



Operating and Support Cost Management Guidebook



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FOREWORD

Evolving global threats and years of persistent conflict drive the need for the Department of Defense (DoD) to modernize and recapitalize our forces and equipment. DoD must accomplish this within constrained budgets and competing priorities. To succeed in this environment, we must build on the successes of recent years and continue to improve our processes to analyze, control, and ultimately reduce costs. We must implement and maintain a cost conscious culture to acquire and sustain needed capabilities for the foreseeable future.

Operating and Support (O&S) costs constitute a significant portion of the life cycle cost for DoD systems. The magnitude of O&S cost makes it a particularly important target for programs to apply Should Cost procedures and management. Since many drivers of O&S cost are determined by decisions made early in the acquisition process, Program Managers (PMs) and their staff need access to the best tools and practices available.

This guidebook is designed to provide some of those tools and to assist PMs and Product Support Managers (PSMs) to structure and conduct O&S cost analysis to inform early life cycle decisions, to effect reliability trades, and to identify Should Cost initiatives having the greatest impact on future costs. The guidebook provides a foundational understanding of the distinctions between affordability and cost and between Will Cost and Should Cost. It also details a method for mapping product support elements to cost elements, in order to focus early life cycle cost analysis on the highest cost drivers and to help programs assess sustainment impacts resulting from funding changes. Finally, the guidebook provides guidance to integrate Should Cost initiatives targeted at drivers of O&S cost with a program's product support strategy, through the Life Cycle Sustainment Plan.

It is our hope that you will find this guidebook to be useful and valuable. If you have suggestions to improve it, please contact Ms. Mary Mertz at mary.m.mertz.civ@mail.mil.

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1. Introduction

The Operations and Support phase of the life cycle in a Department of Defense (DoD) system begins with the initial system utilization and lasts until the final system ceases operations. Operating and Support (O&S) costs are the costs of sustainment incurred from the initial system deployment through the end of system's useful life. Specifically, this consists of the costs (organic and contractor) of personnel, equipment, supplies, software, and services associated with operating, modifying, maintaining, supplying, training, and supporting a system in the DoD inventory. O&S costs can account for a majority of the Life Cycle Costs (LCC) for a program, especially given the longevity and potential extended lifespans for many systems.

O&S Cost Management warrants dedicated attention, especially during the challenging resource environment the DoD will likely face for the foreseeable future. The Product Support Manager (PSM) has a key role in the conduct of trade studies that impact O&S Costs, starting with the determination of a system's Sustainment Key Performance Parameter (KPP) of Availability and its Key System Attributes (KSA) of Reliability and O&S Cost. Working in conjunction with the Systems Engineering (SE) Community, the PSM performs Supportability Analysis trade studies early in the life cycle to address the impact of design characteristics of Reliability and Maintainability on both system design and sustainment. As the system design matures, the PSM focuses on the planning required to implement the product support strategy to ensure achievement of desired product outcomes during sustainment. Ultimately, the PSM plans the support required to meet operational and suitability requirements, while minimizing O&S Costs.

Per Better Buying Power (BBP) 2.0, Component Acquisition Executives are required to establish affordability goals and caps for Acquisition programs. In general, affordability constraints are the product of budget, inventory, and product life cycle analysis within a portfolio context. They are not the product of cost analysis but a constraint on costs. Affordability constraints force prioritization of requirements, drive performance and cost trades, and ensure that unaffordable programs do not enter the acquisition process. PSMs must manage O&S cost to realize more affordable programs. This demands that program management, requirements, programming, financial management, engineering, contracts, cost estimating, and logistics stakeholders work together to assess and effect trades among cost, schedule, and performance to meet the Warfighter's needs. Early product support planning and active O&S cost management both informs, and is informed by, program trades and is among the most effective means by which programs may reduce the risk of readiness shortfalls and O&S cost growth later in the life cycle.

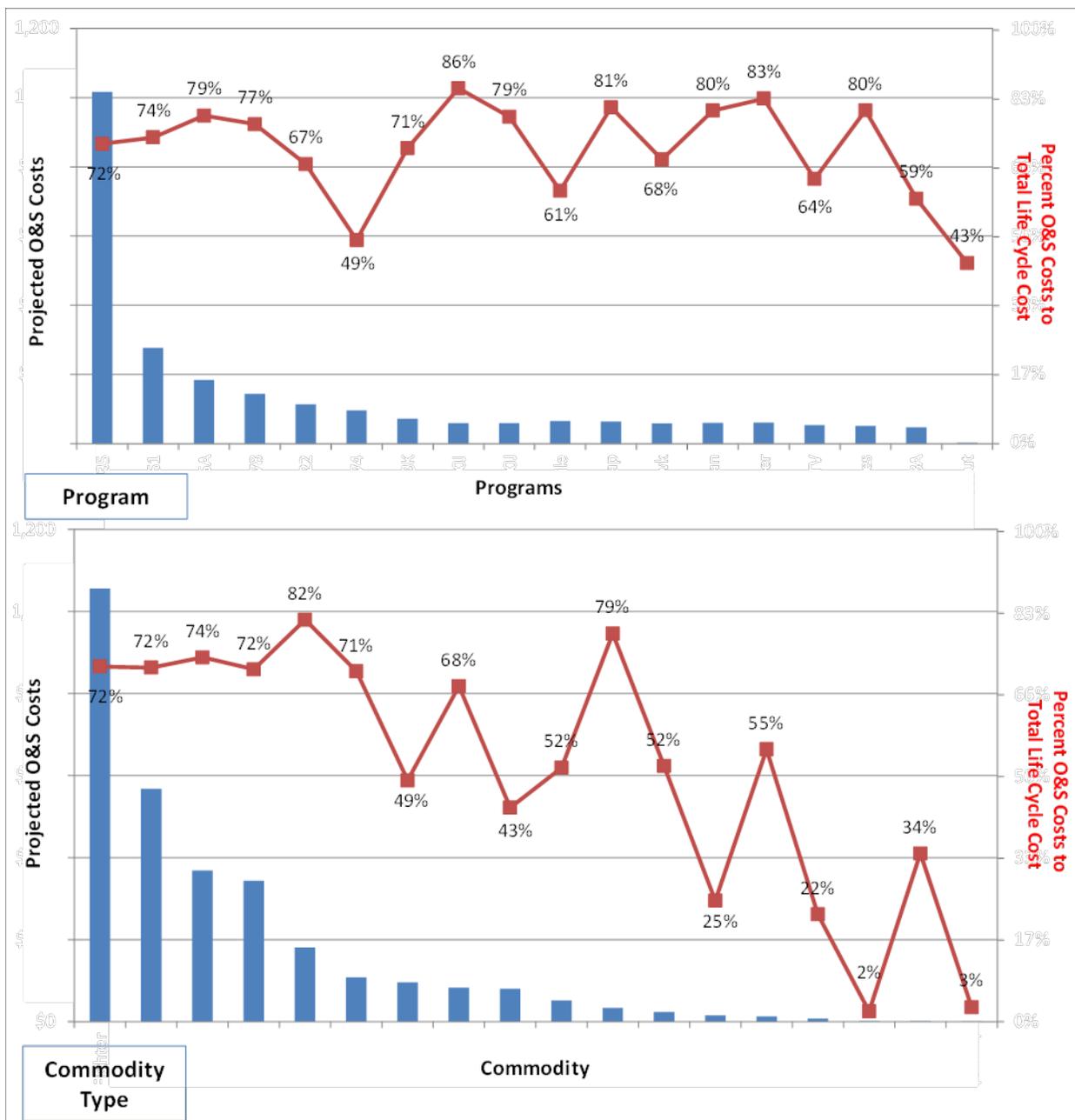


Figure 1 - Total O&S Cost and percentage O&S (TY\$B) Cost to Total LCC for selected programs and commodity types based on December 2014 SARs

In the December 2014 Selected Acquisition Reports (SARs), on average, 67% of the reported costs are attributable to O&S (Figure 1). (These costs do not include the systems that are currently in operation but have already completed their acquisition phase.) DoD must strive to control O&S costs and minimize them where possible.

1.1. Background

In 2009, the United States Congress passed the Weapon System Acquisition Reform Act (WSARA) that resulted in the DoD conducting the Weapon System Acquisition Reform Product Support Assessment (WSAR-PSA). The assessment:

Formally documented the challenges facing major weapons systems product support;

Identified and recommended opportunities for business process improvements;

Provided an operational strategy that aligned and synchronized the operational, acquisition, and sustainment communities to deliver required and affordable Warfighter outcomes.

A key recommendation of the 2009 WSAR-PSA report was to address O&S costs. Specifically, the report stated that the “lack of an affordability requirement and adequate visibility of operating and support costs has been a long-standing barrier to effectively assessing, managing, and validating the benefits or shortcomings of product support strategies.” As a result, the Product Support Executive Council (PSEC), the senior governing body that championed the WSAR-PSA, recommended three specific actions related to O&S cost management:

Establish an O&S affordability requirement that links O&S budgets to readiness.

Develop and implement processes and procedures across the operational, acquisition, and sustainment communities, engaging them in the affordability process.

Increase visibility of O&S costs and their drivers across the life cycle of acquisition programs.

This O&S Cost Management Guidebook provides methods for analyzing available data and identifying cost driving elements to reduce O&S costs.

1.2. Purpose

This guidebook highlights the criticality of early O&S cost management through product design and the Product Support Strategy (PSS). The guidebook helps users focus their requirements, design and product support planning activities to identify and pursue early procedural means to mitigate O&S costs and specific tools to reduce O&S costs. Additionally, the guidebook provides a set of tools for effectively communicating O&S cost assumptions, comparisons, and risks to support acquisition decisions and program reviews. Finally, it provides a list of complementary courses offered by the Defense Acquisition University (Appendix G), a compendium of references (Appendix H), and a Glossary of O&S Terms (Appendix I) to help stakeholders improve O&S cost management. Appendix A answers some frequently asked questions about O&S cost management. Appendix J contains an acronym list for this guidebook.

The focus of the guidebook is on Major Defense Acquisition Programs (MDAPs). The O&S cost management techniques covered can be applied equally to non-MDAP weapons programs and Major Automated Information Systems (MAISs). The guidebook highlights where specific reporting requirements and policies outlined are not applicable to non-MDAP programs.

1.3. Scope

This guidebook is for program, business, engineering, and life cycle logistics management professionals. It provides an approach to O&S cost management with an emphasis on early design trades that influence O&S costs. The Program Manager (PM) and his/her supporting staff, including the PSM, Business Financial Manager (BFM), and Chief Engineer, will benefit most from this guidance. Additionally, Component acquisition, resource and requirements officials will benefit during the pre-program phase, as they set the conditions for effective and affordable life cycle product support.

This guidebook complements existing guidance for the PM and PSM in the task of planning and executing affordable product support. Figure 2 depicts the relationship of this guidebook to several of the other DoD guidance documents.

O&S Cost Management Guidebook...	
<p>Is Complemented by:</p> <ul style="list-style-type: none"> • The Cost Assessment and Program Evaluation (CAPE) Operating and Support Cost Estimating Guide • Product Support Manager’s Guidebook • Integrated Product Support Element Guidebook 	<p>Directly Influences:</p> <ul style="list-style-type: none"> • Life Cycle Sustainment Plan • Will Cost Estimate • Should Cost Estimate

Figure 2 - The O&S Cost Management Guidebook is complemented by existing DoD guidance and influences program documents.

1.4. Guidebook Structure

This guidebook discusses the following topics and their relationship to O&S cost management:

PSM Tip

Highlights for the PSM will be called out in blue boxes throughout the document.

- Will Cost
- Affordability
 - Developing Affordability Goals and Caps
- Should Cost and Should Cost Initiatives
- Managing O&S Costs through Should Cost and Should Cost initiatives
 - Developing and Documenting Should Cost Initiatives
- Tracking the Progress of the Should Cost Initiatives

OTTER USE CASE

This guidebook provides the reader with realistic examples based on the fictitious OTTER program. The OTTER system is an unmanned underwater vehicle for use in littoral areas. 12 OTTER systems will replace 20 aging, manned WEASEL systems. The OTTER systems will each have a service life of 15 years. All OTTER USE CASE examples will be offset in gray boxes.

1.5. Users of this Guidebook – Roles and Responsibilities

Table 1 below reflects the assistance this guidebook can provide to specific users.

Primary Users	O&S Responsibility Description	Assistance Provided by Guidebook
PM	Establishes and manages trades among near-term and long-term investments and costs.	An overview of O&S considerations within the context of affordability and suggests methodologies to develop Should Cost initiatives; details framing affordability discussions for program reviews

Primary Users	O&S Responsibility Description	Assistance Provided by Guidebook
PSM	Serves as the Product Support representative to the PM's Integrated Product Team (IPT) for the conduct of trade studies that reduce O&S costs and the product support planning process, which includes planning and management of O&S costs; leads the development and implementation of the PSS to ensure achievement of desired product support outcomes during sustainment.	An analytical construct that supports better cost estimates and readiness assessments of budget changes
Systems Engineer	Ensures that O&S cost considerations are understood and included during system design.	A method for determining O&S cost drivers during the design process
Cost Estimator	Creates cost estimates during all phases of the life cycle, including all aspects of O&S; supports Will Cost estimates and Should Cost initiatives.	An understanding of the affordability framework and how O&S cost estimates support achieving affordability
Product Support Integrator (PSI)	Integrates all sources of support, public and private, defined within the scope of Performance Based Logistics (PBL) arrangements to achieve the sustainment requirements.	An understanding of the affordability framework and impacts of the Integrated Product Support (IPS) Elements on O&S costs
Resource Sponsor/ Requirements Manager	Responsible for mitigating the growth of total LCC by specifying technical performance capabilities, financial constraints, and business terms, which not only meet Warfighter requirements but are also technologically realistic, affordable, and constrained in number throughout program development. Develop affordability constraints (caps and goals).	An understanding of how requirements decisions impact LCC

Table 1 - Primary audience of the O&S Cost Management Guidebook

Table 2 below shows the secondary audience for this guidebook. The O&S Cost Management Guidebook provides these users with a general understanding of O&S cost management requirements within DoD programs and how programs may approach managing O&S costs.

Secondary Users	O&S Responsibility Description	Assistance Provided by Guidebook
Operational Communities; Warfighter	Define requirements that balance capability with affordability across the life cycle.	An understanding of the requirements generation and financial management that is specific to the acquisition community
Comptroller and Financial Manager	Advise regarding all budgetary and fiscal matters including the development and execution of annual budgets, including all of the O&S appropriation categories (e.g., O&M, MILPERS).	
Product Support Provider (PSP)	Provide product support functions to the government.	Context for the Should Cost initiative process
Industry	Assist DoD in designing, building, and supporting products that meet mission requirements, while remaining affordable within the DoD budget.	

Table 2 - Secondary audience of the O&S Cost Management Guidebook

2. O&S Will Cost

The concepts of Will Cost and Should Cost were formalized for DoD use by the Under Secretary of Defense for Acquisition, Technology and Logistics (USD(AT&L)) in the June 28, 2010 memorandum, “Better Buying Power: Mandate for Restoring Affordability and Productivity in Defense Spending.” The USD(AT&L) expanded on the concepts in the November 13, 2012 memorandum, “Better Buying Power 2.0 – Continuing Pursuit for Greater Efficiency and Productivity in Defense Spending.” These memoranda as well as the subsequent implementation directives are available at <http://bbp.dau.mil/references.html>.

PSM Tip

A Will Cost estimate is an Independent Cost Estimate, while a Should Cost estimate incorporates expected results of cost control actions.

A Will Cost estimate is a historically informed independent cost estimate used to baseline program budgets, whereas a Should Cost estimate is derived through continuous analysis of cost drivers and initiatives to reduce the impact of those cost drivers without degrading effectiveness or suitability. Will Cost will be discussed in the following section, while Should Cost is discussed in Section 4 of this document.

2.1. Will Cost

The Will Cost estimate must include all costs necessary to sufficiently resource and execute the program under normal conditions, assuming average levels of technical, schedule, and programmatic risk. The Will Cost estimate supports the budget build process with sufficient detail to provide confidence that the program can be completed without the need for significant budget adjustment and that the program will avoid Nunn-McCurdy (Nunn-McCurdy Act, Title 10 U.S.C. §2433) or critical breaches. Will Cost estimates should reflect the Program Life Cycle Cost Estimate (PLCCE) and are developed by the responsible Cost Competency for that organization and reconciled with Independent Cost Estimates (ICE) performed by the Component Cost Agency (CCA) or the Office of the Secretary of Defense (OSD) CAPE office following standard cost estimating methodologies.

