM program are the Reliability Centered Maintenance (RCM), Level of Repair Analysis (LORA) and Maintenance Task Analysis (MTA). RCM is a logical, structured process used to determine the optimal failure management strategies for any system based upon system reliability characteristics and the intended operating context. RCM defines what needs to be done for a system to achieve the desired levels of safety, operational readiness, and environmental soundness at best cost. RCM is a continuous process that requires sustainment throughout the life cycle of a system, utilizes data from the results achieved, and feeds this data back to improve design and future maintenance.

The LORA is the process used to determine the most effective and efficient echelon by which to perform maintenance on the system. The MTA is the process used to identify the steps within, and the associated resources and personnel skill levels for, corrective and preventive maintenance tasks required to support a system. Refer to paragraph 3.5.2 and RAM-C Rationale Report ACQuipedia article at https://www.dau.edu/acquipedia/pages/articledetails.aspx#!738 for

information on the DD(R&E) RAM-C Rationale Report outline, training briefing, and related resources.

I.8 Supply Chain Management (SCM)

Product Support in the DoD is heavily reliant on an effective and efficient supply chain. The DoD supply chain differs from a commercial supply chain in several ways.

- DoD supply chains encompass inventory management and maintenance, repair, and overhaul (MRO) functions. This is due to DoD supply chains fulfilling most of their Wholesale stock inventory from the MRO process rather than outside procurement of items as is done by commercial supply chains.
- DoD supply chains are subject to greater variability in demand than commercial supply chains. DoD systems operate in harsh environments often at high OPTEMPOs, precipitating rapid changes in equipment condition and failure rates.
- DoD supply chains face greater challenges in the distribution and tracking of items, with large numbers of deployed assets located OCONUS, often in remote locations, which stress the capability of distribution systems and asset tracking systems.
- The sheer size of the DoD supply system precipitates difficulty in accomplishing accurate demand forecasting, efficient lead times for procurement of needed spares, and difficulty in identifying potential inventory shortfalls or excessive inventory.
- DoD supply chains may be required to support systems well beyond their expected life and sustain systems even if the original manufacturer either no longer chooses to support or is able to support the system.

The above challenges notwithstanding, the DoD supply chain, including MRO, is the single most contributing factor to the operational readiness of defense systems. The need for an efficient, effective, and timely supply chain is critical to the ready availability and consistent performance of Warfighter systems. It is imperative that the PSM give careful consideration to structuring an optimum supply chain strategy. The model for effective sourcing of supply chain functions is evident from past precedent best practices over the last decade. The introduction of Depot Maintenance PPP in 1998 defines the parameters of this sourcing, merging the best capabilities of both the public and private sectors. Title 10 requirements for Core and 50/50 compliance generally dictate that the majority of “touch labor” for MRO will be accomplished by organic Government personnel at DoD Depot Maintenance Activities (DMAs). The CLA is a methodology to identify and quantify the workloads to support the system’s core logistics capabilities. After satisfaction of Core requirements, the PSM has the option (again, considering 50/50 compliance) to source “above Core” MRO workloads to a commercial source. Of critical importance to efficient Depot maintenance is the assurance of a ready and available supply of spares needed to accomplish the MRO function. This includes the requirement to have rights to form, fit and functional technical data as spelled out in Title 10 section 3771, previously 2320, and when appropriate, more detailed technical data necessary for re-manufacturing, re-procurement and/or sustainment engineering as needed to ensure full Life Cycle sustainment and disposal/demilitarization. Consistent with the 1999 (and continuing) emphasis on a shift of the DoD role to “managing suppliers, not supplies”, the use of commercial SCM for wholesale inventories has proven to be a successful model, leveraging industry’s capability to shorten procurement lead times, develop more efficient demand forecasting processes, and in general reduce the non-repair portion of the supply chain process to lower the total repair turnaround time for MRO items. While the exact tailoring of the supply chain sourcing strategy is dependent on

the BCA analysis, the objective should be to use the best competencies of organic and industry resources.

Identification of a SCM strategy is critical to the success of any product support strategy BCA effort. Materiel support is a critical link in weapon systems supportability. All the skilled labor, advanced technology, and performance mean little without the 'right part, in the right place, at the right time.' The supply chain is also a primary target for utilizing industry flexibility, capability, and proprietary spares support. DoD Materiel Management usually addresses four categories of supply support items:

- **Unique Repairable Items.** These are repairable (subject to repair) parts that are unique to the system (not common with other DoD systems). They are often sourced by the prime vendor/OEM of the system. Strong consideration should be given to allocating responsibility for wholesale support of these items to the OEM, who has readily available technical data and identified sources.
- **Common Items.** These parts are common with other systems and may have a variety of sources. They are usually managed within the DoD materiel management process but are also candidates for commodity-level and/or corporate PSAs.
- **Unique Consumable Items.** These are consumable (discarded after use) items that are used only on the target system and are usually sourced by the Prime Vendor/OEM of the system. Strong consideration should be given to allocating responsibility for acquisition of these items to the Prime Vendor, which may elect to use DLA as the preferred source of supply.
- **Common Consumable Items.** These are consumable items used across more than a single system and are generally managed and provided by DLA. It may be viable to allow the Prime Vendor to procure these items, as appropriate, should DLA be unable to meet time, cost, or quantity requirements. If needed, the PM need to encourage establishing a PBA between DLA and the vendor when private support is chosen.

Unique DoD Inventory should always be considered, and a plan for draw down in place, prior to implementing decisions to draw spares and repairs from private sources. Transfer of ownership of spares and equipment, when necessary to support a contract during LRIP or Interim Contract Support (ICS), needs to be managed appropriately to ensure equitability of capitalization and credit issues. SCM includes the distribution, asset visibility, and obsolescence mitigation of the spare parts. From a Warfighter's perspective, transportation and asset visibility have a substantial impact on high-level metrics and should be emphasized in the product support strategy.

I.9 Workload Allocation & PPP

DoD policy requires that "Sustainment strategies include the best use of public and private sector capabilities through Government/industry partnering initiatives, in accordance with statutory requirements." An effective support strategy considers best competencies and partnering opportunities. Building on the previously developed System Baseline, the PM/PSM and the Product Support Management IPT considers each discrete workload and assess where, how, and by whom it can best be accomplished, while considering statutory (see Ref. 30, Title 10, U.S.C.), regulatory, and pertinent DoD/Military Service guidance such as DSOR determinations and Depot Maintenance Inter-service Support Agreements (DMISA). In general, support workloads include system-unique subsystems, commodities, or components; and common subsystems, commodities, and components. Within these categories, various characteristics should be considered as the workload allocation and sourcing decisions are accomplished. These may

include: maximizing the use of existing capabilities, efficiently applying resources, preventing unnecessary duplication of capabilities, and consideration of DoD strategic interests; existing support process (e.g., contract, organic); existing support infrastructure (in-place, to be developed); best capabilities evaluation (public/private sector market research); and opportunities for PPP.