Will Cost estimates for O&S may utilize any of the established cost estimating methodologies described in the CAPE O&S Cost Estimating Guide – parametric, analogy, engineering estimate, actual costs, and cost factors. Most O&S estimates base their estimating starting point on an analogy to an existing or historical system. Accordingly, the DoD Components use the Visibility and Management of Operating and Support Costs (VAMOSC) program to collect historical data for O&S costs. The VAMOSC databases are: the Operating and Support Management Information System (OSMIS) (Department of the Army), Naval VAMOSC (Department of the Navy), and Air Force Total Ownership Cost (AFTOC) (Department of the Air Force). Each VAMOSC system has its own anomalies and deficiencies. Analysts using the databases should become familiar with the data limitations in order to interpret trends or results of data analysis correctly. Other program-specific documents used to develop the Will Cost estimate may include (but are not limited to): the Cost Analysis Requirements Description

(CARD), the Manpower Estimate Report (MER), the Class Maintenance Plan, and the Life Cycle Sustainment Plan (LCSP). Using valid and appropriate historical data and program specific inputs is fundamental to the development of a valid Will Cost estimate.

The Milestone Decision Authority (MDA) records the approved Will Cost estimate in the program's Acquisition Program Baseline (APB), and this estimate becomes the basis for budgeting. A valid Will Cost estimate is crucial to O&S Cost management since the program office will use it not only for budgeting but also as the basis for Should Cost initiatives.

Familiarity with the CAPE O&S recommended cost element structure and the O&S phase appropriations is fundamental to understanding the Will Cost estimate (and ultimately the Should Cost estimate).

OTTER USE CASE

The OTTER program just completed a DAB review and is awaiting a Milestone A decision. During preparation for the milestone, the PSM assisted in drafting the CARD and LCSP. These documents were provided to the program's cost estimators for use in creating a PLCCE. The CARD and LCSP were also provided to the Naval Center for Cost Analysis (the Navy's Service Cost Agency) for use in preparing an ICE. The program and service cost estimators have reconciled their estimates into a single Service Cost Position (SCP). In the Milestone A Acquisition Decision Memorandum (ADM), the SCP was designated as the program's Will Cost estimate. The O&S portion of the Will Cost estimate is \$2.7B (BY2016), with an average annual cost per system of \$15M (BY2016).

2.1.1. O&S Cost Structure

The CAPE's Operating and Support Cost-Estimating Guide provides the standard DoD O&S cost element structure and detailed definitions of each cost element. The O&S cost structure includes six main cost categories containing potentially 49 discrete cost elements through three levels of indenture; programs can create subsequent levels of indenture as required. The six major O&S categories are:

- Unit-level Manpower
- Unit Operations
- Maintenance
- Sustaining Support
- Continuing System Improvements
- Indirect Support

Understanding the O&S cost elements, both structure and definitions, is foundational for all discussion of managing O&S costs. The CAPE Operating and Support Cost Estimating Guide can be found at http://www.cape.osd.mil/files/OS_Guide_v9_March_2014.pdf.

OTTER USE CASE

The average annual O&S Will Cost estimate of \$15M is comprised of the following:

	BY2016 \$M/sys/year	OTTER Costs included in category
1.0 Unit-Level Manpower	\$2.2	Fully Burdened cost of operators and unit-level maintainers (FY15 rates)
2.0 Unit Operations	\$1.7	Fuel (FY15 rate), travel costs of operators
3.0 Maintenance	\$3.7	Organizational and Depot level maintenance
4.0 Sustaining Support	\$1.1	Training, Sustaining Engineering, Program Management, Technical Data
5.0 Continuing System Improvements	\$5.0	Software maintenance, hardware updates
6.0 Indirect Support	\$1.3	Personnel related indirect costs
TOTAL	\$15.0	

2.1.2. Appropriation Categories

It is important to realize that not all costs incurred during the O&S phase of the life cycle are funded by the O&M appropriation. PMs must consider five appropriation categories when developing requests for program funding. Table 3 lists the relevant appropriation categories and includes potential O&S cost considerations for each. For more detailed descriptions and guidance on the use of appropriations, refer to the DoD Financial Management Regulation (DoD FMR 7000.14-R) Volume 2A, Chapter 1.

Appropriation	Description	Potential O&S Cost Considerations
RDT&E	Research, Development, Test, and Evaluation –	Funding required to demonstrate confidence that new sustainment technology required to achieve the Sustainment KPP will be available.

Appropriation	Description	Potential O&S Cost Considerations
	<p>Expenses necessary for basic and applied scientific research, development, test and evaluation -</p> <ul style="list-style-type: none"> • Development of equipment, material, or computer application software Developmental Test and Evaluation (DT&E); • Initial Operational Test and Evaluation (IOT&E); • Operational costs for some Research and Development (R&D) dedicated installations. 	<p>Examples include but are not limited to:</p> <ul style="list-style-type: none"> • Diagnostics and Prognostics; • Condition-Based Maintenance Plus (CBM+); • Repair capabilities for new materials; • Corrosion prevention versus corrosion control; • Modernization requirements; • Commonality/Standardization; • Open System Architecture; • Designing for supportability; • Reliability and maintainability; • Diminishing Manufacturing Sources and Material Shortages (DMSMS); • Demilitarization.
Procurement	<p>Procurement –</p> <ul style="list-style-type: none"> • Purchase of major end items and defense systems; • Initial issue of spares for above items; • All costs necessary to deliver a useful end item intended for operational use or inventory. <p>Note: Shipbuilding and Conversion, Navy (SCN) is a specific Procurement appropriation category account that has a longer obligation period than other procurement accounts. The Navy uses SCN to fund procurements and major conversions of Naval ships.</p>	<p>Funding required to develop and acquire weapons system including resulting technologies falling out of R&D effort and its Product Support Strategy:</p> <ul style="list-style-type: none"> • Commercial off the Shelf (COTS) versus Government off the Shelf (GOTS) or standard parts; • Interoperability/accessibility; • Product Support Package requirements for: <ul style="list-style-type: none"> ○ Various levels of repair strategies; ○ Consolidating repair locations; ○ Embedded versus off equipment or remote testing, including Test Program Sets for new/standard testers alternatives; ○ Embedded training vice stand-alone trainers (equipment) or detailed course work; • Special packaging/transportation (including handling/disposal); • Logistics footprint reduction; • Special tools, test equipment, or minor modifications to existing facilities; • Modernization or modification (exceeding \$250,000). • Stand up of Working Capital Fund (WCF)¹ capabilities
MILCON	<p>Military Construction –</p> <p>Acquisition, construction, installation, and equipment of temporary or permanent public works, military</p>	<p>Requirements for special environmental considerations including the following requirements:</p> <ul style="list-style-type: none"> • Clean room;

¹ More information on the WCF can be found in the FMR, Volume 11B, Chapter 1.

Appropriation	Description	Potential O&S Cost Considerations
	installations, facilities and real property - <ul style="list-style-type: none"> • Major military construction projects; • Construction of military schools; • Construction of facilities; • Construction of bases. 	<ul style="list-style-type: none"> • Electro-Magnetic isolation; • Maintenance facilities: engine test cells, aircraft hangars, secure storage facilities, etc.; • Hazardous material used in servicing or maintenance.
MILPERS	Military Personnel – Pay, allowances, individual clothing subsistence, interest on deposits, gratuities, permanent change of station travel (including all expenses thereof for organizational movements), and expenses of temporary duty travel between permanent duty stations for Component members <ul style="list-style-type: none"> • Training in conjunction with Permanent Change of Station (PCS) moves • Bonuses • Retired pay accrual 	Manning levels to sustain the design/maintenance concept: <ul style="list-style-type: none"> • Skill levels to maintain; • Impact of modernization on crew/maintainers.
O&M	Operation and Maintenance – Expenses not otherwise provided for; necessary for the operation and maintenance of the [Component] as authorized by law: <ul style="list-style-type: none"> • Day-to-day operations; • Headquarters operations; • Civilian salaries • Travel • Fuel • Minor construction; • Training and education; • Expenses of operational military forces; • Base operations support; • Recruiting. 	<ul style="list-style-type: none"> • Corrosion avoidance versus corrosion prevention; • Special calibration requirements; • Modernization/product improvements (less than \$250,000) and associated program protection and information assurance validation, verification, and accreditation; • DMSMS; • Transportation of material; • Hazardous material management; • Sustaining engineering; • Obsolescence mitigation; • System retirement, reclamation, demilitarization & materiel disposition. • Items related to the functioning of the WCF

Table 3 – Funding Appropriations Categories Descriptions and Considerations

Understanding the different O&S cost categories and appropriations is important to ensuring that the Will Cost estimate creates an appropriate baseline for the O&S costs. The Will Cost estimate becomes the foundation for all discussions about affordability.

PSM Tip

PSMs must understand how the O&S Cost Element Structure translates into appropriations in order to effectively budget for O&S costs.

OTTER USE CASE

The OTTER program O&S costs are funded through several appropriations.

CAPE O&S Cost Element	BY2016 \$M/sys/year	Appropriation Categories
1.0 Unit-Level Manpower	\$2.2	MPN
2.0 Unit Operations	\$1.7	OMN
3.0 Maintenance	\$3.7	OMN, MPN
4.0 Sustaining Support	\$1.1	OMN, MPN
5.0 Continuing System Improvements	\$5.0	OMN, OPN
6.0 Indirect Support	\$1.3	MPN, OMN

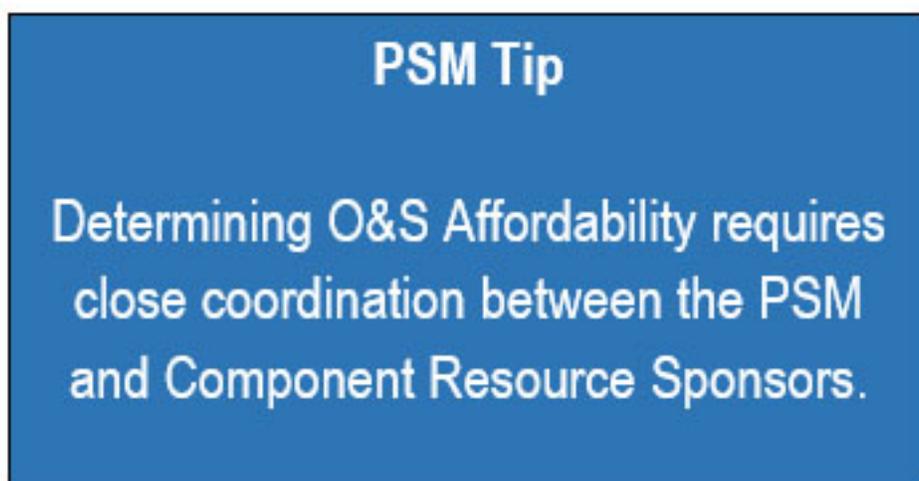
MPN = Military Personnel, Navy

OMN = Operations & Maintenance, Navy

OPN = Other Procurement, Navy

3. Affordability

In recent years, DoD has placed increased focus on program affordability, including total life cycle affordability. Affordability is the degree to which the program's LCC² is in alignment with the long-range investment, sustainment, force structure plans and resources of the DoD or the individual DoD Components. Within the DoD context, affordability requires an enterprise perspective – no single weapon system can be deemed affordable in isolation; it must be viewed in terms of its cost vis-à-vis the aggregate cost of other weapon systems across the Component and DoD portfolio. In simple terms, each individual weapon system may be considered affordable viewed individually, but the aggregated cost of all weapon systems may exceed the Military Services enterprise resources – and therefore create “unaffordable” programs.



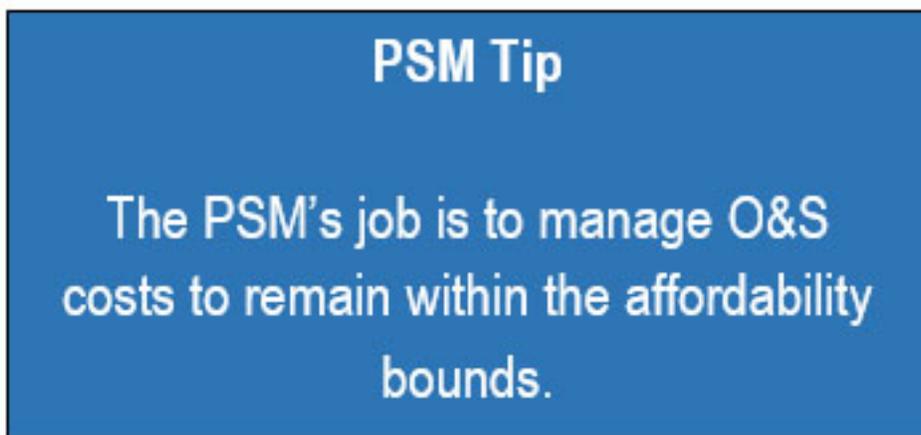
This requires consideration of costs and associated cost reduction measures and trade off analyses both within each weapon system program as well as across the aggregated weapon system enterprise. The costs considered in assessing weapon system affordability are comprehensive, encompassing research, development, design, production, fielding, operation, and disposal across the life cycle. By considering affordability constraints from the inception of a program, the DoD can prevent unaffordable programs from entering the Defense Acquisition System.

A major update to the Defense Acquisition Guidebook (DAG), Chapter 3, Affordability & Life Cycle Resource Estimates, was released by the DoD on June 26, 2013. This revision provides the basic procedures associated with the consideration of affordability in the acquisition process. Section 3.2 (Affordability), which can be found at <http://acc.dau.mil/DAG3.2>, has been significantly updated to re-align and revise affordability content to describe the relationship of affordability processes to the acquisition process; institute a system of investment analysis to derive affordability; and discuss affordability goals and caps.

² The terms Life Cycle Cost (LCC) and Total Ownership Cost (TOC) are synonymous for the purposes of this discussion.

3.1. Affordability and LCC

Affordability and LCC are distinct. LCC is the sum of all research and development costs, investment costs, O&S costs, and disposal costs attributable to a program, whereas affordability is an assessment of whether or not the program's costs can be borne within an expected budget level.



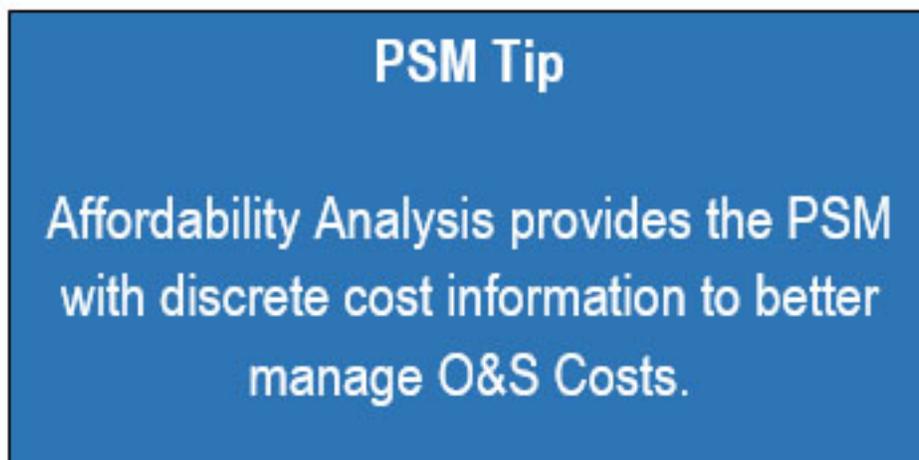
As such, affordability informs key program decisions. O&S cost is a significant factor in determining the affordability of a program throughout its life cycle. The affordability requirement in Department of Defense Instruction (DoDI) 5000.02, Operation of the Defense Acquisition System (<http://www.dtic.mil/whs/directives/corres/pdf/500002p.pdf>) directs Components to establish quantitative goals for unit production and O&S costs, bounded by the resources available in the short term and projected over the long term. Program Executive Officers (PEOs) and ultimately PMs must use the affordability requirements, which the MDA establishes early in the program's life cycle, to constrain costs by driving design trades and program priorities. Additionally, affordability must feature explicitly in the trades that PEOs and PMs consider among the requirements, acquisition, and resource decision support systems.

3.2. Affordability Analysis

An affordability analysis includes the determination that the O&S cost of an acquisition program is in agreement with long-range resource and force structure plans. O&S cost estimates used in the analysis come from the OSD CAPE office, the CCA, and the Program Office. The estimates from the CCA and the Program Office are typically reconciled into a single SCP before comparison with the CAPE estimate. The analysis can be used to demonstrate the degree to which program resource requirements match projected funding and manpower in the context of the Component's long-range investment, sustainment and force structure plans, also known as the planning horizon, as required by the DoDI 5000.02.

DoDI 5000.02 requires an affordability analysis for all acquisition programs and should involve the Component's programming, resource planning, requirements, intelligence, and acquisition communities. At the early decision points of the Material Development Decision (MDD) and Milestone (MS) A, Components present affordability constraints as non-binding goals for the program. At Pre-Engineering and Manufacturing Development (EMD) and subsequent decision

reviews, the refined affordability constraints will be binding caps (for O&S, typically annual O&S dollars per unit), which the program must treat similarly to a KPP. To support the Component's affordability cap determination, a broad group of stakeholders must collaborate to produce an affordability analysis based on the most accurate and timely assessment of resources that will be available in the program's portfolio for 30-40 years.



Components may tailor affordability analysis based on evolving needs and priorities at subsequent major program decision points. However, the component must explain all changes to the MDA, and affordability analysis must always take a long-term perspective, typically based on a 25+-year capability (or full life cycle) Component-level plan.

At major milestones, the CAPE will develop an ICE, and the Component will develop the SCP, both of which will include an O&S estimate. The ADM will typically direct which estimate the Component should use for funding. The estimate is compared with the component's affordability cap, and the PM must be able to characterize the ability to execute and sustain the systems. Such insight enables the Component to assess the risk to the capability portfolio and better informs funding trades among individual programs.

3.3. Affordability Goal

At MDD and MS A for all ACAT I programs, Components will provide the results of their affordability analysis and recommend an affordability goal. The purpose of the affordability goal at MS A is to inform pre-MS B decisions and to balance systems-engineering trades among requirements, early materiel solution alternatives, and potential sustainment strategies. The affordability goal includes both average procurement unit cost (APUC) and average annual O&S costs per unit values, which inform baseline establishment, monitoring and trade analysis. The ADM documents a program's affordability goal.

The Navy's OHIO Replacement program was one of the first programs to establish affordability goals at MS A (an average boat unit cost of \$4.9B (Base Year (BY) 2010\$) and an average annual boat O&S cost of \$110M (BY2010\$)). These affordability goals were codified in the ADM signed on January 10, 2011, and are reported by the Navy in subsequent Overarching Integrated Product Teams (OIPs) and Defense Acquisition Boards (DABs). During

preparations leading to a MS B decision, the Navy will assess progress toward the goals. At the MS B decision, affordability caps will be established.

OTTER USE CASE

At the Milestone A DAB meeting, the program presented data that showed the average annual O&S cost of the legacy system (WEASEL) is \$25M (BY2016). The WEASEL system is a crewed system, utilizes 3-level maintenance, and is based on outdated software. The OTTER system is unmanned, is planned to use 2-level maintenance, and open architecture. The OTTER system is estimated to cost less than the WEASEL, but recent outyear budget projections show that the Navy is experiencing funding shortfalls in the ships portfolio. Although OTTER is a required capability, based on current projections and priorities the Navy cannot afford to support OTTER if it costs more than \$13M (BY2016)/system/year in O&S costs.

3.4. Affordability Cap

The affordability cap acts as a threshold that a program must remain under for the program to be affordable. The scope of the affordability cap is the program's entire life cycle as reflected in all cost estimates (ICE, Component Cost Estimate (CCE), Program Office Estimate (POE), or SCP), and it must include discrete caps for acquisition and O&S costs. The PM, PEO, Component, Resource Sponsor, and the requirements community must work together to establish a reasonable affordability cap, based on the understanding of the assumptions of the resources available.

PSM Tip

The PSM must work with the PM, the PEO, the Resource Sponsor, and the requirements community to establish an Affordability Cap.

At Pre-EMD phase and subsequent decision reviews, Components and programs present the results of the systems engineering tradeoff analysis and the updated affordability analysis that underpin the recommended affordability cap. The affordability cap ensures that a program that cannot be executed and sustained within defined funding constraints does not enter the MS B or

subsequent phase. The MDA will document the approved affordability cap for both acquisition and O&S costs in the MS B ADM and in the APB.

The affordability cap is the functional equivalent of a KPP for establishing the program baseline and monitoring program performance. Accordingly, provisions may be made that would allow a program to adjust the affordability cap based on economic factors over which the program does not have control; examples include fuel prices, inflation outside of normal ranges, and precious metal demands. The affordability cap is set based on the context of the larger Component or commodity portfolio.

As an example, the Joint Light Tactical Vehicle (JLTV) MS B ADM tasked the Army to manage the program to remain at or below an APUC of \$399K (BY2012\$) and an average annual O&S cost per vehicle of \$29.1K (BY2012\$). The ADM requires the Army to report status relative to the caps in the quarterly Defense Acquisition Executive Summary (DAES) following the program's initial SAR.

Once a program has a Will Cost estimate to build a budget request and has established affordability objectives; it can move forward to use Should Cost as a way to manage its O&S costs.

OTTER USE CASE

During the Technology Maturation and Risk Reduction phase, the OTTER program was able to refine its O&S cost estimates based on better defined design parameters and fact of life changes in O&S cost estimating factors. The new Will Cost estimate is \$13M (BY2016)/system/year (total O&S \$2.34B (BY2016)) which meets the Affordability Goal set at Milestone A. However, there is no margin for uncertainty since the estimate is exactly at the Affordability Goal value. The new estimate breaks out as follows:

	BY2016 \$M/sys/year	OTTER Costs included in category
1.0 Unit-Level Manpower	\$2.0	Fully Burdened cost of operators (FY17 rates)
2.0 Unit Operations	\$1.9	Fuel (FY17 rate), travel costs of operators
3.0 Maintenance	\$3.1	Organizational and Depot level maintenance (refined parts assumptions)
4.0 Sustaining Support	\$0.9	Training, Sustaining Engineering, Program Management, Technical Data
5.0 Continuing System Improvements	\$3.8	Software maintenance, hardware updates (refined software code estimate)
6.0 Indirect Support	\$1.3	Personnel related indirect costs
TOTAL	\$13.0	

In meetings with the Senior Navy leadership, the program was congratulated on meeting its Affordability Goal, but challenged to further reduce the O&S cost. The budget projections have worsened, and an updated affordability assessment estimates that the Navy cannot afford for OTTER to cost any more than \$11M (BY2016)/system/year. In the Milestone B ADM, this value is established as the OTTER O&S Affordability Cap.

4. O&S Should Cost

Should Cost is a tool, introduced by USD(AT&L) in the BBP 1.0 memorandum, to manage costs across all phases of the life cycle that focuses on controlling the cost of the actual work being performed or expected to be done. Should Cost management requires the PM to incorporate the efficiencies, lessons learned, and best practices of current and historical programs to aggressively drive down costs in execution and of future years.

PSM Tip

Managing O&S Costs through Should Cost requires the PSM to incorporate efficiencies, lessons learned, and best practices of current and historic programs.

Should Cost is a target -- often a stretch goal -- that PMs must work toward in order to improve the overall affordability of the weapon system. Should Cost is not a way to refine current cost estimates, but rather “to examine a program’s technical and programmatic assumptions and make deliberate changes to reduce costs.”³

The BBP 1.0 memorandum urged the use of Should Cost Management throughout the life cycle, with particular emphasis on up-front planning and engineering trades. The BBP 2.0 memorandum progressed the concept of Should Cost, directing each PM to scrutinize every element of cost under his/her control and assess how to reduce the dollar value without an unacceptable reduction in the value received.

4.1. Should Cost Initiatives

Should Cost initiatives are the deliberate actions that programs plan to take to reduce cost. Every Should Cost initiative represents a savings opportunity that the program office must tie to a specific engineering or business practice that can be quantified and tracked. The Should Cost estimate is the summation of the Should Cost initiatives incorporated with the other parameters of the cost estimate.

³ Carter, Ashton and Mueller, John, “Should Cost Management: Why? How?” - *Defense AT&L Magazine*, September-October 2011.

PSM Tip

Should Cost initiatives are deliberate actions to reduce program costs. Initiatives may be short or long-term and may require near-term investment to deliver savings later in the life cycle.

PMs can create Should Cost initiatives at any time, and these initiatives can apply to any phase of the life cycle. In the August 6, 2013 memorandum “Should Cost Management in Defense Acquisition”, USD(AT&L) emphasized two concepts. First, Should Cost initiatives should not focus on short-term savings that ultimately cause long-term expense or degradation of system effectiveness or suitability. Second, it is appropriate to consider an investment of funds in a Should Cost initiative in order to achieve a bigger return later in the program. Programs should be aware that not all Should Cost initiatives will prove fruitful in achieving cost savings and/or cost avoidance. Careful consideration of the options will result in a balance of risk and reward.

Ultimately, successful Should Cost initiatives will lower future Will Cost estimates and program budgets. The April 2011 Joint Memorandum from USD(AT&L) and USD(Comptroller) states that once achieved savings have been validated by the appropriate Service Assistant Secretary (Financial Management and Comptroller) then the savings will generally be retained by that Military Service. The Military Service can reallocate those funds to the highest priority needs. The savings may be diverted to departmental requirements if the Secretary of Defense determines that they are required to meet high-priority Department-wide needs, such as financial requirements generated by Joint Urgent Operational Needs.

The remainder of this document focuses on developing, documenting, and tracking Should Cost initiatives specific to the management of O&S costs to achieve program affordability.

4.2. Managing O&S Costs through Should Cost Initiatives

PMs must introduce and actively manage O&S Should Cost initiatives as a means to achieve the program’s sustainment requirements while ensuring the program’s costs remain below the O&S affordability cap. Supportability analysis, including the mapping of IPS element cost drivers to cost categories, provides the PM with information to determine and prioritize those Should Cost initiatives that will affect the largest drivers of O&S cost. Figure 3 illustrates a

process that iteratively applies supportability analysis and re-evaluation of the support strategy to identify Should Cost initiatives and revise plans of action to reduce O&S costs.

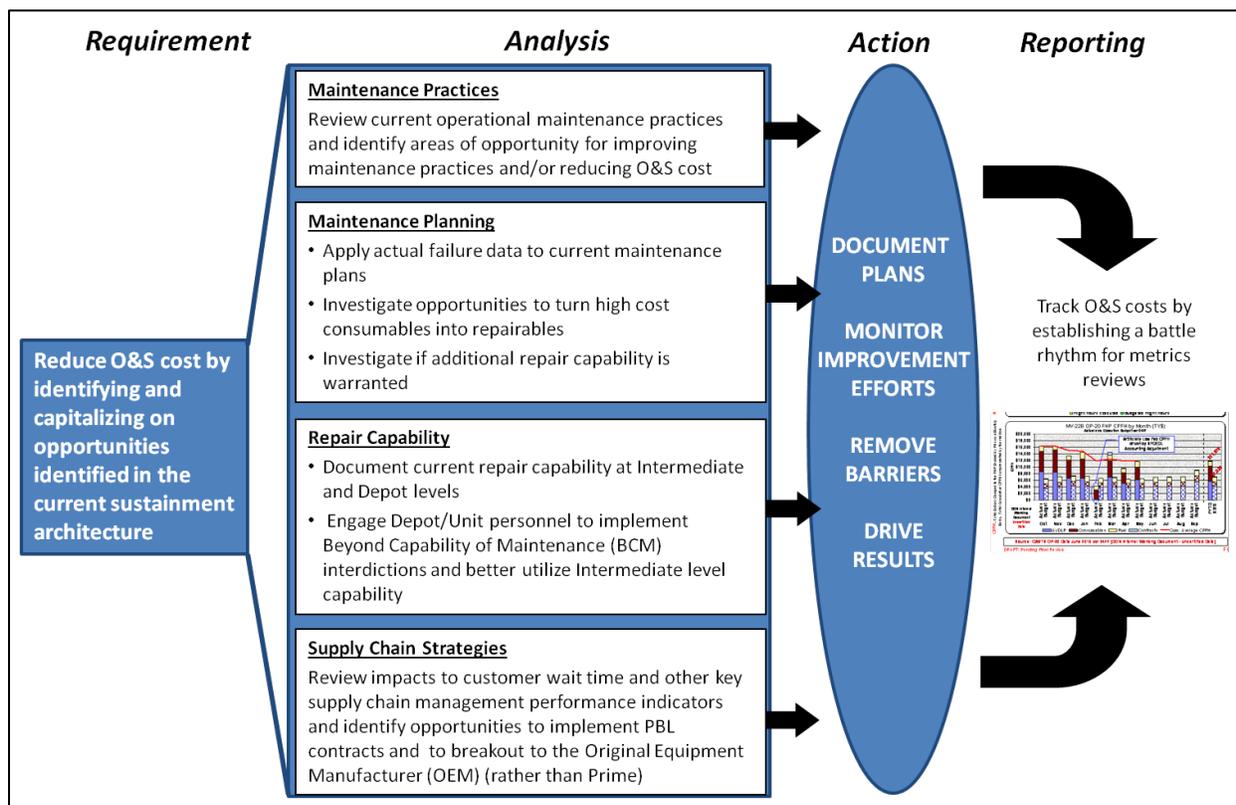


Figure 3 – Example process for identifying Should Cost Initiatives that target O&S cost reduction

4.2.1. Develop the Should Cost Initiatives

The first step to using Should Cost to manage program O&S Costs is to develop reasonable Should Cost Initiatives.

4.2.1.1. Establishing Affordable System Requirements

Before the Joint Requirements Oversight Council (JROC) validates the requirements of a program for formal initiation into the systems acquisition process, affordability plays a key role in the identification of capability needs as part of the Joint Capabilities Integration and Development System (JCIDS) (<https://acc.dau.mil/communitybrowser.aspx?id=267116>). Following the validation of an Initial Capabilities Document (ICD) in the JCIDS process and approved entrance into MDD by the MDA, the solution sponsor conducts an AoA or similar study to identify the available options that address the identified capability gaps. The AoA compares alternatives and includes an assessment of the development, production, O&S and disposal costs. The AoA should utilize an antecedent system or capability as the AoA baseline alternative from which to develop an O&S cost estimate in terms of cost per year or operating cost per unit of utility (e.g., Cost per Flying Hour, or Cost per Vehicle Mile). The O&S cost of alternative systems are estimated against the baseline. The Component and the Acquisition

Executive consider the relative O&S cost of each alternative against the Component's programmed and projected resources prior to initiating a MS A decision.

PSM Tip

O&S cost estimates are often expressed in terms of average cost per year or average cost per operating unit of utility. Consistent terms allow the program to make comparisons among alternatives and the baseline.

Prior to the MS A, Components must implement measures to:

1. Determine whether the desired capability is worth the projected cost in the context of the capability portfolio;⁴
2. Track and assess the cost and capability benefit through the program life;
3. Trade off capability if necessary to control the cost;
4. Consider program restructure or cancellation if program cost is unrealistic within current portfolio affordability projections.

⁴ USD AT&L, Implementation Directive for Better Buying Power - Obtaining Greater Efficiency and Productivity in Defense Spending, November 3, 2010. <https://acc.dau.mil/CommunityBrowser.aspx?id=407883>

PSM Tip

Opportunities to influence O&S costs diminish as design decisions are made through the life cycle. PSMs are the program's primary advocate for sustainment early in the life of the program.

Decisions on program requirements, performance, and configuration made early in the acquisition process will largely determine a system's O&S costs, and the opportunities to reduce/avoid O&S costs diminish as a program advances through the phases of the life cycle. For example, manpower is a significant O&S cost driver, and it is dictated by crew size and maintenance demands. These parameters are established by the system design under the cognizance of the PM. It is very difficult to decrease the manpower costs once the system is in use. The program's choices of technology and system architecture also drive the O&S cost. Thus, controlling O&S cost requires properly scoped capability requirements and program structure.