The development of an effective support strategy considers all of these factors in arriving at best value decisions, using decisions tools, including BCAs, to develop the optimum support sourcing decisions. Additional information is available in the DoD Public-Private Partnering (PPP) for Product Support Guidebook (https://www.dau.edu/tools/t/DoD-Public-Private-Partnering-(PPP)-for-Product-Support-Guidebook) and the DoD Product Support Business Case Analysis (BCA) Guidebook (https://www.dau.edu/tools/t/Product-Support-Business-Case-Analysis-(BCA)-Guidebook).

I.10 Financial Improvement & Audit Remediation (FIAR)

Product Support Managers have an impact on the financial reporting of DoD assets. Efforts to establish strong financial reporting practices and maintain a robust control environment fall under the Financial Improvement & Audit Remediation (FIAR) division of the OUSD Comptroller. Routine operations, such as physical inventories and reporting item issuance, impact financial reporting. This means an auditor may review your Component policies, standard operating procedures, and supporting documentation in support of the annual financial audits. Statements for Standards for Attestation Engagements (SSAE) are specific audits designed for service providers. Depending on the level of engagement with other services, Product Support Managers may be required to support an SSAE-18 audit annually to ensure processes and controls are designed effectively.

The program needs to have property records established in accountable property systems of record (APSR). The Product Support Strategy should help determine accountability for program assets, oversight mechanisms, expected outcomes, and roles and responsibilities. The LCSP reflects the PSS decisions by designating the APSR used to report the program assets. The APSR is typically that of the owning Component; it should be under DoD control and meet the requirements set forth in DoD policies. In joint programs, multiple APSR may be used and the business rules for reporting asset information should be documented. By covering this in the LCSP, you reduce the likelihood an auditor requires additional information on your procedures in this aspect. Additionally, identifying the personnel required to maintain these property records should be considered in the resourcing and support strategies. Accountable property officers (APO) are typically in charge of the accountable property records and need to receive data and supporting documentation to ensure the program is reporting on property assets correctly. Engaging an APO early in the support design phase can help with appropriately covering asset accountability in the program.

The program also needs to know about the costs of parts (i.e., unit price) and internal use software (IUS) so the value of final assemblies can be supported. The PSM should consider the catalog data costs associated with the parts in the program. An APO may not be able to establish the catalog information needed if the vendor is holding all the information. If the catalog data is not delivered up front, it can drive costs to the program later on. The catalog and the unit price for parts are critical sources of information in a financial audit.

Oversight mechanisms are required to assure an auditor the program has internal controls to validate the right people are performing the right task at the right time. Internal controls also

contribute to risk mitigation of data errors. Strong internal controls give auditors confidence your program is operating as designed. For example, auditors expect to see DoD is actively ensuring contractors perform physical inventories of DoD assets. The PSS or the LCSP should identify how the program is accomplishing oversight so the information presented is as good as possible. Ensuring all required Federal Acquisition Regulation (FAR) and Defense Federal Acquisition Regulation (DFARS) clauses are in place is an excellent and easily achievable metric for performance and supports oversight. If the PSS or LCSP does not go to that level of detail, then the program needs to generate standard operating procedures to manage the internal controls and oversight performed. Typically, the financial framework is determined by the (lead) Component headquarters, and the guidance available from there aids the PSM.

Establishment of accountability and FIAR KPI early in the program provides insight on the program's level of audit readiness. One aspect the PSM should consider is including KPI regarding physical inventories to support the existence of all program assets and the completeness of the population. The vendors could report on property losses, percentage of inventories completed, inventory accuracy rates, or self-assessment results (e.g. spot checking processes for accuracy/deviation). Similar KPI can also be applied to organic support elements. These KPI are supported by voluntary consensus standards (e.g. ASTM International) and by DoD policies.

The program itself also ensures the mechanisms are in place to provide a financial auditor sample, documents, etc. The first source could be Government people and systems, including the APSR, accounting systems, and enterprise systems like ADVANA or Procurement Integrated Enterprise Environment (PIEE). Supplemental information about property assets flows through mandatory systems (e.g., PIEE) or through CDRLs. The CDRLs provide details not typically sent such as a "date of last inventory." This data flows into the government systems so that the program can respond to auditor requests. IUS has different needs than physical assets, so the program should be able to produce documents like final testing acceptance, development decisions, and support for IUS ownership (see DoDI 5000.76). How the program identifies and reports obsolete parts matters, too. The financial management team needs to substantiate financial reporting adjustments to reflect the disposals. This may need to be a report from the organizations managing program parts to the program office so the auditors can see if obsolete parts are being removed from the financial statements promptly.

Finally, the PSM should be aware of the financial requirements to establish "Construction in Process" accounts and IUS in Development accounts when needed. Construction in Process accounts are used to collect costs incurred while work is being performed until a complete end item is delivered. The financial managers need enough information to know how much of an invoiced amount applies to each end item. Improper valuation of assets can cause DoD to fail an audit. Structuring contracts to deliver a "lot" of aircraft (for example) without supporting line items to break down the purchases makes valuation of assets even harder (see FAR Part 4.10 and DFARS Part 204.71). When Government furnished property (GFP) is part of the equation, it gets more complex. If your program utilizes multiple contracts and one vendor delivers an asset to another vendor for incorporation, this is GFP to the second vendor. An APO needs to know about the GFP delivery, have the supporting documentation, establish records as appropriate, and work with the financial management team to ensure those costs are correctly associated with an asset when the DoD gets the ultimate end item.

Key Supporting References for FIAR include:

- DoD Financial Management Regulation, DoD 7000.14-R
- DoDI 5000.64
- DoDI 5000.76
- DoDI 4140.73
- DoDM 4140.01
- DLM 4000.25
- DoDI 5010.40
- Financial Improvement and Audit Readiness (FIAR) Guidance (latest version) https://comptroller.defense.gov/Portals/45/documents/fiar/FIAR_Guidance.pdf
- OMB Circular A-123
- FAR Part 45
- DFARS Part 245 and associated PGI

FIAR Relevant Legislation:

- The Chief Financial Officers Act of 1990
- The Federal Financial Management Improvement Act of 1996
- The Federal Information Security Management Act of 2002

Appendix J: Key Product Support Questions

J.1 MS A Product Support Consideration

MS A is a risk reduction and investment decision. For product support planning, this decision establishes the product support strategy for the new capability. Table 20 lists key sustainment questions for the elements of the LCSP. This framework stimulates critical thinking but is not a complete listing of questions.

Note: While the contents of this Appendix are aligned to the MCA pathway, product support activities at equivalent points in the life cycle of other AAF pathways may benefit from considering these key questions.

Table 20: Overview of PSM Activities in the MSA Phase

LCSP Section	Consideration
Introduction	Does the strategy require sustainment technology development?
Product Support Performance	Have the Warfighter requirements (including planned operational environment and availability) been included in the draft CDD and decomposed to affordable sustainment design-to requirements (both weapon system and support systems)?
Product Support Strategy	Have the plans for maintenance, supply, technical data, and manpower been defined such that cost and schedule estimates can be made? Are there alternatives? Are there planned sustainment trades?
Product Support Arrangements	Have the Technical Maturity and Risk Reduction (TMRR) phase sustainment-related tasks been identified? Are legacy/analogous system PSAs applicable?
Product Support Package Status	Have the specific design features the PSM assesses in the TMRR phase design reviews been identified?
Integrated Schedule	Are logistics objectives linked to Program milestones? This includes Initial Operational Capability) (IOC), Initial Operational Test & Evaluation (IOT&E), Full Operational Capability (FOC), Material Support Date (MSD), etc.? Are major logistics events identified in sufficient detail for estimating sustainment costs? Are analyses phased to support milestones?
Cost / Funding / Affordability	Are O&S Cost affordability goals established? Has a program office Life Cycle Cost Estimate (LCCE) been developed? Are there affordable cost management targets for sustainment?
Management	Is the PSM in place? Are IPTs in place to address TMRR phase sustainment issues? Does the program/LCSP address competition across the system life cycle?
Supportability Analysis	What analyses ensure affordable logistics and readiness - Level of Repair Analysis (LORA), RCM Analysis, depot support, organizational manning, and use studies)? What alternatives have been identified as cost reduction initiatives? Have provisioning requirments been identified and initial spares adequately funded?
Additional Sustainment Planning Factors	Are O&S Cost drivers for the legacy/analogous system and risk identified?
LCSP Annexes	Are sustainment Cost Estimates and their drivers identified?

J.2 PS Considerations Pre - MS B

Table 21: Key Product Support Questions at Pre-Milestone B RFP Release

LCSP Section	Consideration
Introduction	Has the program identified the tasks required to integrate sustainment features into the weapon system and identified the required Product Support Package design requirements?
Product Support Performance	Are Warfighter requirements traceable to RFP specifications (availability, reliability, O&S Cost)? How will the requirements be tested and verified?
Product Support Strategy	Can the product support plan be traced to the RFP? Does the RFP reflect the IP/data rights strategy? Does the RFP include supportability trades for the Product Support Strategy? Does the RFP include CDRLs for provisioning and sparing of the system?
Product Support Arrangements	Does the LCSP include process and timeline for determining PSAs, including support during IOT&E and any Low-Rate Initial Production (LRIP) options?
Product Support Package Status	Does the schedule include evaluation points to assess status of product support development?
Regulatory/Statutory Requirements that Influence Sustainment	Are core depot transition (contractor to organic) requirements addressed?
Integrated Schedule	Are program milestones (IOC IOT&E, FOC, MSD, etc.) linked to logistics objectives? Are support element delivery dates aligned with the TEMP?
Cost / Funding / Affordability	Have O&S Affordability goals been established? Has a program office LCCE been developed, and does it include disposal costs? Have O&S affordability cost initiatives been identified?
Management	Are the organizational structure and interfaces with key stakeholders identified? Is there sufficient expertise to conduct a source selection?
Supportability Analysis	Is the analytical framework traceable to the RFP, and are explicit provisions included for trade studies, LORA, depot support, organizational manning, and use studies?
Additional Sustainment Planning Factors	Can the O&S Cost drivers, assumptions and risks be addressed in RFP? Can they be mitigated? Does the RFP include assertions for Intellectual Property rights and provisions for data pricing and delivery where needed?

J.3 MS B PS Considerations

MS B is the critical decision point in an acquisition program because it commits the organization's resources to a specific product, budget profile, choice of suppliers, contract term, schedule, and sequence of events leading to production and fielding. For product support planning, many of these activities affect the effectiveness and cost of sustainment. **Table 22** provides some considerations necessary to implement effective and efficient product support.

Table 22: Key Product Support Questions at Milestone B

LCSP Section	Consideration
Introduction	Has the sustainment program been adjusted to take into account the source selection results? Does the program address support of developmental testing and any early operational capabilities or assessments?
Product Support Performance	Have metrics for availability, reliability, and cost been established? Are requirements traceable to contractual design requirements? How will the sustainment requirements be tested and verified? Is a reliability growth plan in place?
Product Support Strategy	Are the product support requirements defined (organizational maintenance, depot level maintenance, training, support equipment, technical data, and provisioning)?
Product Support Arrangements	Are PS Arrangement to support IOT&E and contract options in place?
Product Support Package Status	Are the product support package requirements defined (organizational maintenance, depot level maintenance, training, support equipment, technical data)? How will the product support package be tested and verified? Has a Milestone-B Independent Logistics Assessment (ILA) been completed and risk mitigation planned?
Regulatory/Statutory Requirements that Influence Sustainment	Has core depot workload been estimated? Is preliminary Depot Source of Repair complete?
Integrated Schedule	Does the schedule reflect detailed product support elements development and fielding plans aligned with program milestones? Does the schedule align supportability analysis to decision points?
Cost / Funding / Affordability	Have O&S affordability caps been established? Have CAPE ICE and SCP been reconciled? Do RDT&E and acquisition budgets include product support element development and delivery? Are O&S cost reduction initiatives initiated?
Management	Is the organizational structure in place (government and contractor)? Are projections of organizational structure and manpower to support fielding and operations identified?
Supportability Analysis	Is there a detailed plan for completing required analyses?
Additional Sustainment Planning Factors	Are mitigation plans in place for O&S Cost drivers and risks?
LCSP Annexes	Are Source of Repair Analysis results, a Depot Source of Repair decision, projected core depot workload, and BCA results documented?

J.4 MS C PS Considerations

The LCSP at MS C should lay out the plan to verify sustainment metrics and requirements, deliver product support to test and evaluation assets, and provide support for initial fielding. It should include addressing any ICS requirements, identifying depot sources of repair and anticipated depot workload, and providing plans to implement the product support strategy over time. The LCSP is updated based on the results of engineering design reviews and should provide the findings of ILAs. Design decisions can impact the product support package by driving changes in failure rates, O&S Costs, maintenance plans, discard decisions, provisioning requirements, required support equipment, technical data, and training. The PM also identifies opportunities to reduce O&S Costs using cost reduction initiatives, address risks to sustainment, and identify mitigation strategies.

The activities undertaken by the PM to finalize designs for product support elements and integrate them into a comprehensive product support package are approved as part of the MS C decision. **Table 23** shows a sample of the considerations taken by a PSM and staff to prepare for implementing a system's product support package.

Table 23: Key Product Support Questions at Milestone C

LCSP Section	Consideration
Introduction	Does the program have an executable plan to deploying the Product support package based on the achieved design as reflected in the test results?
Product Support Performance	Are requirements included in the Capability Development Document (CDD) update? Has the product support package been tested and demonstrated (organizational maintenance, training, support equipment, provisioning and technical data)? Is the reliability growth on target? Are sustainment metrics achievable by Full Operational Capability (FOC)?
Product Support Strategy	Are product support elements defined and resources programmed?
Product Support Arrangements	Are PSAs to support IOT&E and contract options in place and ready for execution? Are future arrangements and alternatives defined?
Product Support Package Status	Are Product support elements defined and resources programmed? Has a Milestone-C ILA been completed and risk mitigation executed?
Regulatory & Statutory Requirements that Influence Sustainment	Has the Depot Source of Repair been finalized and workload estimate updated? Is the depot stand-up planned and funded?
Integrated Schedule	Are detailed site fielding plans, product support elements delivery tied to program milestones (IOT&E, IOC, FOC, etc.)?
Cost / Funding / Affordability	Have O&S affordability caps been updated? Have updated CAPE ICE and SCP been reconciled? Have disposal costs been updated to the final production design? Do acquisition budgets include product support element delivery? Are O&S cost reduction initiatives implemented?
Management	Is the organizational structure in place (government and contractor)? Are projections of organizational structure and manpower to support fielding and operations identified?
Supportability Analysis	Are analyses complete and results implemented?
Additional Sustainment Planning Factors	Are detailed site fielding plans refined?
LCSP Annexes	Is the Depot Source of Repair documented as part of the Core Logistics Analysis (CLA)? Are supportability analyses results documented? Are depot workload projections updated?