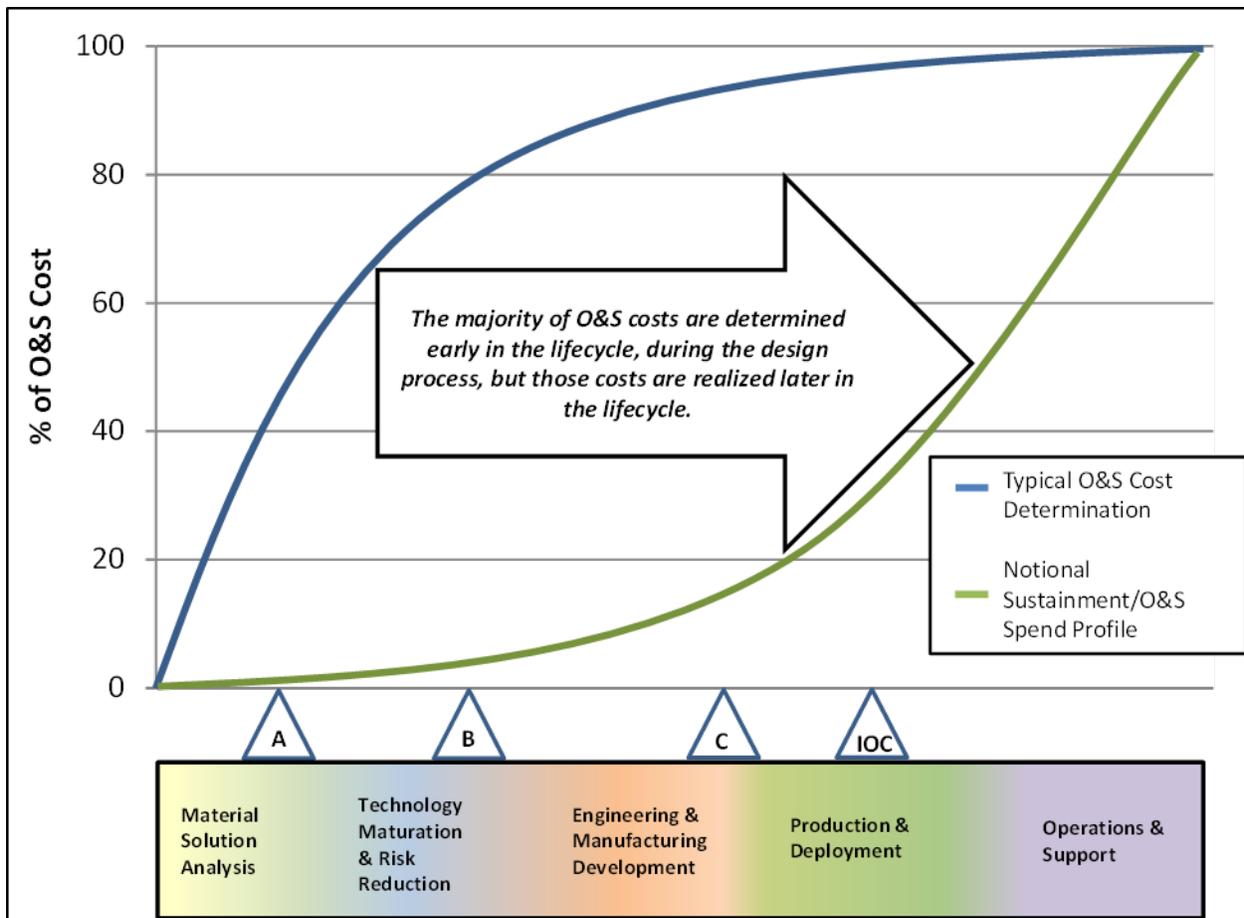


Figure 4 – Time delay between decisions effecting O&S cost and the realization of those costs

Figure 4 illustrates that requirements influencing O&S costs are established early in the program, but the resultant costs of early decisions are not realized until later phases of the life cycle.

The AoA results may require tradeoffs among capabilities to control costs and inform KPP and KSA development for the Capability Development Document (CDD). AoAs typically consider O&S trades among parameters, such as crew size, total carrying capacity, mobility, fuel efficiency and range, size, weight, power and cooling (SWaP-C) growth capacity, combat enablers, survivability, and total system weight. The program must consider O&S cost impacts in trades among these parameters for the system to remain affordable.

4.2.1.2. Design Interface and Affordability

Design Interface is the exchange of information between a program’s product support and systems engineering functions to enable design trades among product support considerations, including O&S costs. System design’s influence on O&S costs is surpassed only by requirements definition in its effect on O&S cost, and the magnitude of this impact is greatest during early design decisions. SE and Supportability Analysis trade studies that focus on

managing O&S costs are conducted in the context of the Affordable System Operational Effectiveness (ASOE) Model, as discussed in the DAG Chapter 4, Systems Engineering and Chapter 5, Life Cycle Logistics.

PMs and PSMs must ensure O&S cost is integrated into the SE process. For O&S cost information to be appropriate to use in analysis, it must have a level of accuracy and precision that is comparable to other design factors that the program is using in its design trades. This section provides guidance on the points of integration in the SE process that will enable timely design influence. This section also provides guidance on the means of progressively increasing the accuracy and precision of O&S cost information through methodical association of design factors that influence cost. This method is termed decomposition for the balance of this discussion.

PSM Tip

PSMs can integrate O&S cost into the System Engineering process by establishing O&S Cost as a Technical Performance Measure.

PMs can integrate O&S cost into the SE process using the steps depicted in Figure 5:

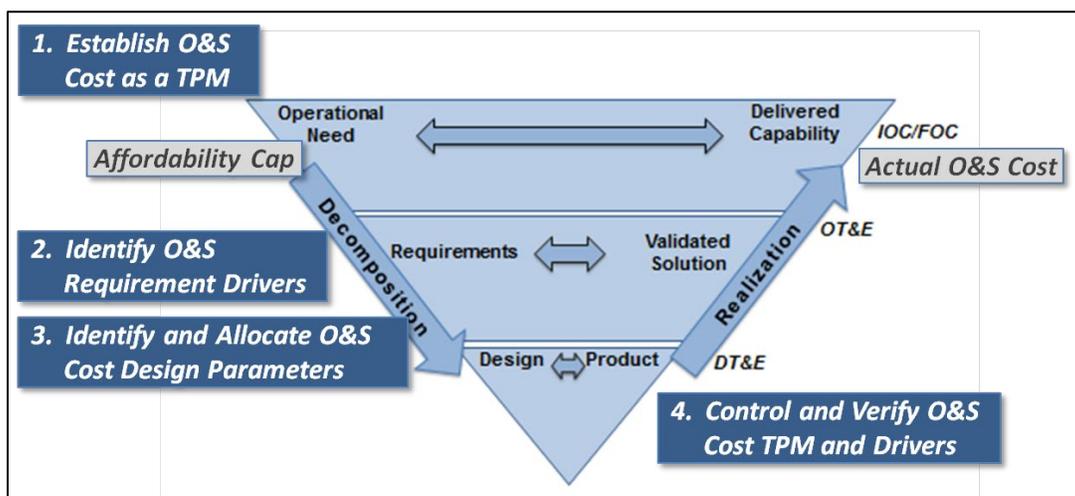


Figure 5 – Steps to Integrating O&S Cost within the SE Process

1. Establish the O&S cost as a program performance metric within the Systems Analysis and Control function. Programs without a formal O&S Cost KSA should establish cost metrics to help manage O&S costs.
2. Identify requirements that drive O&S cost. The systems engineer, cost analyst, and PSM should decompose the system to its O&S cost factors and determine which may be controlled through design or product support strategy. (System reliability and maintainability are examples of design requirements that drive O&S cost.) Decomposition generates design requirements for controlling O&S cost, which may be candidates for contractor program performance measures.
3. Ensure design requirements are properly allocated to support O&S cost. For O&S cost to influence design, the program must allocate design requirements that influence O&S cost to work breakdown structure elements as part of the requirement flow-down process. Examples of allocated cost drivers related to fuel costs include power train efficiency, sub-system weight targets and drag coefficients.
4. Control and verify the O&S cost of the system and its top cost drivers. The program should track O&S cost as it tracks Technical Performance Measures (TPMs), throughout development and integration, including documentation of value changes and estimated O&S cost ranges. Programs should similarly track O&S cost drivers as the design matures to verify that the design supports achieving the expected O&S cost. Examples include tracking the wind tunnel results and design weight estimates as the design evolves and continually updating the estimated fuel consumption values used in cost estimates.

PSM Tip

Cost decomposition provides the stakeholders with an understanding of costs drivers that are both within and outside of the program's control. O&S cost drivers that fall outside the program's control may be partially mitigated by engineering and sustainment planning.

In order to identify design factors that drive O&S costs, the program must decompose the O&S Cost KSA into its constituent cost elements. The decomposition provides the PM, PSM, and other stakeholders with an understanding of costs and drivers of costs that are both within and

beyond the program's control. For costs that are within the program's control, decomposition offers insight into the design factors that the program may use to control costs.

Cost drivers that the PM controls fall into two categories:

- Design factors; examples include: reliability, diagnostics, fuel efficiency, and maximum speed. Design factors include CDD or Capability Production Document (CPD) requirements, as well as derived design parameters that may be in the proposal evaluation criteria, contract requirements, or lower-level cost allocation.
- Non-design factors; examples include: core logistics capability requirements to include depot maintenance, supply chain performance, and transportation.

The PM should treat O&S cost drivers that fall outside of the program's control as assumptions or constraints to which the program must respond to through engineering and sustainment planning. These assumptions and constraints should be thoroughly documented, with particular attention on how they impact the O&S cost estimate. Such drivers may include:

- Operational factors determined by the Component or Warfighter, such as the mission profile, deployment strategy, and the yearly operating rate or Operational Tempo (OPTEMPO).
- Infrastructure factors which generally fall within the Component or DoD control. Examples include supply chain overhead/surcharge rates and organic personnel costs.
- Costing ground rules that structure the cost estimate, such as the cost estimate length (i.e., the operating duration assumption for the program) and production quantity. Since service life and system quantity become multiplicative factors in the O&S cost estimate, these ground rules are often significant O&S cost drivers.
- Factors not within DoD control (e.g., the price of fuel, inflation, statutes, acts of Congress, etc.).

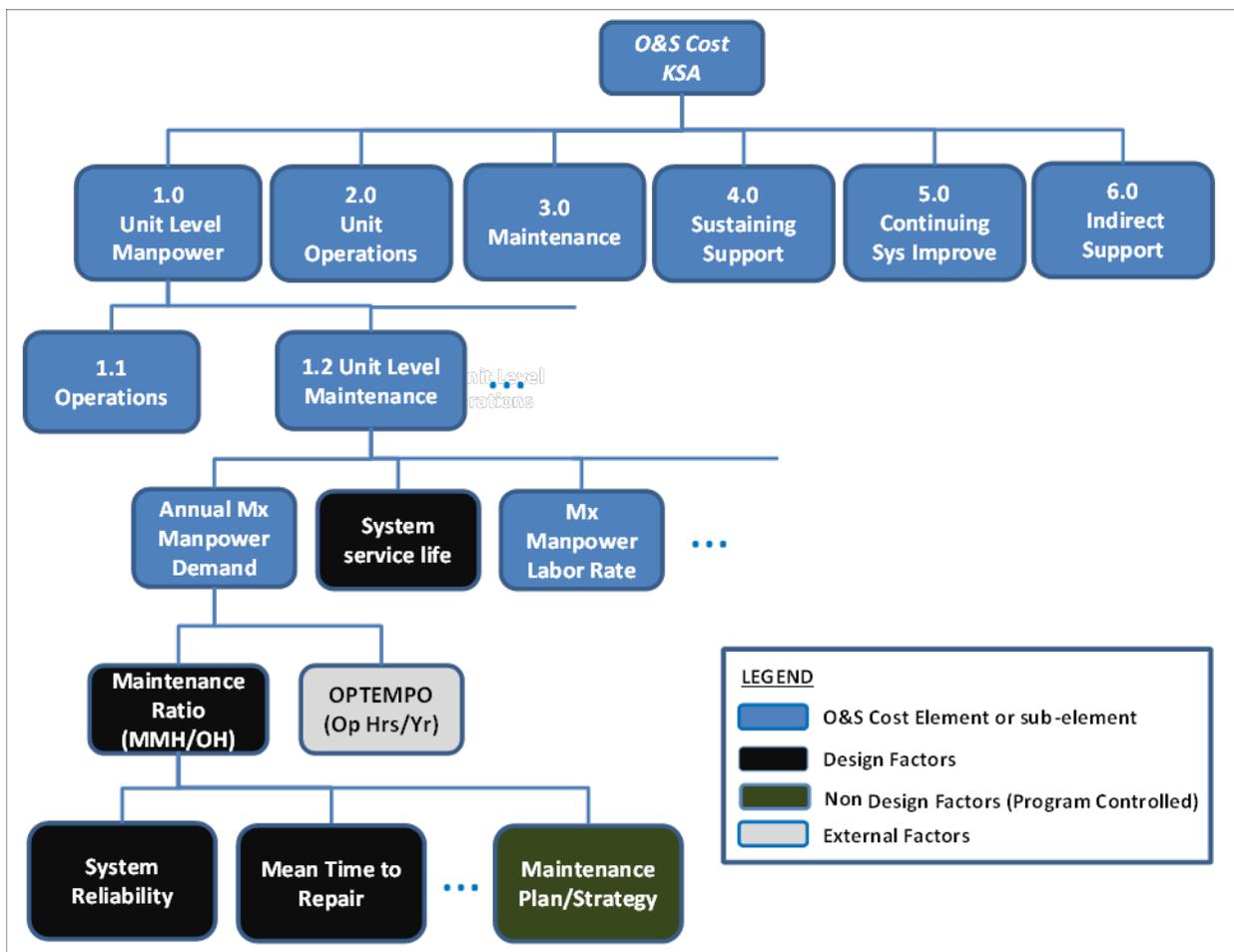


Figure 6 – Notional Decomposition of a Cost Sub-Element (Based on CAPE O&S Cost Element Structure)

Figure 6 follows a notional decomposition of the Unit Level Manpower O&S Cost Element. The costs of the O&S Cost KSA are first broken into the six (6) top level CAPE O&S Cost elements. Element 1.0 Unit Level Manpower is broken into its primary cost drivers, shown here as Operations and Unit Level Maintenance Manpower. This level of decomposition may suffice for cost estimate reporting, but it is not adequate for the PM/PSM to determine the cost drivers and subsequent design factors that control costs. Further decomposition is required to estimate maintenance manpower. In this case, Annual Mx Manpower Demand, the service life, and the Maintenance Manpower Labor Rate determine the Unit Level Maintenance Manpower Cost. It is at this level that the cost estimator has enough information to perform a cost estimate of Maintenance Manpower for the system.

The PM/PSM needs a deeper level of breakdown to help control the costs of the Maintenance Manpower. This is where the design factors (shown in Figure 6 in black) and non-design factors (shown in Figure 6 in green) are important. At the lowest level in Figure 6, the design factors of System Reliability and the Mean Time to Repair determine the Maintenance Manpower demand. These are attributes that the PM/PSM can use during the design phase to analyze,

trade, and effect the future O&S costs. For example, an increase in system reliability will likely reduce Maintenance Manpower demands since the system will require fewer repairs.

The non-design factor Maintenance Plan/Strategy also determines the Maintenance Manpower Demand. For example, a decision to use two levels of maintenance instead of three levels of maintenance impacts O&S Maintenance Manpower Demand. While there would be a decrease overall in maintenance manhours; O-level maintainers could increase in order to assume additional workload. The depth and breadth of the analysis done to determine cost drivers will depend on the maturity of the program and phase in the life cycle; detailed analysis will be difficult to conduct when the program is pre-MS A since many of the programmatic and engineering specifics are still being determined. However, as the program progresses through the life cycle, the depth of the identification of cost drivers should mature.

PSM Tip

The extent of the PSM's decomposition efforts depends on the maturity of the program and phase of the life cycle. As the program progresses through the phases, the analysis should mature.

The PM/PSM should conduct an assessment like the one above on each high-level component of the O&S Cost to determine the design elements that exist in the program. Once these design elements are determined, then the PM/PSM develops the product support strategy, and eventually Should Cost initiatives, to promote program affordability. This iterative process is repeated multiple times as the system design matures.

OTTER USE CASE

Through the build-up of the OTTER O&S cost estimate in the CAPE O&S Cost Element Structure, it is clear where the largest cost elements are – Maintenance and Continuing System Improvements. Using the decomposition process, the PSM determined what specifically is driving the costs. Within Continuing System Improvements, the first subcategories are Hardware Modifications and Software Maintenance. In the case of OTTER, Hardware Modifications is comprised of a bill of materials, a refresh cycle, and the installation labor. Software maintenance is comprised of the quantity of source lines of code, number of bugs/defects, labor rates, and a refresh cycle.

4.2.1.3. Reliability, Availability, Maintainability and Cost (RAM-C) Rationale

Another point of integration between the requirements development, product support and SE is the development of the program's RAM-C Rationale Report

(<https://acc.dau.mil/CommunityBrowser.aspx?id=299671>). This report provides early (pre-MS A) reliability, availability, maintainability and cost feasibility assessments of alternative concepts, including:

- Early formulation of maintenance and support concepts;
- Audit trail to document and support JCIDS thresholds;
- Balance between the sustainment metrics (Availability KPP, Reliability KSA, and O&S Cost KSA); and
- Early risk reductions by ensuring requirements are achievable.

The RAM-C Rationale Report, in conjunction with the Systems Engineering Plan (SEP), Test & Evaluation Master Plan (TEMP), LCSP and design reviews, are the critical management tools for monitoring progress against the affordability goal/cap prior to the Operations and Support phase of the life cycle.

4.2.1.4. Product Support Planning

Product Support Planning entails development of the Product Support Strategy (PSS) and relating that strategy to the O&S cost estimate through the IPS elements.

4.2.1.4.1. Product Support Strategy

The PSS defines the sustainment of the system throughout the life cycle. The PSM's principal goal of the PSS should be achievement of the Sustainment KPP. The end-state PSS should achieve the intended mission in the most austere conditions balanced against affordability and the Sustainment KPP.

PSM Tip

The PSM develops the Product Support Strategy to achieve the Sustainment KPP.

Examples of areas the PSS might define are: levels of maintenance, mix of government and commercial support providers, repair locations, wholesale inventory locations, and main transportation resupply routes. PMs/PSMs, in conjunction with business and contracting advisors, must employ the tenets of performance-based product support, which may include the use of performance-based agreements and PBL contracts/arrangements to increase the likelihood of achieving the sustainment requirements and improving the management of O&S costs. More information on performance-based product support and PBL can be found in the ASD(L&MR) memorandum “Performance Based Logistics Comprehensive Guidance” signed on November 22, 2013 and in the PBL Guidebook, signed May 27, 2014. These documents are found at <http://bbp.dau.mil/docs/ASD-LandMR-PBL-ComprehensiveGuidance-22Nov2013.pdf> and <https://acc.dau.mil/pbl-guidebook>, respectively.

The PSS informs the more detailed LCSP, which defines the capabilities, resources, timelines, roles, and responsibilities necessary to deliver the PSS. The PSS, together with the program’s agreements with organic support providers and contracts with commercial providers, comprise the product support package. The LCSP annotated outline issued with the Principal Deputy USD(AT&L) September 14, 2011 Memorandum on Document Streamlining provides detailed guidance on LCSP content.

The PSS helps the program, the Component, and the CAPE to better identify and quantify the drivers of O&S cost in cost estimates. Cost estimates developed by different organizations provide both common and unique management information, which offers insight into the relative impact and risks that IPS elements have on O&S cost. The DAG Chapter 3.4 provides descriptions of the different types of cost estimates performed by programs, Components, and the CAPE for MDAP programs; the DAG Chapter 3.6 covers MAIS programs. A program’s analysis of O&S cost in conjunction with supportability analysis should continually identify both risks of cost increases and opportunities to reduce/avoid cost.

OTTER USE CASE

The OTTER program is currently pre-MS B and can summarize its product support strategy as:

The OTTER sustainment approach is a blend of sailor maintenance and Contractor Logistics Support to keep the system available for mission tasking. The OTTER is a software intensive system, and the software will be kept current through planned system updates. Operators will be kept current on system operation through simulator training.

4.2.1.4.2. IPS Elements

This section begins with a listing of the IPS elements then turns to the logical mapping among the IPS Elements, the CAPE O&S cost element structure, and the appropriation categories. This mapping is intended to help PMs and PSMs identify the areas of greatest opportunity to initiate Should Cost initiatives.

The PSM Guidebook introduces the IPS elements and a listing of the sub-elements to the third level of indenture. The DoD IPS Element Guidebook (<https://acc.dau.mil/ips-guidebook>) provides detailed points that PMs/PSMs should consider in designing each product support element. Detailed information on these elements and their associated sub-elements can be found in the DoD IPS Element Guidebook.

PSM Tip

PSMs must focus analytical efforts on items that most significantly impact a particular program.

The twelve 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
- Computer Resources

Within the framework of the twelve IPS elements, there are three levels of indenture with numerous potential work items. PSMs must use their knowledge and experience to focus their analytical efforts on those work items that will most significantly influence the effectiveness of the product support package and O&S costs.

4.2.1.4.3. Map the IPS Elements to O&S Cost Elements

The explicit mapping of IPS elements to O&S cost categories shown through an example in this section provides the PM/PSM with a technique to characterize the impact of funding changes to the program's ability to achieve the Sustainment KPP and the O&S affordability cap. Funding changes may be necessary due to alterations in user requirements that precipitate additional design trades. These trades must be accomplished with due consideration of the impacts to the product support strategy and O&S affordability.

Taken together, the IPS elements and sub-elements, O&S cost elements, and five appropriations (RDT&E, Procurement, MILCON, MILPERS, and O&M) imply 50,000+ potential points of association. An experienced product support professional can significantly reduce the number of associations in this map through simple inspection and focus on the largest cost drivers. For example, the association among the Technical Data product support element, the Unit-Level Manpower cost element and the MILCON appropriation is highly unlikely to require detailed consideration. The point of this analysis is to quickly narrow the list of associations to those which represent the greatest influence and the greatest cost, which then warrant more intensive analysis.

For the purpose of illustration, this guidebook simplifies the list of associations by focusing on the costs for people, parts, and fuel. This focus does not imply that other costs are not important in managing O&S cost; for example, in some net-centric programs, the cost of software maintenance contributes heavily to the O&S cost due to ongoing software support and license fees. Rather, the focus on people, parts, and fuel provides a realistic emphasis on costs that tend to dominate weapon systems O&S cost estimates. This claim warrants some justification, which must be in the analysis. While the data for this example is Air Force specific, a similar analysis of the other Military Services should yield similar insights. Comparable data for Naval systems is available through the Naval VAMOSC database and for the Army systems through OSMIS.

Figure 7 shows that in 2014, 79 percent of the Air Force weapon system O&S cost was for aircraft-related costs.

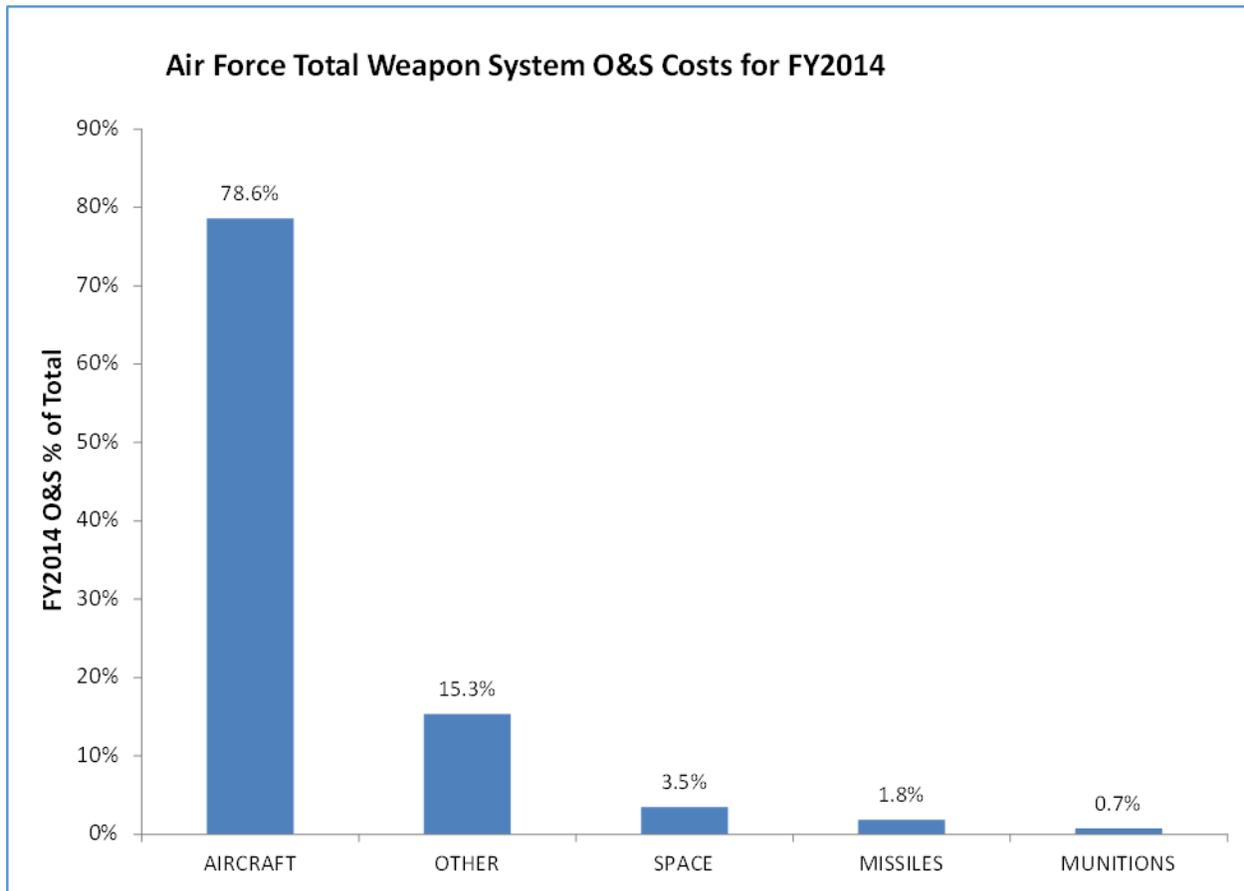


Figure 7 – Air Force 2014 O&S Costs

Figure 8 provides a breakout of 2014 major aircraft costs. Costs explicitly categorized as people, parts, and fuel constitute 58 percent of O&S costs. This number understates the total cost of people and parts because the cost categories for Contractor Logistics Support (CLS) and Depot Maintenance include costs for manpower and repair parts, though not explicitly.

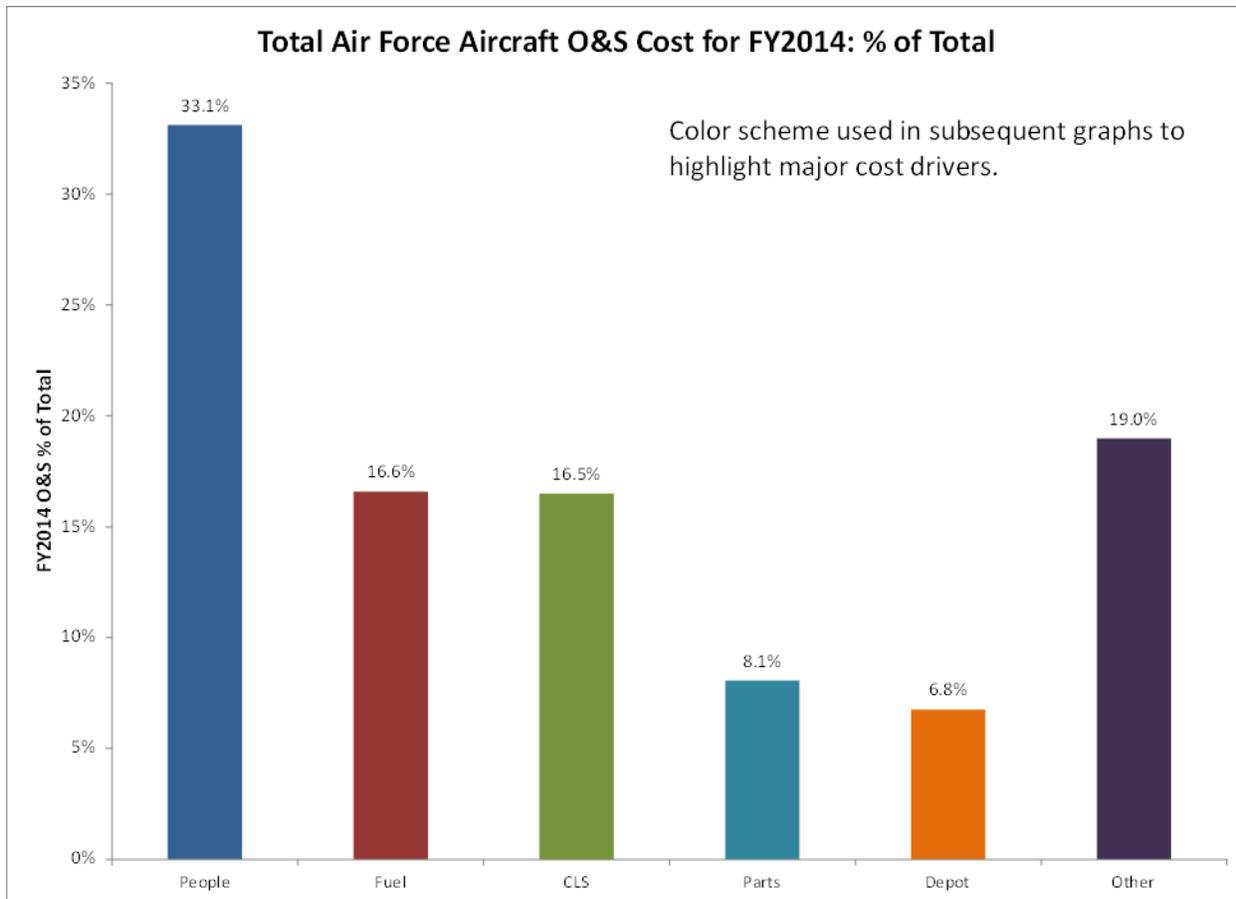


Figure 8 – Breakout of major aircraft costs

The CLS and Depot cost categories are difficult to categorize since they are likely to include costs for manpower and parts as well as other things like overhead and facilities. Due to the fact that the CLS and Depot costs include costs for manpower and parts, they are included in the discussion of “people, parts, and fuel.” Additionally, the inclusion of CLS and Depot costs provides a useful upper bound in the scoping of costs for this discussion.

With the inclusion of CLS and Depot costs, the total potential costs of people, parts, and fuel could be as high as 81 percent of the total Air Force Aircraft O&S in FY2014. A more detailed analysis could refine this estimate of people, parts, and fuel costs. However, knowing the total is between 58 and 81 percent (the latter when CLS and Depot are included) of the Air Force aircraft O&S cost provides the user a reasonable appreciation for their significance. It also is a good starting point in identifying the cost categories that require the greatest management focus.

Further breaking the cost data down shows that of the 88 aircraft programs captured in AFTOC, 16 programs constituted 80 percent of the aircraft O&S cost (Figure 9).