J.5 PS Considerations for Planning Production and Deployment Phase

PS planning during P&D phase centers around incorporating lessons learned from beginning phases of implementing the product support package, refining the fielding plan, and contracting for sustainment.

The PSM should use the LCSP during this phase to manage the program's fielding efforts and to execute the required product support infrastructure, including PSAs, maintenance and supply capabilities, and sustaining engineering and logistics functions. The PSM updates the LCSP based on results from logistics evaluation reports on operating procedures, maintenance procedures, maintenance analysis reports, and Packing, Handling, Storage, and Transportation (PHS&T) verification reports.

The Full-Rate Production (FRP) Decision or Full Deployment Decision authorizes the program to proceed to FRP or Full Deployment. The LCSP at FRP focuses on measurement and assessment of sustainment performance, sustaining A_m, and adjustments to the product support package. The purpose of FRP is to review manufacturing processes, acceptable performance and reliability, and the establishment of adequate sustainment and support systems. **Table 24** provides some considerations for product support planning, implementation, and monitoring that correspond with this decision review.

Table 24: Key Product Support Questions at FRP Decision Review

LCSP Section	Consideration
Introduction	Has the program demonstrated that the sustainment requirements have been met or achieved at FOC? Does the program have a correction plan for any problems?
Product Support Performance	Has the product support package been demonstrated in operations (organizational maintenance, training, support equipment, technical data)? Is the reliability growth on target? Are the sustainment metrics achievable by FOC? Are issues identified and mitigation plans in place?
Product Support Strategy	Are the product support elements in place? Are performance-based arrangements established or being executed as planned?
Product Support Arrangements	Are PSAs executed?
Product Support Package Status	Are all product support elements in place? Has the ILA been completed and risk mitigation executed?
Regulatory and Statutory Requirements that Influence Sustainment	Is the core depot stand-up on track to meet the required date?
Integrated Schedule	Will program meet MSD and core depot schedules? Have fielding plans been adjusted for mitigation plans and Engineering Change Proposals (ECPs)?
Cost / Funding / Affordability	Are O&S affordability caps being met or on track to be met? Have updated CAPE ICE and SCP been reconciled? Do Acquisition and/or Service O&M budgets include product support element delivery? Have O&S cost reduction initiatives been completed and/or additional initiatives been established?
Management	Does the Organizational structure support fielding schedule, operations and sustainment?
Supportability Analysis	Are results validated from operational data and additional analyses identified? Are cost reduction efforts underway to help reduce/control sustainment costs?
Additional Sustainment Planning Factors	How is feedback from fielding and operations incorporated into the program to drive cost reduction initiatives?
LCSP Annexes	Are sustainment costs & their drivers tracked in revalidating if the product support strategy needs to be updated?

Additionally, the PSM updates the LCSP to support the FRP decision based on satisfactory performance in IOT&E and other evaluations. The PSM documents any deficiencies in the product support package based on initial deployment and plans and resources to correct those deficiencies.

The LCSP details how fielded performance of the system is measured, how system level performance is sub-allocated to PSPs, and how PSI and/or PSP performance is measured, assessed, and reported.

Metrics (e.g., availability rates, failure rates, repair rates, supply fill rates) may be established for each indenture of product support.

Appendix K: Key References & Resources for the PSM

Statutory

(Note: See Appendix L for Title 10 Crosswalk to updated section numbers – however these links are current)

- 10 U.S.C. §2208 Working Capital Funds
- 10.U.S.C § 2228 Office of Corrosion Policy and Oversight
- 10 U.S.C. §3771 - 3775 Rights in Technical Data
- 10 U.S.C. §4324 Life Cycle Management and Product Support
- 10 U.S.C. §4325 Major Weapon Systems Assessment, Management, and Control of Operating and Support Costs
- 10 U.S.C. §4251 Major Defense Acquisition Programs: Certification Required Before Milestone A Approval
- 10 U.S.C. §4252 Major Defense Acquisition Programs: Certification Required Before Milestone B Approval
- 10 U.S.C. §4321 Development of Major Defense Acquisition Programs: Sustainment of System to be Replaced
- 10 U.S.C. §4323 Sustainment Reviews
- 10 U.S.C. §4328 Weapon System Design Sustainment Factors
- 10 U.S.C. §2460 Definition of Depot-Level Maintenance and Repair
- 10 U.S.C. §2464 Core Logistics Capabilities (“Core”)
- 10 U.S.C. §2466 Limitations on the Performance of Depot-Level Maintenance of Materiel (“50-50 Rule”)
- 10 U.S.C. §2469 Contracts to Perform Workloads Previously Performed by Depot-Level Activities of the DoD: Requirement of Competition ("$3M Rule")
- 10 U.S.C. §2474 Centers of Industrial and Technical Excellence: Designation; Public-Private Partnerships ("CITEs")
- 10 U.S.C. §2563 Articles and Services of Industrial Facilities: Sale to Persons Outside the Department of Defense

Policy

- DoDD 4151.18, Maintenance of Military Materiel
- DoDD 5000.01, The Defense Acquisition System
- DoDI 4151.20, Depot Maintenance Core Capabilities Determination Process
- DoDI 4151.21, Public-Private Partnerships for Product Support
- DoDI 4151.24, Depot Source of Repair (DSOR) Determination Process
- DoDI 4245.15, Diminishing Manufacturing Sources and Material Shortages Management
- DoDI 5000.02, Operation of the Adaptive Acquisition Framework
- DoDI 5000.66 Defense Acquisition Workforce Education, Training, Experience, and Career Development Program (Change 3)
- DoDI 5000.67, Prevention and Mitigation of Corrosion on DoD Military Equipment and Infrastructure
- DoDI 5000.73, Cost Analysis Guidance and Procedures
- DoDI 5000.74, Defense Acquisition of Services
- DoDI 5000.75, Business Systems Requirements and Acquisition

- DoDI 5000.80, Operation of the Middle Tier of Acquisition (MTA)
- DoDI 5000.81, Urgent Capability Acquisition
- DoDI 5000.85, Major Capability Acquisition
- DoDI 5000.87, Operation of the Software Acquisition Pathway
- DoDI 5000.88 Engineering of Defense Systems
- DoDI 5000.91, Product Support Management for the Adaptive Acquisition Framework
- DoDI 5000.92, Innovation and Technology to Sustain Material Readiness
- DoDI 5000.93, Use of Additive Manufacturing in the DoD
- DoDI 5000.95 Human Systems Integration in Defense Acquisition
- DoDM 5000.04, Cost and Software Data Reporting
- CJCSI 5123.01I, Charter of the Joint Requirements Oversight Council (JROC) and Implementation of the Joint Capabilities Integration and Development System (JCIDS)