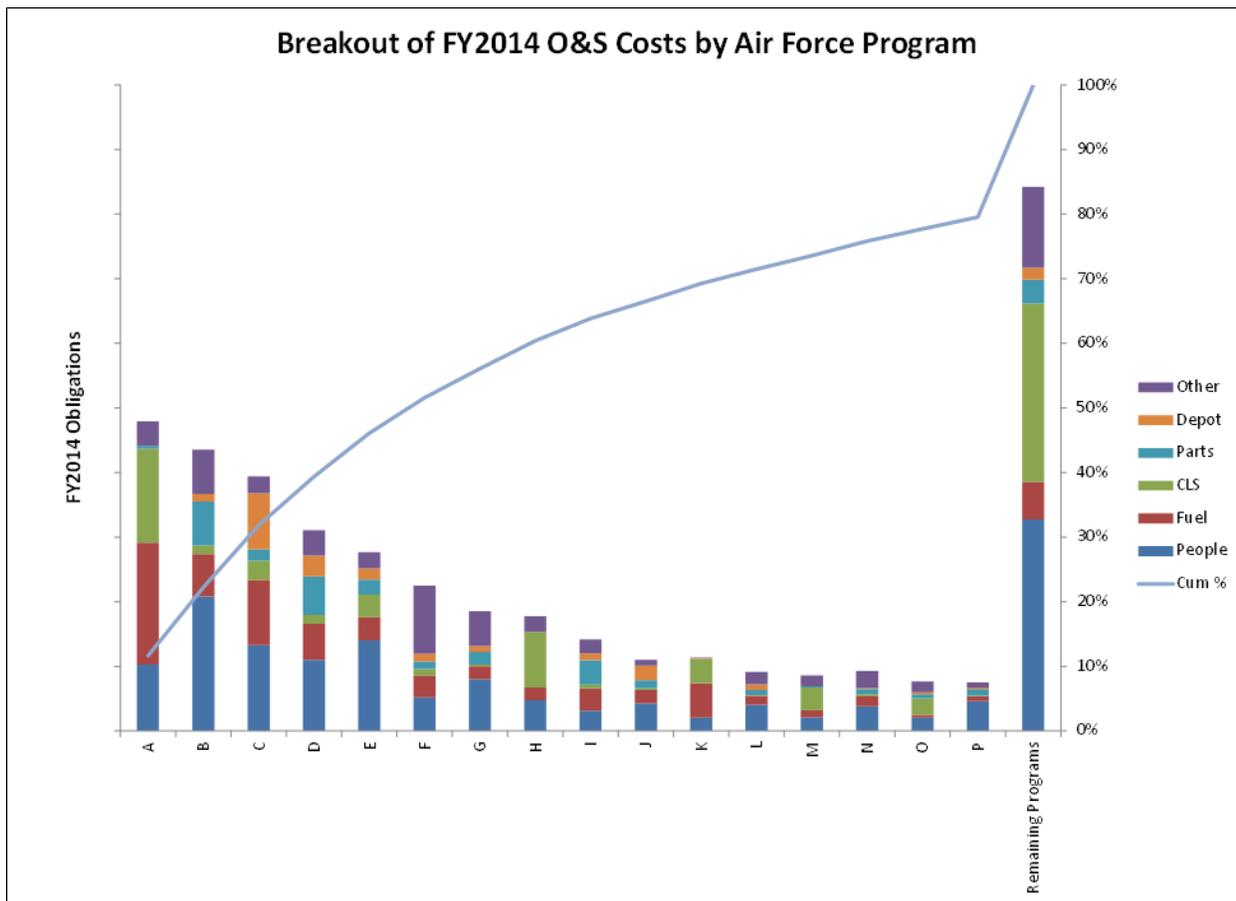


Figure 9 – Breakout of aircraft O&S costs by program

PSM Tip

PSMs must tailor O&S Cost analyses and management to the needs of the program.

Within the individual programs, the cost of people, parts, and fuel (inclusive of CLS and Depot) varies as a percentage of the total O&S cost, from a low of 57 percent to a high of 95 percent (Figure 10). There are two key insights here. First, in absolute magnitude, even the low of 57 percent highlights the criticality of actively planning for and managing the drivers of these costs. Second, the program-to-program variability highlights the need for program-specific sustainment planning. Effective O&S cost management defies a one-size-fits-all approach.

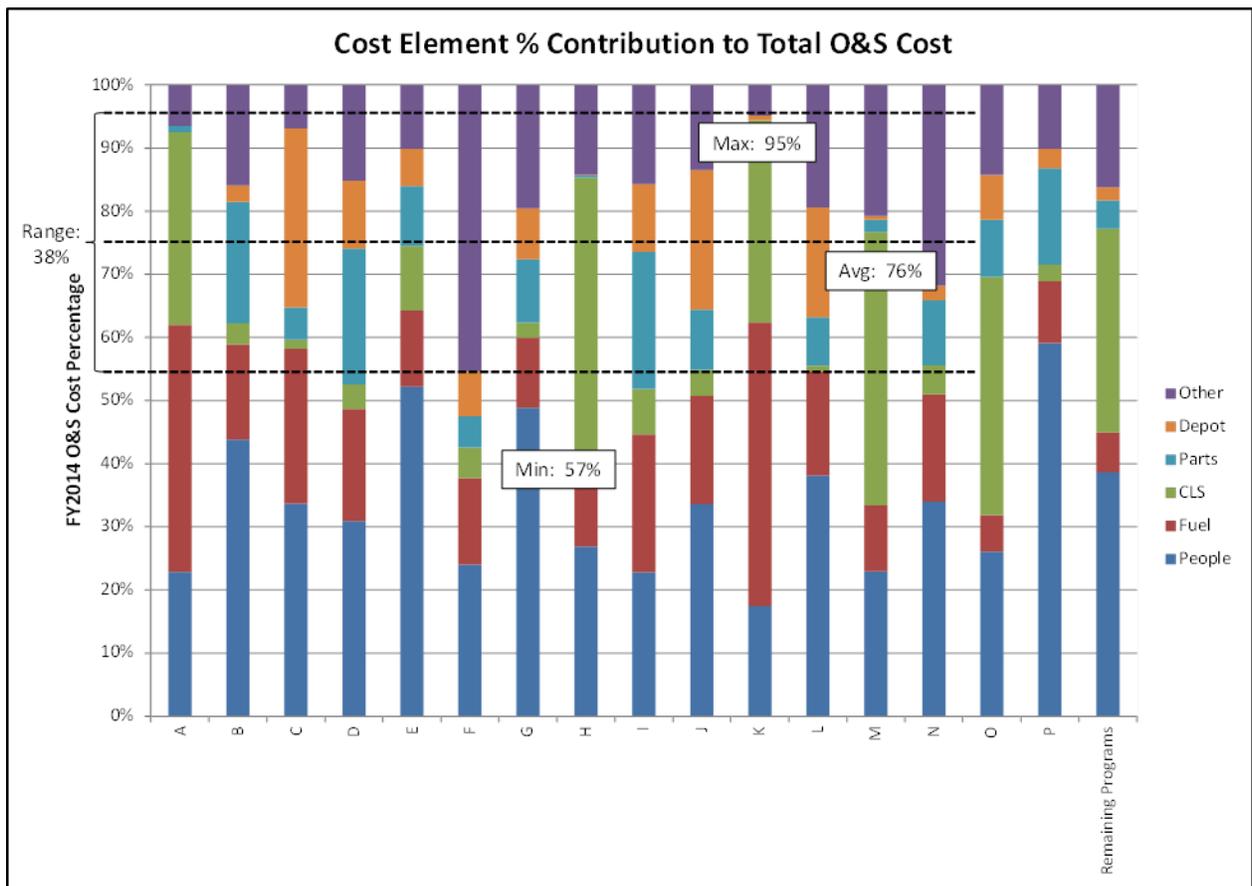


Figure 10 – Breakout of aircraft people, parts, and fuel (inclusive of CLS and Depot) costs by program as a percentage of individual program total O&S costs

The significance of people, parts, and fuel is not unique to 2014 O&S cost data. Figure 11 shows that costs for people, parts, and fuel (inclusive of CLS and Depot) varied significantly over the 18 years prior to 2014 but have largely fallen between 70 and 90 percent of aircraft O&S cost.

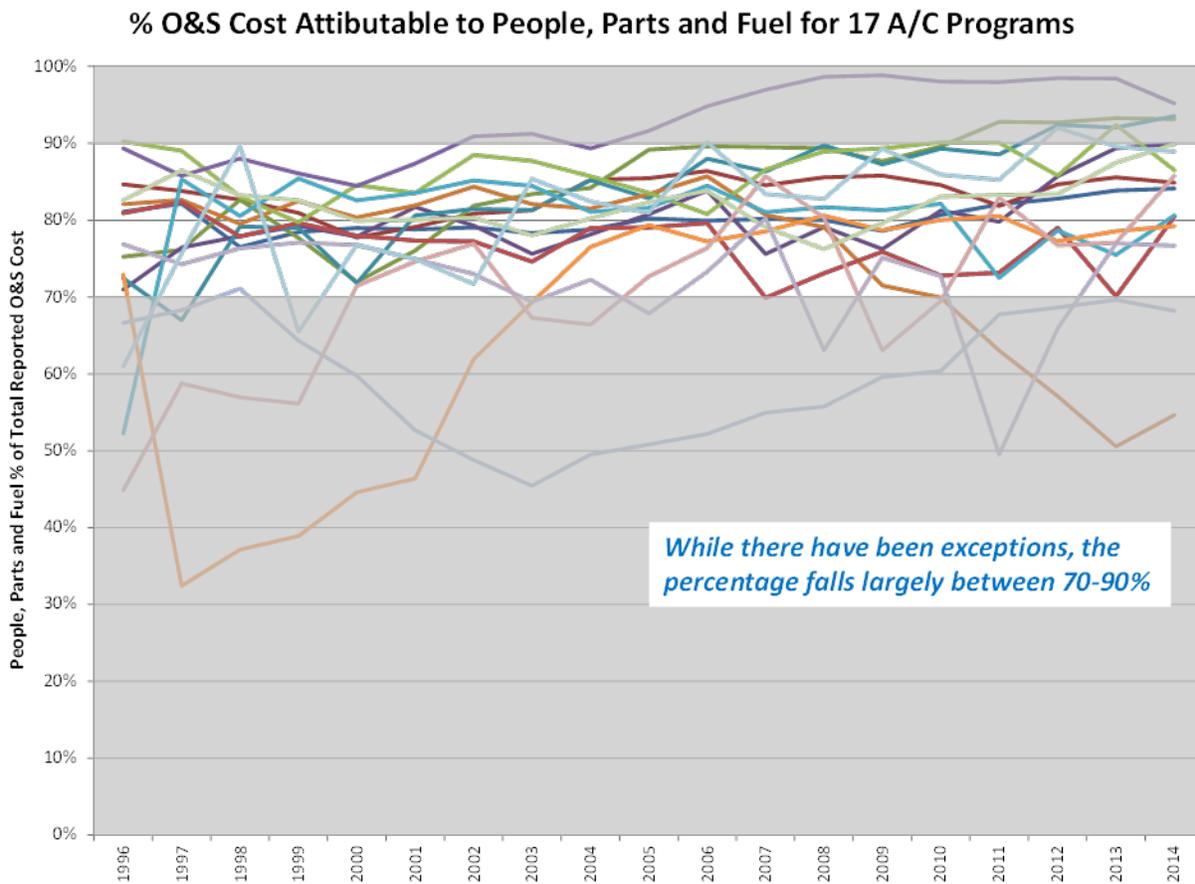


Figure 11 – Percentage of total program O&S cost driven by people, parts, and fuel (inclusive of CLS and Depot) since 1996 for 17 aircraft programs

The remainder of this section will focus on those CAPE O&S cost elements that capture costs associated with people, parts, and fuel. The example shown will specifically emphasize 3.1.4 Contracted Maintenance Services (Figure 12).

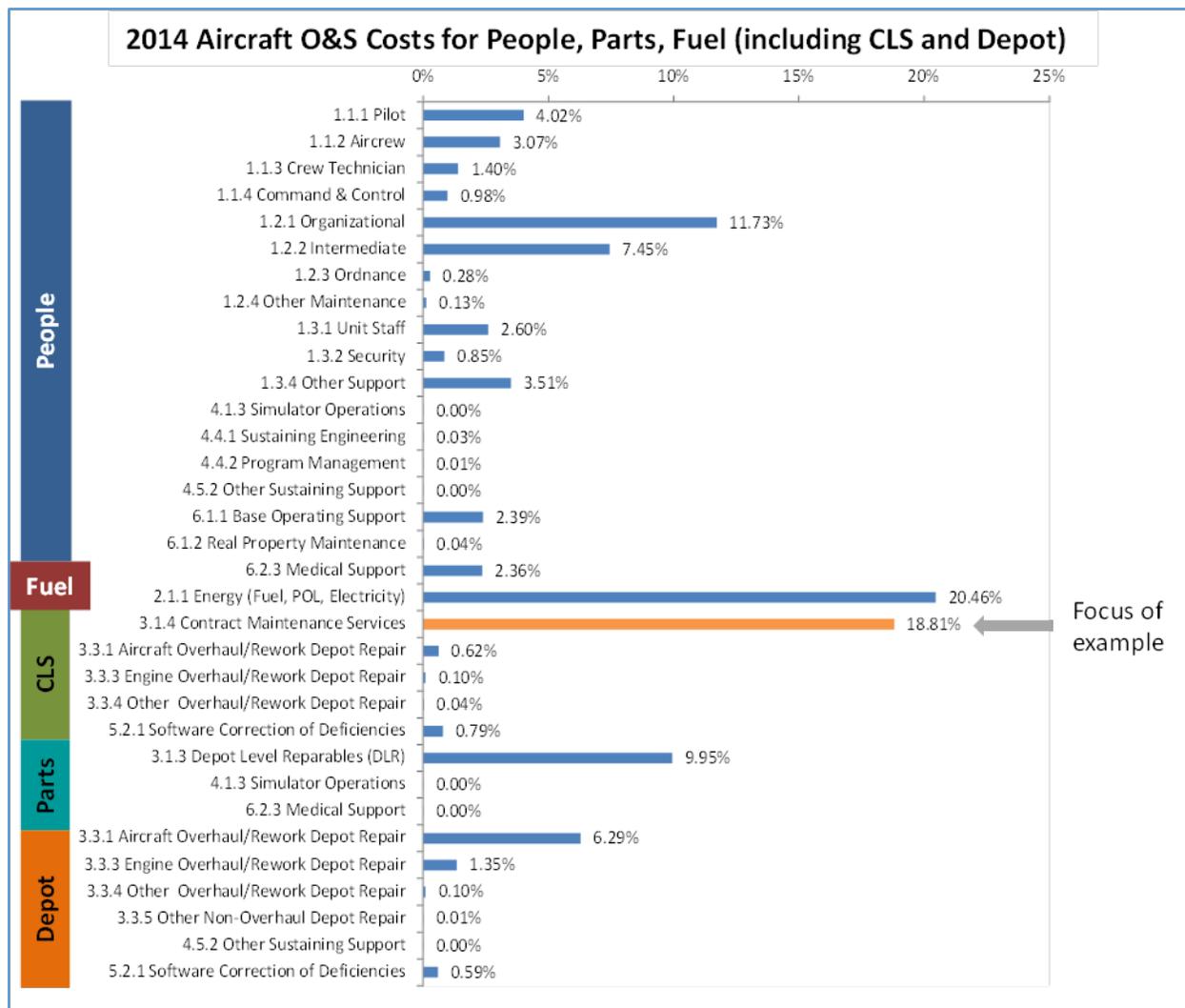


Figure 12 – Level 2/3, CAPE cost elements capturing costs for aircraft people, parts, and fuel (inclusive of CLS and Depot)

Contract Maintenance Services is second in magnitude only to energy. This cost category offers an example of a strong association with the IPS elements, particularly Supply Support. (In AFTOC, Contract Maintenance Services includes all CLS costs; however, it can be strongly associated with the Supply Support IPS element.) As an example, Figure 13 traces the influence of discrete Supply Support on the cost of Contract Maintenance Services. The figure shows that the first association is between the Supply Support IPS element and the CAPE cost element 3.1.4 of maintenance. It further shows that these two elements are primarily associated with the O&M and MILPERS appropriations.