Tools, Training & Resources

- Life Cycle Logistics Functional Area
- Key Product Support Policy, Guidance, Tools & Training
- PSM Reference & Resource Repository
- Product Support Strategy Development Tool
- Logistics Community of Practice (LOG CoP)
- PBL Community of Practice (PBL CoP)
- Additive Manufacturing Community of Practice (AM CoP)
- Diminishing Manufacturing Sources & Material Shortages (DMSMS) Knowledge Sharing Portal (DKSP) (DMSMS CoP)
- Life Cycle Sustainment Plan (LCSP) Outline
- DoD Product Support Analytical Tools Database
- DoD Product Support Business Model (PSBM)
- Product Support Implementation Roadmap Tool
- DAU Logistics & Sustainment Director's LOG Blog
- LOG 465 Executive Product Support Manager's (PSM) Course
- Life Cycle Logistics ACQuipedia Article Repository
- Life Cycle Logistics Professional Reading List
- Key Product Support Definitions

Guidance

- Integrated Product Support Guidebook Suite (12 Key Product Support Guidebooks)
- Technical Data Management & Intellectual Property Guidebook Suite
- Product Support Manager (PSM) Guidebook
- Performance Based Logistics (PBL) Guidebook
- Integrated Product Support (IPS) Element Guidebook
- Logistics Assessment (ILA) Guidebook
- Public-Private Partnering (PPP) for Product Support Guidebook
- Condition Based Maintenance Plus (CBM+) Guidebook
- Operating & Support (O&S) Cost Management Guidebook
- Product Support Business Case Analysis (BCA) Guidebook
- Diminishing Manufacturing Sources & Material Shortages (DMSMS) Guidebook (SD-22)
- DoD Reliability, Availability, Maintainability, and Cost Rationale (RAM-C) Report Outline

- Reliability Centered Maintenance (RCM) Manual (DoDM 4151.22-M)
- DoD Risks, Issues, Opportunities (RIO) Guide
- Test & Evaluation Management Guide
- Joint Capabilities Integration and Development System (JCIDS) Manual
- Corrosion Prevention and Control Planning Guidebook for Military Systems & Equipment
- MIL-HDBK-338B, Electronic Reliability Design
- MIL-STD 882E, DoD Standard Practice: System Safety - DoD Joint Software Systems Safety Engineering Handbook
- DoD Reliability and Maintainability Engineering Guide Management Body of Knowledge
- R&M engineering website
- DoD Digital Engineering website
- OSD CAPE Operating and Support Cost Estimating Guide
- OSD CAPE Inflation and Escalation Best Practices for Cost Analysis

Appendix L: Title 10 Crosswalk

Appendix L includes all Title 10 sections common throughout the acquisition framework pathways. Old section numbers of United States code and the new section numbers pursuant to the FY21 NDAA changes.

Note: U.S. Code Sections Reflect the United Stated Code as Maintained and Presented by the Office of the Law Revision Counsel (OLRC) of the United States House of Representatives at https://uscode.house.gov/

At the time of this guidebook's publishing, the OLRC database did not reflect FY22 NDAA updates." ***Ctrl-Click*** the New Section Number to View that Section of Code

Table 25: Title 10 Crosswalk

OLD Section#	OLD Section Title	NEW Section#	NEW Section Title
10 USC 139	Director of Operational Test and Evaluation	10 USC 0139	Director of Operational Test and Evaluation
10 USC 196	Department of Defense Test Resource Management Center	10 USC 4173	Department of Defense Test Resource Management Center
10 USC 1722a	Special requirements for military personnel in the acquisition field	10 USC 1722a	Special requirements for military personnel in the acquisition field
10 USC 2222	DBS: business process reengineering; enterprise architecture; management	10 USC 2222	DBS: business process reengineering; enterprise architecture; management
10 USC 2223a	Information technology acquisition planning and oversight requirements	10 USC 4571	Information technology acquisition: planning and oversight processes
10 USC 2302(1)	Definitions [head of an agency]	10 USC 3004	[Definitions] Head of an agency
10 USC 2302(2)	Definitions [competitive procedures]	10 USC 3012	[Definitions] Competitive procedures
10 USC 2302(3)	Definitions [*following terms*]	10 USC 3011	[Definitions] Definitions incorporated from title 41
10 USC 2302(4)	Definitions [technical data]	10 USC 3013	[Definitions] Technical data

10 USC 2302(5)	Definitions [major system]	10 USC 3041	[Definitions] Major system
10 USC 2302(6)	Definitions [Federal Acquisition Regulation]	10 USC 3002	[Definitions] Federal Acquisition Regulation
10 USC 2302(7)	Definitions [simplified acquisition threshold]	10 USC 3015(1)	[Definitions] Simplified acquisition threshold
10 USC 2302(8)	Definitions [humanitarian or peacekeeping operation]	10 USC 3015(2)	[Definitions] Simplified acquisition threshold [humanitarian or peacekeeping operation]
10 USC 2302(9)	Definitions [nontraditional defense contractor]	10 USC 3014	[Definitions] Nontraditional defense contractor
10 USC 2302a	Simplified acquisition threshold	10 USC 3571	Simplified acquisition threshold
10 USC 2302d(a)	Major system: definitional threshold amounts	10 USC 3041(c)	Major system
10 USC 2302d(b)	Major system: definitional threshold amounts [civilian]	10 USC 3041(d)	Major system [civilian]
10 USC 2302d(c)	Major system: definitional threshold amounts	10 USC 4202(b)&(c)	Authority to increase definitional threshold amounts: major defense acquisition programs; major systems
10 USC 2304(a)	Contracts: competition requirements	10 USC 3201	Full and open competition
10 USC 2304(b)	Contracts: competition requirements	10 USC 3203(a)	Exclusion of particular source or restriction of solicitation to small business concerns
10 USC 2304(c)	Contracts: competition requirements	10 USC 3204(a)	Use of procedures other than competitive procedures
10 USC 2304(d)	Contracts: competition requirements	10 USC 3204(b)	Use of procedures other than competitive procedures
10 USC 2304(e)	Contracts: competition requirements	10 USC 3204(d)	Use of procedures other than competitive procedures
10 USC 2304(f)	Contracts: competition requirements	10 USC 3204(e)	Use of procedures other than competitive procedures