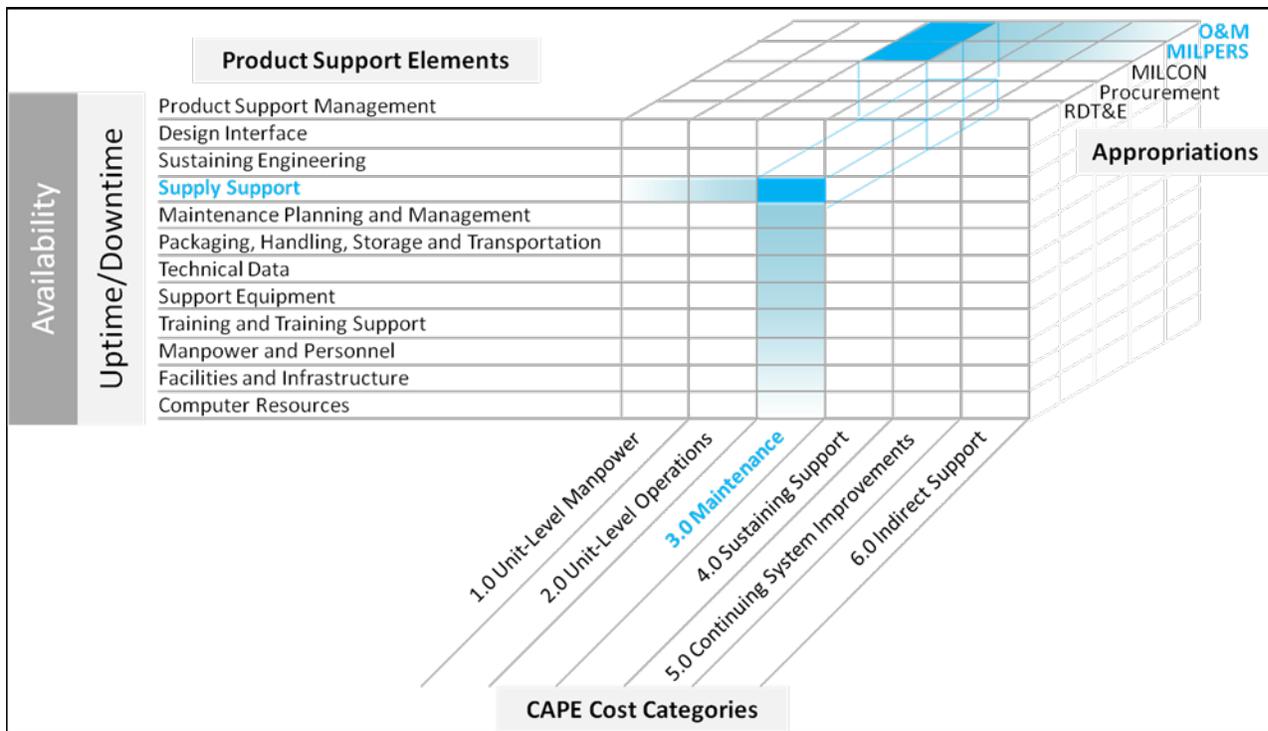


Figure 13 – Association among IPS Elements, Cost Categories and Funding Appropriations; focus on Supply Support, Maintenance, and O&M and MILPERS funding

Table 4 provides some detailed considerations necessary to map Supply Support to Contract Maintenance Services.

PSM Tip

The PSM’s critical thinking is essential to ensure that the program’s O&S cost estimates are as accurate as the program’s maturity will allow.

The considerations provided are not intended to be exhaustive but to stimulate the critical thinking necessary to ensure that the program’s cost estimates are as accurate as the program’s maturity will allow, and that the logical association is explicit such that the impact of funding changes on product support performance can be assessed. An exploration of such associations for all IPS elements and CAPE O&S cost elements are in Appendix B.

IPS Elements	Cost Element	
	3.1 Organizational Maintenance and Support; 3.1.4 Contract Maintenance Services	
4.0 Supply Support	Potential Appropriations	Key O&S Cost Considerations
4.1 Supply Chain Management	O&M, Procurement, DWCF and Service WCF - non-expiring, revolving funds	<ul style="list-style-type: none"> • Overhead costs associated with inventory and stock positioning and materiel planning procurement, manufacturing, delivery, and storage and returns; • Wholesale versus retail price; • Prime contractor pass-through costs of subcontractor supplied parts; • Costs of supply chain assurance (E.g., counterfeit material, malicious hardware/software). • Managers of activity groups within the WCFs are required to set prices based upon the full cost recovery principle. The budget process establishes and, except for the Depot Maintenance and Central Design Agent Activity Groups, they remain fixed during the year of execution. These stabilized rates allow customers to confidently budget for a desired level of supplies or services, minimizing the potential of having to reduce their programs due to higher-than-anticipated prices during the year of execution. The use of WCF facilitates full cost visibility, stabilized rates and application of standard policies across the business functions.
4.2 Forecasting	O&M, Procurement, RDT&E	<ul style="list-style-type: none"> • Requirements for Readiness-Based Sparing (RBS) and Multi-Echelon modeling or Availability Based Sparing (ABS); • Reliability growth investment and realization; • Long-lead items and obsolescence.
4.3 Initial Provisioning	O&M, Procurement	<ul style="list-style-type: none"> • Item identification, data, documentation, and participation in provisioning conferences; • Support for Defense Logistics Agency (DLA) Logistics Information Service (DLIS); • Parts pricing and initial allowance and replenishment quantities; • Storage, handling, and transportation; • Obsolescence.
4.4 Procurement	O&M, Procurement	<ul style="list-style-type: none"> • Direct material and fuel costs; • Overhead costs of procurement function; • Parts obsolescence; • Warranties.

<p>4.5 Inventory Management</p>	<p>O&M</p>	<ul style="list-style-type: none"> • Receiving; • Issuance; • Transfer; • Redistribution; • Buffer stock, safety stock, war reserve; • Munitions storage and transportation management; • Total asset visibility requirements (e.g., serialized item management, item-unique identification, radio frequency identification); • Requirements to provide asset visibility in government system of record.
<p>4.6 Selected DoD and DoD Component-Unique Supply Systems and Tools</p>	<p>O&M</p>	<ul style="list-style-type: none"> • Cost of furnishing data for DoD systems that provide analytical support in supply management.

Table 4 – Considerations in Mapping 4.0 Supply Support to 3.1.4 Contract Maintenance Services

The intent of this example is to demonstrate the utility of mapping IPS elements to O&S cost categories and appropriations to drive collaborations among program functional areas, with emphasis on product support and O&S cost estimating. There are varying levels of criticality in the associations among IPS elements, costs categories and appropriations, and that criticality should influence the relative efforts to analyze cost, benefits, and risks.

PSM Tip

The PSM must recognize the varying levels of criticality in associations among IPS elements, cost categories, and appropriations. This criticality should dictate the relative efforts to assess costs, benefits, and risks. The PSM should keep a record of key assumptions used in any analysis.

The PSM must maintain a record of key assumptions used in estimating the cost of the IPS elements. An understanding of these assumptions is vital to assessing the impact to availability if key assumptions are violated or if funding constrains delivery of a product support element, either in part or in its entirety.

4.2.1.5. Historical Analysis

Another way to define appropriate Should Cost initiatives is through analysis of historical costs for analogous legacy systems in the capability portfolio. Portfolio-based analysis is similar to the analysis shown using AFTOC data in the previous map of the IPS elements to O&S cost elements. Figure 14 shows an example of program-specific analysis for Program ABC. This method is not prescriptive for all programs; rather, it illustrates one method a program may use to develop Should Cost initiatives.

Program ABC is an aircraft that will replace an existing DoD asset. With the help of the cost estimating team, the PSM analyzed the current costs of the legacy aircraft in the CAPE O&S cost element structure (Figure 14). Within each cost element, the PSM identified the significant cost drivers (to the left) and assessed the opportunity to influence the cost element (to the right). With almost half of the legacy system's O&S costs in the category of maintenance, this was an obvious area to explore for cost reduction opportunities, but the PSM did not limit potential opportunities to this category.

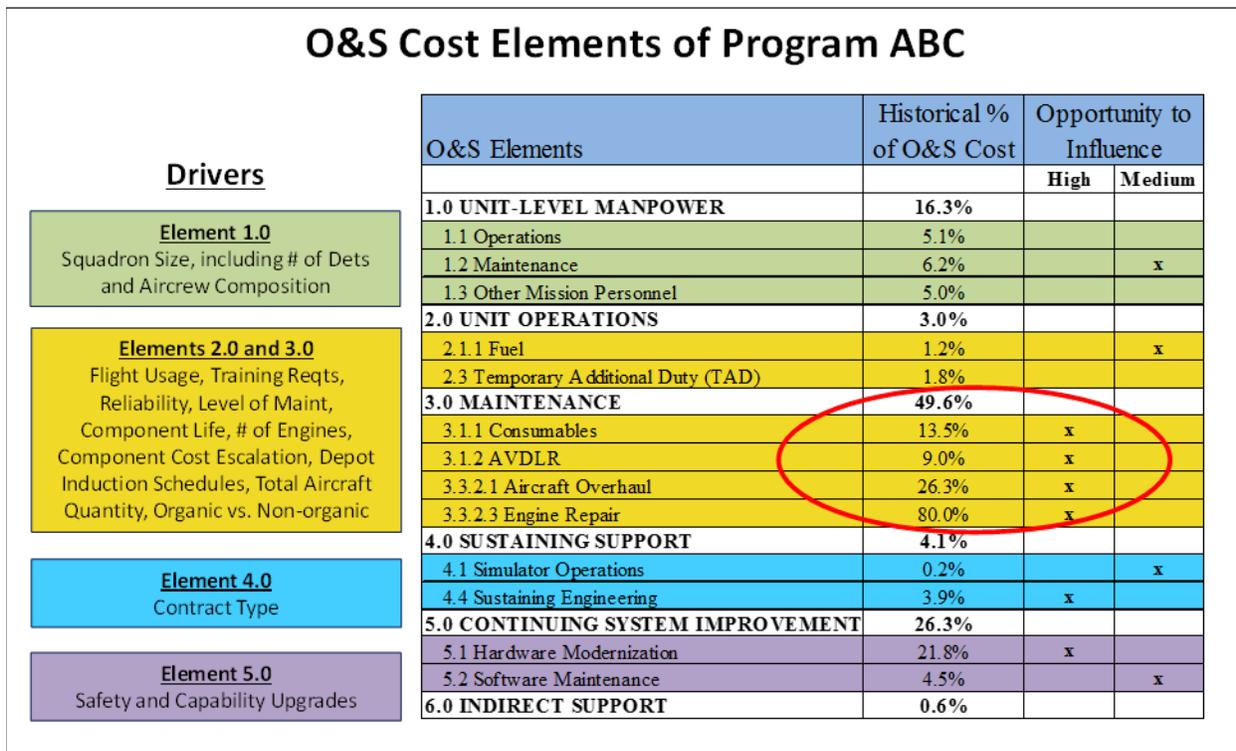


Figure 14 – Example of legacy system O&S cost analysis

Once the PSM identified the top cost drivers and assessed the ability to influence those cost drivers, then he established Should Cost initiatives. Figure 15 shows the top costs and the areas in which Should Cost initiatives might have the greatest impact. The left side of the pareto graph lists specific opportunities within the four top cost elements' Should Cost initiatives. For example, the PSM determined that within the maintenance cost of Aircraft Re-work, optimizing the induction interval of the aircraft might be a key O&S cost savings opportunity.

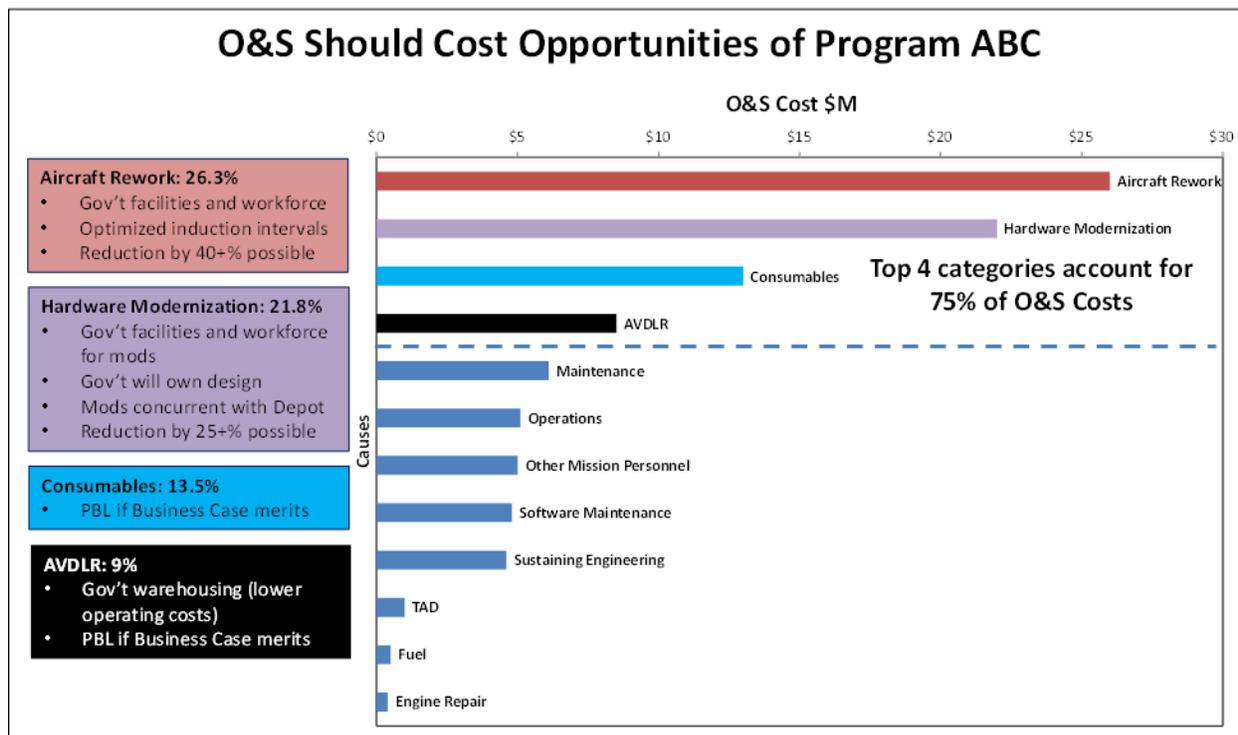


Figure 15 – Example of Should Cost Initiative Development

Once the PSM completed the analysis of historical costs and cost drivers, and identified Should Cost initiatives, he considered the potential impact of the Should Cost initiatives within the parameters of the new system estimate. Figure 16 shows the legacy aircraft average annual cost compared against several iterations of the Program ABC average annual O&S cost estimate. The current O&S estimate shows a range of \$10.5-\$12.6M/aircraft/year; the initial goal column shown is the estimated O&S cost if the program achieves all O&S Should Cost initiatives.

O&S Should Cost Goals

Annual per Aircraft Cost (CYSM)				
O&S Cost Elements	Current Cost (2009-2011 avg)	ABC Cost		Targeted % Reduction
		AoA Estimate	Initial Goal	
1.0 Unit-level Manpower	\$2.1	\$1.80	\$1.8	
2.0 Unit Operations	\$0.3	\$0.4-\$0.5	\$0.4	
3.0 Maintenance	\$4.0	\$5.8-\$7.6	\$4.4	40% reduction for organic depot
4.0 Sustaining Support	\$0.7	\$1.0-\$1.1	\$0.7	30% reduction
5.0 System Improvements	\$3.4	\$1.8-\$2.0	\$1.2	25% reduction for avionics concept
6.0 Indirect Support	\$0.4	\$0.30	\$0.3	
Annual per Aircraft (CY\$M)	\$10.9	\$11.1-\$13.2	\$8.8	

Total O&S Cost			
Total O&S (CY\$M)	N/A	\$10,219-\$12,140	\$7,392.0
Total O&S (TY\$M)	N/A	\$16,976-\$20,872	\$12,280.0

Figure 16 – Example of Should Cost Initiative impact on new system O&S costs

OTTER USE CASE

Analysis of actual O&S costs for the WEASEL system show that the largest costs occur in Unit-level Manpower, Maintenance, and Continuing System Improvements. The PSM used this information as a starting point for focusing efforts to develop Should Cost initiatives on the OTTER system. Since OTTER is an unmanned system, the PSM felt that the areas of Maintenance and Continuing System Improvements provided the best areas to explore.

4.2.1.6. Potential Should Cost Enablers

Should Cost initiatives can relate to any part of the life cycle and encompass any potential future cost. The inclusion of the limited examples that follow should not limit development of any other type of initiative. Rather, the examples are included to stimulate thinking about possible areas for development of Should Cost initiatives.

PSM Tip

The PSM's choice of Should Cost Initiatives should prioritize those that effect the largest future cost drivers.

4.2.1.6.1. Competition

PSMs can manage some aspects of O&S costs through effective competition. Modular design and the use of an intellectual property strategy can give the Government the ability to level the competitive landscape and drive down cost. The Open Systems Architecture Contract Guidebook for Program Managers, version 1.1 (<https://acc.dau.mil/OSAGuidebook>) contains more information on the use of competition.

4.2.1.6.2. Performance Based Logistics Arrangements

Properly structured and executed PBL arrangements can be useful tools in Should Cost management in that they deliver needed performance and reduce total cost.