10 USC 2304(g)	Contracts: competition requirements	10 USC 3205(a)	Simplified procedures for small purchases
10 USC 2304(h)	Contracts: competition requirements	10 USC 3201(d)	Full and open competition
10 USC 2304(i)	Contracts: competition requirements	10 USC 3204(g)	Use of procedures other than competitive procedures
10 USC 2304(j)	Contracts: competition requirements	10 USC 3201(c)	Full and open competition
10 USC 2304(k)	Contracts: competition requirements	10 USC 3201(e)	Full and open competition
10 USC 2304(l)	Contracts: competition requirements	10 USC 3204(f)	Use of procedures other than competitive procedures
10 USC 2306b	Multiyear contracts: acquisition of property		NOTE: The FY2022 NDAA changed the transfer of 2306b to a single section rather than the multiple sections prescribed in FY2021. This table will be updated when house.gov implements the FY22 direction.
10 USC 2306b(a)	Multiyear contracts: acquisition of property	10 USC 3501	Multiyear contracts for acquisition of property: authority; definitions
10 USC 2306b(b)	Multiyear contracts: acquisition of property	10 USC 3502	Multiyear contracts for acquisition of property: regulations
10 USC 2306b(c)	Multiyear contracts: acquisition of property	10 USC 3503(a)	Multiyear contracts for acquisition of property: contract cancellation or termination
10 USC 2306b(d)	Multiyear contracts: acquisition of property	10 USC 3504	Multiyear contracts for acquisition of property: participation by subcontractors, vendors, and suppliers
10 USC 2306b(e)	Multiyear contracts: acquisition of property	10 USC 3505	Multiyear contracts for acquisition of property: protection of existing authority
10 USC 2306b(f)	Multiyear contracts: acquisition of property	10 USC 3503(b)	Department of defense contracts: acquisition of weapon systems

10 USC 2306b(g)	Multiyear contracts: acquisition of property	10 USC 3503(c)	Department of defense contracts: defense acquisitions specifically authorized by law
10 USC 2306b(h)	Multiyear contracts: acquisition of property	10 USC 3506	Department of defense contracts: notice to congressional committees before taking certain actions
10 USC 2306b(i)	Multiyear contracts: acquisition of property	10 USC 3507	Department of defense contracts: multiyear contracts with value in excess of $500,000,000
10 USC 2306b(j)	Multiyear contracts: acquisition of property	10 USC 3510(a)	Department of defense contracts: additional matters with respect to multiyear defense contracts
10 USC 2306b(k)	Multiyear contracts: acquisition of property	10 USC 3501(b)	Increased funding and reprogramming requests
10 USC 2306b(l)(1)	Multiyear contracts: acquisition of property	10 USC 3508(a)	Department of defense contracts: notice to congressional committees before taking certain actions
10 USC 2306b(l)(2)	Multiyear contracts: acquisition of property	10 USC 3510(b)	Department of defense contracts: additional matters with respect to multiyear defense contracts
10 USC 2306b(l)(3)	Multiyear contracts: acquisition of property	10 USC 3509(a)	Department of defense contracts: multiyear contracts with value in excess of $500,000,000
10 USC 2306b(l)(4)	Multiyear contracts: acquisition of property	10 USC 3509(b)(2)	Department of defense contracts: multiyear contracts with value in excess of $500,000,000
10 USC 2306b(l)(5)	Multiyear contracts: acquisition of property	10 USC 3509(b)(1)	Department of defense contracts: multiyear contracts with value in excess of $500,000,000
10 USC 2306b(l)(6)	Multiyear contracts: acquisition of property	10 USC 3508(b)	Department of defense contracts: notice to congressional committees before taking certain actions
10 USC 2306b(l)(7)	Multiyear contracts: acquisition of property	10 USC 3510(c)	Department of defense contracts: additional matters with respect to multiyear defense contracts

10 USC 2306b(l)(8)	Multiyear contracts: acquisition of property	10 USC 3508(c)	Department of defense contracts: notice to congressional committees before taking certain actions
10 USC 2306b(l)(9)	Multiyear contracts: acquisition of property	10 USC 3509(b)(3)	Department of defense contracts: multiyear contracts with value in excess of $500,000,000
10 USC 2306b(m)	Multiyear contracts: acquisition of property	10 USC 3511	Increased funding and reprogramming requests
10 USC 2320(a)	Rights in technical data	10 USC 3771	Rights in technical data: regulations
10 USC 2320(b)	Rights in technical data	10 USC 3772(a)	Rights in technical data: provisions required in contracts
10 USC 2320(c)	Rights in technical data	10 USC 3772(b)	Rights in technical data: provisions required in contracts
10 USC 2320(d)	Rights in technical data	10 USC 3773	Domestic business concerns: programs for replenishment parts
10 USC 2320(e)	Rights in technical data	10 USC 3774(a)	Major weapon systems and subsystems: long-term technical data needs
10 USC 2320(f)	Rights in technical data	10 USC 3774(c)	Major weapon systems and subsystems: long-term technical data needs
10 USC 2320(g)	Rights in technical data	10 USC 3775(a)	Definitions
10 USC 2320(h)	Rights in technical data	10 USC 3775(b)	Definitions
10 USC 2330	Procurement of services: data analysis and requirements validation	10 USC 4501	Procurement of contract services: management structure
10 USC 2330	Procurement of services: data analysis and requirements validation	10 USC 4502	Procurement of contract services: senior officials responsible for management of acquisition of contract services
10 USC 2330a	Procurement of services: tracking of purchases	10 USC 4505	Procurement of services: tracking of purchases

10 USC 2334(a)	Independent cost estimation and cost analysis	10 USC 3221(a)-(b)	Director of Cost Assessment and Program Evaluation
10 USC 2334(b)	Independent cost estimation and cost analysis	10 USC 3222(a)	Independent cost estimate required before approval
10 USC 2334(c)	Independent cost estimation and cost analysis	10 USC 3223	Director: review of cost estimates, cost analyses, and records of the military departments and Defense Agencies
10 USC 2334(d)	Independent cost estimation and cost analysis	10 USC 3224	Director: participation, concurrence, and approval in cost estimation
10 USC 2334(e)	Independent cost estimation and cost analysis	10 USC 3225	Discussion of risk in cost estimates
10 USC 2334(f)	Independent cost estimation and cost analysis	10 USC 3226(a)	Estimates for program baseline and analyses and targets for contract negotiation purposes
10 USC 2334(g)	Independent cost estimation and cost analysis	10 USC 3227(a)	Guidelines and collection method for acquisition of cost data
10 USC 2334(h)	Independent cost estimation and cost analysis	10 USC 3221(c)	Director of Cost Assessment and Program Evaluation
10 USC 2337	Life-cycle management and product support	10 USC 4324	Life-cycle management and product support
10 USC 2337a	Assessment, management, and control of operating and support costs for major weapon systems	10 USC 4325	Major weapon systems: assessment, management, and control of operating and support costs
10 USC 2350a	Cooperative research and development agreements: NATO organizations; allied and friendly foreign countries	10 USC 2350a	Cooperative research and development agreements: NATO organizations; allied and friendly foreign countries
10 USC 2357	Technology protection features activities	10 USC 4009	Technology protection features activities equipment *Pending FY22*
10 USC 2366	Major systems and munitions programs: survivability testing and lethality testing required before full-scale production	10 USC 4172	Major systems and munitions programs: survivability testing and lethality testing required before full-scale production

10 USC 2366a	Major defense acquisition programs: determination required before Milestone A approval	10 USC 4251	Major defense acquisition programs: determination required before Milestone A approval
10 USC 2366b	Major defense acquisition programs: certification required before Milestone B approval	10 USC 4252	Major defense acquisition programs: certification required before Milestone B approval
10 USC 2366c	Major defense acquisition programs: submissions to Congress on Milestone C	10 USC 4253	Major defense acquisition programs: submissions to Congress on Milestone C
10 USC 2368	Centers for Science, Technology, and Engineering Partnership	10 USC 4146	Centers for Science, Technology, and Engineering Partnership *Pending FY22*
10 USC 2377	Preference for commercial products and commercial services	10 USC 3453	Preference for commercial products and commercial services *Pending FY22*
10 USC 2383	Contractor performance of acquisition functions closely associated with inherently governmental functions	10 USC 4508	Contractor performance of acquisition functions closely associated with inherently governmental functions
10 USC 2399	Operational test and evaluation of defense acquisition programs	10 USC 4171	Operational test and evaluation of defense acquisition programs
10 USC 2400	Low-rate initial production of new systems	10 USC 4231	Major systems: determination of quantity for low-rate initial production
10 USC 2430(a)	Major defense acquisition program defined	10 USC 4201	Major defense acquisition programs: definition; exceptions
10 USC 2430(b)-(c)	Major defense acquisition program defined	10 USC 4202	Authority to increase definitional threshold amounts: major defense acquisition programs; major systems
10 USC 2430(d)	Major defense acquisition program defined	10 USC 4204	Milestone decision authority
10 USC 2430a	Major subprograms	10 USC 4203	Major subprograms
10 USC 2431	Weapons development and procurement schedules	10 USC 4205	Weapon systems for which procurement funding requested in

			budget: development and procurement schedules
10 USC 2431a	Acquisition strategy	10 USC 4211	Acquisition strategy
10 USC 2431b	Risk management and mitigation in major defense acquisition programs and major systems	10 USC 4212	Risk management and mitigation in major defense acquisition programs and major systems
10 USC 2432(a)	Selected Acquisition Reports	10 USC 4351	Selected acquisition reports: definitions *Pending FY22*
10 USC 2432(b)	Selected Acquisition Reports	10 USC 4352	Selected acquisition reports: requirement for quarterly reports *Pending FY22*
10 USC 2432(c)	Selected Acquisition Reports	10 USC 4353	Selected acquisition reports for 1st quarter of a fiscal year: comprehensive annual report *Pending FY22*
10 USC 2432(d)	Selected Acquisition Reports	10 USC 4354	Selected acquisition reports for 2d, 3d, and 4th quarters *Pending FY22*
10 USC 2432(e)	Selected Acquisition Reports	10 USC 4355	Selected acquisition reports: quarterly SAR report content *Pending FY22*
10 USC 2432(f)	Selected Acquisition Reports	10 USC 4356(a)	Selected acquisition reports: time for submission to Congress; form of report *Pending FY22*
10 USC 2432(g)	Selected Acquisition Reports	10 USC 4357	Selected acquisition reports: termination of requirements with respect to a program or subprogram *Pending FY22*
10 USC 2432(h)	Selected Acquisition Reports	10 USC 4358	Selected acquisition reports: when total program reporting begins; limited reports before approval to proceed to system development and demonstration *Pending FY22*
10 USC 2432(i)	Selected Acquisition Reports	10 USC 4356(b)	Selected acquisition reports: time for submission to Congress; form of report *Pending FY22*

10 USC 2432(j)	Selected Acquisition Reports	10 USC 4350	Selected acquisition reports: termination *Pending FY22*
10 USC 2433(a)	Unit cost reports	10 USC 4371(a)	Cost growth definitions; applicability of reporting requirements; constant base year dollars
10 USC 2433(b)	Unit cost reports	10 USC 4372(a)	Unit cost reports: quarterly report from program manager to service acquisition executive
10 USC 2433(c)	Unit cost reports	10 USC 4373	Unit cost reports: immediate report from program manager to service acquisition executive upon breach of significant cost growth threshold
10 USC 2433(d)	Unit cost reports	10 USC 4374	Unit cost reports: determinations by service acquisition executive and secretary concerned of breach of significant cost growth threshold or critical cost growth threshold; reports to Congress
10 USC 2433(e)	Unit cost reports	10 USC 4375(a)-(c)	Breach of significant cost growth threshold or critical cost growth threshold: required action
10 USC 2433(f)	Unit cost reports	10 USC 4371(c)	Cost growth definitions; applicability of reporting requirements; constant base year dollars
10 USC 2433(g)	Unit cost reports	10 USC 4375(d)-(e)	Breach of significant cost growth threshold or critical cost growth threshold: required action
10 USC 2433(h)	Unit cost reports	10 USC 4371(b)	Cost growth definitions; applicability of reporting requirements; constant base year dollars
10 USC 2433a(a)-(b)	Critical cost growth in major defense acquisition programs	10 USC 4376(a)-(b)	Breach of critical cost growth threshold: reassessment of program; presumption of program termination
10 USC 2433a(c)	Critical cost growth in major defense acquisition programs	10 USC 4377(a)	Breach of critical cost growth threshold: actions if program not terminated

10 USC 2433a(d)	Critical cost growth in major defense acquisition programs	10 USC 4376(c)	Breach of critical cost growth threshold: reassessment of program; presumption of program termination
10 USC 2435	Baseline description	10 USC 4214	Baseline description
10 USC 2437	Development of major defense acquisition programs: sustainment of system to be replaced	10 USC 4321	Development of major defense acquisition programs: sustainment of system to be replaced
10 USC 2440	National technology and industrial base plans, policy, and guidance	10 USC 4211(c)(3)	Acquisition strategy *Pending FY22*
10 USC 2441	Sustainment reviews	10 USC 4323	Sustainment reviews
10 USC 2443	Sustainment factors in weapon system design	10 USC 4328	Weapon system design: sustainment factors
10 USC 2446a	Requirement for modular open system approach in major defense acquisition programs; definitions	10 USC 4401	Requirement for modular open system approach in major defense acquisition programs; definitions
10 USC 2446b	Requirement to address modular open system approach in program capabilities development and acquisition weapon system design	10 USC 4402	Requirement to address modular open system approach in program capabilities development and acquisition weapon system design
10 USC 2446c	Requirements relating to availability of major system interfaces and support for modular open system approach	10 USC 4403	Requirements relating to availability of major system interfaces and support for modular open system approach
10 USC 2448a	Program cost, fielding, and performance goals in planning major defense acquisition programs	10 USC 4271	Program cost, fielding, and performance goals in planning major defense acquisition programs
10 USC 2448b	Independent technical risk assessments	10 USC 4272	Independent technical risk assessments
10 USC 2457	Standardization of equipment with North Atlantic Treaty Organization members	10 USC 2457	Standardization of equipment with North Atlantic Treaty Organization members

10 USC 2461	Public-private competition required before conversion to contractor performance	10 USC 2461	Public-private competition required before conversion to contractor performance
10 USC 2463	Guidelines and procedures for use of civilian employees to perform Department of Defense functions	10 USC 2463	Guidelines and procedures for use of civilian employees to perform Department of Defense functions
10 USC 2464	Core logistics capabilities	10 USC 2464	Core logistics capabilities
10 USC 2466	Limitations on the performance of depot-level maintenance of materiel	10 USC 2466	Limitations on the performance of depot-level maintenance of materiel
10 USC 2546	Civilian management of the defense acquisition system	10 USC 3103	Civilian management of the defense acquisition system
10 USC 2546a	Customer-oriented acquisition system	10 USC 3102	Customer-oriented acquisition system
10 USC 2547	Acquisition-related functions of chiefs of the armed forces	10 USC 3104	Acquisition-related functions of chiefs of the armed forces
10 USC 2548	Performance assessments of the defense acquisition system	10 USC 3105	Elements of the defense acquisition system: performance assessments
10 USC 2548	Performance assessments of the defense acquisition system	10 USC 3106	Elements of the defense acquisition system: performance goals

Appendix M: Glossary

M.1 Acronyms

ACRONYM	MEANING
3PL	Third Party Logistics
AAF	Adaptive Acquisition Framework
A_M	Materiel Availability
ANSI/EIA	American National Standards Institute/Electronic Industry Alliance
A_o	Operational Availability
AoA	Analysis of Alternatives
APA	Additional Performance Attributes
APB	Acquisition Program Baseline
BCA	Business Case Analysis
BFM	Business Financial Manager
CAIV	Cost as an Independent Variable
CAPE	Cost Assessment and Program Evaluation
CBM+	Condition Based Maintenance Plus
CEA	Cognizant Engineering Activity
CIP	Capability Implementation Plan
CITE	Center of Industrial and Technical Excellence
CLA	Core Logistics Analysis
CLS	Contractor Logistics Support
CM	Configuration Management
CMO	Chief Management Officer
COTS	Commercial Off-the-Shelf
CPAR	Contractor Performance Assessment Report
CPT	Corrosion Prevention Team
CPC	Corrosion Prevention and Control
CSA	Commercial Service Agreement
CSCI	Computer Software Configuration Item
CSP	Capability Support Plan
CWT	Customer Wait Time
DAB	Defense Acquisition Board
DAMIR	Defense Acquisition Management Information Retrieval
DAVE	Defense Acquisition Visibility Environment
DET	Displaced Equipment Training
DFARS	Defense Federal Acquisition Regulation Supplement
DID	Data Item Description
DISN	Defense Information Switch Network
DLA	Defense Logistics Agency
DM	Data Management
DMA	Depot Maintenance Activity

DMS	Data Management Strategy
DMSMS	Diminishing Manufacturing Sources and Material Shortages
DoD	Department of Defense
DPO	Distribution Process Owner
DSOR	Depot Source of Repair
DVD	Direct Vendor Delivery
DWCF	Defense Working Capital Fund
EDI	Electronic Data Interchange
EMD	Engineering and Manufacturing Development
EMI	Electromagnetic Interference
ERP	Enterprise Resource Planning
ESOH	Environment, Safety and Occupational Health
EVM	Earned Value Management
FAR	Federal Acquisition Regulation
FCA	Functional Configuration Audit
FMECA	Failure Mode, Effects, and Criticality Analysis
FMS	Foreign Military Sales
FOC	Full Operational Capability
FRACAS	Failure Reporting and Corrective Action System
FRP	Full Rate Production
FTA	Fault Tree Analysis
GEIA	Government Electronics & Information Technology Association
HSI	Human Systems Integration
ICE	Independent Cost Estimate
ICS	Interim Contractor Support
IDE	Integrated Data Environment or Integrated Digital Environment
IETM	Interactive Electronic Technical Manual
ILA	Independent Logistics Assessment
IOC	Initial Operational Capability
IOT&E	Initial Operational Test and Evaluation
IP	Intellectual Property
IPS	Integrated Product Support
IPT	Integrated Product Team
ISO	International Organization for Standardization
ISP	Information Support Plan
IUID	Item Unique Identification
JCIDS	Joint Capabilities Integration and Development System
JROC	Joint Requirements Oversight Council

KLP	Key Leadership Position
KPP	Key Performance Parameter
KSA	Key System Attribute
LA	Logistics Assessment
LCC	Life Cycle Cost
LCM	Life Cycle Management
LCSP	Life Cycle Sustainment Plan
LORA	Level of Repair Analysis
LRIP	Low Rate Initial Production
LRT	Logistics Response Time
LSE	Lead Systems Engineer
MOA	Memorandum of Agreement
MOSA	Modular Open Systems Approach
MOU	Memorandum of Understanding
MRL	Manufacturing Readiness Level
MRO	Maintenance, Repair, and Overhaul
MS	Milestone
MSA	Materiel Solution Analysis
MTA	Maintenance Task Analysis
MTA	Middle Tier of Acquisition
NAVSUP WSS	NAVSUP Weapons System Support
NDAA	National Defense Authorization Act
NET	New Equipment Training
NMCM	Not Mission Capable Maintenance
NMCS	Not Mission Capable Supply or Non-Mission Capable Supply
O&M	Operations and Maintenance
O&S	Operations and Support
OEM	Original Equipment Manufacturer
OJT	On-the-Job Training
OPEVAL	Operations Evaluation
OPLAN	Operations Plan
OPORD	Operations Order
OSD	Office of the Secretary of Defense
P&D	Production and Deployment
PBL	Performance-Based Logistics
PCA	Physical Configuration Audit
PEO	Program Executive Office or Program Executive Officer
PBA	Performance Based Agreement
PESHE	Programmatic Environmental, Safety and Occupational Health Evaluation
PHS&T	Packaging, Handling, Storage, and Transportation

PLM	Product Lifecycle Management
PM	Program Manager
PPBE	Planning, Programming, Budgeting, and Execution
PPP	Public-Private Partnership
PSA	Product Support Arrangement
PSBCA	Product Support Business Case Analysis
PSBM	Product Support Business Model
PSDM	Product Support Decision Matrix
PSI	Product Support Integrator
PSM	Product Support Manager
PSP	Product Support Provider
R&M	Reliability and Maintainability
RAM-C	Reliability, Availability, Maintainability and Cost
RBS	Readiness Based Sparing
RCM	Reliability Centered Maintenance
RDT&E	Research, Development, Test, and Evaluation
RFID	Radio Frequency Identification
RSSP	Replaced System Sustainment Plan
SAR	Selected Acquisition Report
SCM	Supply Chain Management
SEP	Systems Engineering Plan
SIM	Serialized Item Management
SLA	Service Level Agreement
SLEP	Service Life Extension Program
SME	Subject Matter Expert
SML	Sustainment Maturity Level
SOO	Statement of Objectives
SOW	Statement of Work
SRU	Shop Repairable Unit
SSEC	Source Selection Evaluation Criteria
TADSS	Training Aids, Devices, Simulators, and Simulations
TEMP	Test and Evaluation Master Plan
TI	Technology Insertion
TM	Technical Manual
TOC	Total Ownership Cost
TPM	Technical Performance Metric (or Measure)
USTRANSCOM	US Transportation Command
VAMOSC	Visibility and Management of O&S Cost
WCF	Working Capital Fund

M.2 Definitions

A complete Glossary of acquisition terms are maintained on the Defense Acquisition University website. The Defense Acquisition University Glossary can be found at https://www.dau.edu/tools/t/DAU-Glossary.