For detailed guidance on developing PBL arrangements, please see the ASD(L&MR) memorandum "Performance Based Logistics Comprehensive Guidance" signed on November 22, 2013 and the PBL Guidebook, signed May 27, 2014. These documents are found at <http://bbp.dau.mil/docs/ASD-LandMR-PBL-ComprehensiveGuidance-22Nov2013.pdf> and <https://acc.dau.mil/pbl-guidebook>, respectively.

4.2.1.6.3. Use of the Working Capital Fund

Volume 11B, Chapter 1, of the FMR establishes the Defense Working Capital Fund (DWCF) under the authority of 10 U.S.C. 2208. The DWCF is designed to provide a more effective means for controlling the costs of goods and services required, produced, or furnished by DWCF activities, and a more effective and flexible means for financing, budgeting, and accounting for the costs thereof.

Defense and Service WCFs are revolving funds that exist to finance the operations of government business units that are managed like a commercial business, such as supply activities. The business units in a WCF sell goods or services to "customers" (that is, operating forces such as squadrons, brigades, as well as other WCF business units). Customers place their orders with the business unit, but do not pay until their goods or services are actually received. In the meantime, the business unit finances the cost of the work it performs with dollars from the revolving fund corpus. Once the customer accepts the goods or services, the customer pays its bill using appropriated funds provided by Congress. These customer

payments replenish the corpus, providing funds to finance new work. This cycle continues throughout the life of the revolving fund.

Managers of activity groups within the WCFs are required to set their prices based upon the full cost recovery principle. The budget process establishes prices, and except for the Energy, Depot Maintenance, and Central Design Agent Activity Groups, these prices remain fixed during the year of execution. The stabilized rates allow customers to confidently budget for a desired level of supplies or services, minimizing the potential of having to alter their programs because of higher-than-anticipated prices during the year of execution.

WCFs create a customer-provider relationship between military operating units and many support organizations. This relationship makes all participants focus more closely on support costs. Using the WCF requires the operating forces to budget and pay for the support they receive. This assures that they request only those goods and services that are actually necessary. In turn, working capital fund business units must control their costs to maintain their business base, since customers may often use commercial vendors to obtain the same goods and services provided by the WCF.

PSM Tip

The PSM should not confuse the Working Capital Fund price with the cost to the DoD when assessing potential Should Cost initiatives.

Although managed in many ways like a commercial business, a WCF business unit is not profit-oriented and must only break-even on the sale of goods and services. Customers of WCFs must realize that the prices the WCFs charge for each specific item or job do not necessarily equate to the “costs” that the WCF incurs to deliver that item or service. The requirement to break-even applies to the entire business unit. There often are large gains and losses at the customer order level. The prices also include a large fixed cost that is allocated, and those costs exist regardless of order quantity. For these reasons, customers should not confuse the WCF prices with true costs when evaluating ways to reduce costs or to become more efficient. Rather, customers must work with the WCFs to understand and isolate the direct and variable costs of the work when performing business case analysis or establishing Should Cost initiatives.

4.2.1.6.4. Product Improvement

According to the Fiscal Year (FY) 2008 National Defense Authorization Act (NDAA) (Public Law 110-181), Sec. 330 as amended by FY2013 NDAA (Public Law 112-329), Sec. 332, product improvement is defined as “the procurement, installation, retrofit, modernization, upgrade, or rebuild of a component or subsystem of a weapon system platform or major end item that would improve the reliability, availability and maintainability, extend the useful life, enhance safety, lower maintenance costs, or provide performance enhancement of the weapon system platform or major end item.” Closely aligned with key acquisition processes such as evolutionary acquisition, open systems architecture, configuration management, sustaining engineering, and technology insertion, product improvement is clearly an essential consideration for PSSs as documented in a program’s LCSP. Product improvement serves as a means for improving readiness and reducing O&S costs by both (or either) public and private sector PSIs and Product Support Providers (PSPs) as part of a comprehensive PBL PSS.

OTTER USE CASE

Based on analysis, the OTTER program developed the following O&S Should Cost Initiatives:

1. Reduce the planned overhaul cycle from every 5 years (2 per life) to a single mid-life overhaul at age 7.
2. Reduce the planned software refresh cycle from every 3 years (4 per life) to every 4 years (3 per life) at years 4, 8, and 12.
3. Design the system based on the principles of CBM+ to reduce replacement of good parts and reduce required maintenance labor.

The program expects that these initiatives will generate enough cost avoidance to reduce the O&S cost estimate to meet the O&S Affordability Cap and provide some margin for future cost uncertainty.

4.2.2. Document the Ideas

After the O&S Should Cost initiatives are developed, the PSM must document them to track progress and explain to senior leadership.

4.2.2.1. Sustainment KPP and Associated KSAs

The management of O&S cost must not exist in isolation from the broader acquisition effort. Rather, O&S cost is one of a number of parameters that PMs/PSMs must manage through the set of product and product support design decisions necessary to achieve the Warfighter’s sustainment requirements. The requirements for availability, reliability, O&S cost, and affordability are interrelated, and efforts to affect one invariably necessitates trades among the others to achieve an optimal balance. The RAM-C Rationale Report documents these relationships and trades.

PSM Tip

Availability, reliability, O&S cost, and affordability are interrelated. The PSM's goal to achieve the optimal balance will require trades among the parameters.

In the Chairman of the Joint Chief of Staff Instruction (CJCSI) 3170.01H,⁵ the JCIDS mandates a single Sustainment metric, Availability, with two components - Materiel Availability (A_M) and Operational Availability (A_O). The Sustainment KPP is mandatory for all ACAT I programs; ACAT II and below programs, with materiel solutions, must include either the Sustainment KPP or Component defined sustainment metrics.

A_M is the measure of the percentage of time that a system or group of systems of the total population is capable of performing an assigned mission. A_O is the percent of time that systems within a unit are operationally capable of performing an assigned mission. The distinction between the terms is important to understand. A_M is calculated based on total system population, while A_O is calculated based on systems assigned to operating units. The remainder of this document uses the broader term of Availability, without being specific to A_M or A_O .

⁵ The entirety of this instruction can be found at http://www.dtic.mil/cjcs_directives/cdata/unlimit/3170_01.pdf.

PSM Tip

The goal of the O&S Cost KSA is to ensure the consideration of O&S cost when trades are explored. The O&S Cost KSA is a tradable parameter, but the O&S Affordability Cap is not.

The Sustainment KPP entails two KSAs: Reliability and O&S Cost. Reliability is the probability that the system will perform without failure over a specific interval, under specified conditions. Reliability must be sufficient to support the war fighting capability requirements, within expected operating environments. The O&S Cost KSA seeks to balance the sustainment solution by ensuring the consideration of O&S costs associated with availability and reliability during the decision-making process. The program must define the O&S Cost KSA threshold value using BY\$ for all CAPE-defined O&S cost elements, and it should calculate the O&S Cost KSA objective value as ten percent less than the threshold value using the same BY\$.

Material Reliability is a key driver of system uptime, and a program's ability to achieve this requirement depends heavily on system design. The effectiveness of the product support package drives system downtime. The O&S Cost KSA complements the O&S affordability cap but is distinct in a number of ways. First, the JROC is the authority behind the O&S Cost KSA; whereas, the authority of the O&S affordability cap is the Defense Acquisition Executive (DAE). This is important because the authorities drive the set of stakeholders with whom PMs must negotiate to ensure consistency among the requirements. While directly related, the two O&S cost requirements may also differ in the specific program definitions of their cost metrics. PMs must coordinate with their requiring authority and their Component to ensure that the O&S Cost KSA and the recommended O&S affordability cap are complementary. The most important distinction is that the O&S Cost KSA is a tradable parameter at the PM level, while the O&S affordability cap is not. The program must treat the O&S affordability cap like a KPP; i.e., it requires MDA approval to sacrifice the cap because of program design and sustainment trades.

OTTER USE CASE

When the OTTER CDD was signed prior to MS A, the O&S Cost KSA included a Threshold of \$2.97B (BY2016) and an Objective of \$2.7B (BY2016). Later, in the CPD, this was revised to a Threshold of \$2.57B (BY2016) and an Objective of \$2.34B (BY2016). The Objective represents the Total O&S Cost Estimate (Will Cost) at the time, and the Threshold is calculated as 10% higher than the Objective.

4.2.2.2. Life Cycle Sustainment Plan

PMs must develop an LCSP to satisfy the Warfighter’s sustainment requirements through the delivery of a product support package, the cost of which must be less than the O&S affordability cap. The LCSP is the PM’s tool, aligning the program’s O&S cost management with the sustainment requirements, system design and test planning, supportability analysis, and product support element design. More information on the LCSP is at [https://www.dau.edu/tools/t/Life-Cycle-Sustainment-Plan-\(LCSP\)-Outline](https://www.dau.edu/tools/t/Life-Cycle-Sustainment-Plan-(LCSP)-Outline).

The design for the IPS elements must include assumptions on cost drivers. The PSM should share these assumptions with the program cost estimators, Component cost estimators, and CAPE as each develops a Life Cycle Cost Estimate (LCCE), the reconciliation of which is the basis for the program’s Will Cost. The largest costs highlight areas in which programs should identify specific Should Cost initiatives. Should Cost initiatives are the PSM’s most important tool in managing O&S cost. As a minimum, PSMs may use Should Cost initiatives to ensure their programs’ O&S costs remain under the Will Cost and within the affordability cap. Programs that aggressively pursue Should Cost initiatives may drive O&S costs below the affordability cap, potentially reducing the need for budgeted funding. Components should encourage this behavior and recognize those PMs whose cost reductions provide the Component with flexibility in other financial priorities.

The LCSP provides the PSM a means to integrate Should Cost initiatives with product support planning. The LCSP is the program’s plan for delivering the sustainment requirements, and PSMs should incorporate product support Should Cost initiative information in a manner that best supports his/her management objectives. Table 5 offers guidance on potential sections of the LCSP that PSMs may find valuable for documenting and managing Should Cost initiatives.

Life Cycle Sustainment Plan Section	Potential Should Cost Initiative Documentation Location
3.1 Sustainment Strategy Considerations	In Table 3-2, Sustainment Cost Drivers: Under the column “Product Support Element Impact/Control,” list Should Cost initiative(s) that mitigate risk in cost driver or provide for cost reduction over time.

Life Cycle Sustainment Plan Section	Potential Should Cost Initiative Documentation Location
4.1 Contracts	Table 4-1, Performance Based Arrangement Implemented in Contracts: Under the column “Metrics and Incentives,” identify how the contractor will be incentivized to execute Should Cost initiative(s) or contribute to government led Should Cost initiative(s).
5.2 Product Support Package Assessment	Table 5-2, Product Support Package Assessment: Under the column “Corrective Action/ECD,” list any Should Cost initiatives used to resolve or mitigate issues for individual product support elements.
7 Integrated Schedule	Figure 7-1, Product Support Schedule: Major Should Cost initiatives must be listed in the table. Programs should consider IPS Element dependencies and long-lead time efforts depending on the outcomes when establishing the schedule. (Additional Supportability Analysis/Should Cost initiatives may be listed in Annex B.)
8 Funding	Table 8-1, Product Support Funding Summary: Funding requirement for Should Cost initiatives must be captured in the funding summary, highlighting the near-term investments (RDT&E and Procurement) required to achieve O&S cost savings in the long term.
9.1 Organization	Table 9-1, Integrated Product Team Details: IPTs focused on “Should Cost,” major supply chain (including maintenance) cost reduction, or design trades to reduce O&S costs should be listed.
9.2.2 Sustainment Risk Management	Table 9-2, Risk Summary: For those risks that have cost implications, capture the Should Cost initiatives for specific Drivers under the “Mitigation Plan” column.
10.1.1 Design Analysis	<p>Tables 10-3 and 10-4, Completed and Planned Supportability Trades: The supportability analysis trade studies form the foundation for O&S Cost Management and the data needed through the “Results” and product support Should Cost initiatives. While the program may start out with a predefined list of specific trades additional trades may result from issues identified in:</p> <ul style="list-style-type: none"> • Table 5-1 • Funding shortfalls identified in Table 8-1; • Table 9-2; • Tables 10-1, 10-2, and 10-5;

Life Cycle Sustainment Plan Section	Potential Should Cost Initiative Documentation Location
	<ul style="list-style-type: none"> Section 11. <p>Results from the trades listed in Tables 10-3 and 10-4 should provide the program with a more comprehensive list of significant cost drivers, and this insight should drive the level of analytical detail and rigor used in mapping integrated product support elements to cost elements.</p>
10.2 Integrated Product Support Element Determination	Table 10-6, Product Support Analytical Methods and Tools: The analytical tools for individual product support elements should help the program focus the level of analytical detail and rigor used to determine affordable system operational effectiveness and in mapping integrated product support elements to cost elements.

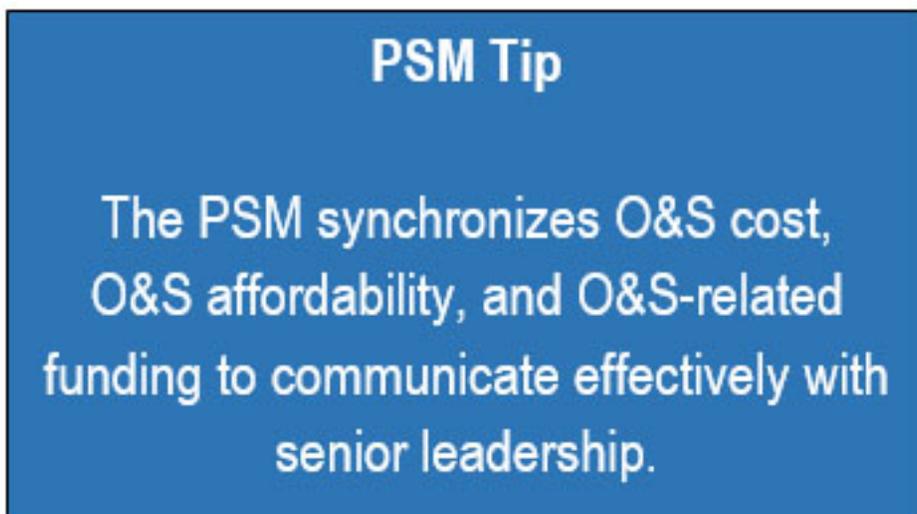
Table 5 – Potential Should Cost provisions in the LCSP

As an example, returning to Program ABC, one of the program’s potential O&S Should Cost initiatives is to use a PBL strategy for consumables if the Business Case Analysis (BCA) proves it a cost saving measure. (More information on BCA is in the DoD Product Support BCA Guidebook (<https://acc.dau.mil/bca-guidebook>.) The PSM should document more specific information on this initiative in the LCSP in Section 4, specifically in Table 4-1, Performance-Based Arrangements Implemented in Contracts. The incentives column should identify how the government will incentivize the contractor for reducing the cost of system consumables.

OTTER USE CASE

The O&S Should Cost initiatives tied specifically to the most significant cost drivers of the OTTER system. The PSM should document these initiatives and the expected cost savings/avoidance in the LCSP. Specific places in the LCSP include Table 3-2 Sustainment Cost Drivers, Table 4-1 Contracts, Table 8-1 Product Support Funding Summary, and Table 9-2 Risk Summary.

4.2.2.3. Decision Support



To support decisions related to the program's O&S cost management and affordability initiatives, the Office of the Under Secretary of Defense (OUSD) AT&L has provided guidance in the form of four charts intended to simplify the task of concisely presenting the program's efforts. The four charts include the portfolio affordability, the program funding and quantities, the sustainment quad, and the O&M and O&S crosswalk. It is essential to coordinate and synchronize all affordability, cost, and funding information among these charts, in order to provide accurate decision support.

An example of a fifth chart, the Should Cost Initiative documentation chart, provides an illustration of a chart currently in use to provide information on program-specific Should Cost initiatives.

Figure 17 is a notional example of a portfolio affordability chart. The chart depicts the program under review in the context of the other programs that comprise the Component's capability portfolio (e.g., Army aircraft, Navy surface combatants, etc.). The chart depicts the level of funding requirements that the Component is prepared to commit to the program. The notes on the bottom left of the chart highlight key life cycle events for programs within the portfolio. The O&M data note on the bottom right of the chart highlights information included in the funding requirements goal. For specific directions on completing this chart in preparation for an OSD-level review, see Appendix C.

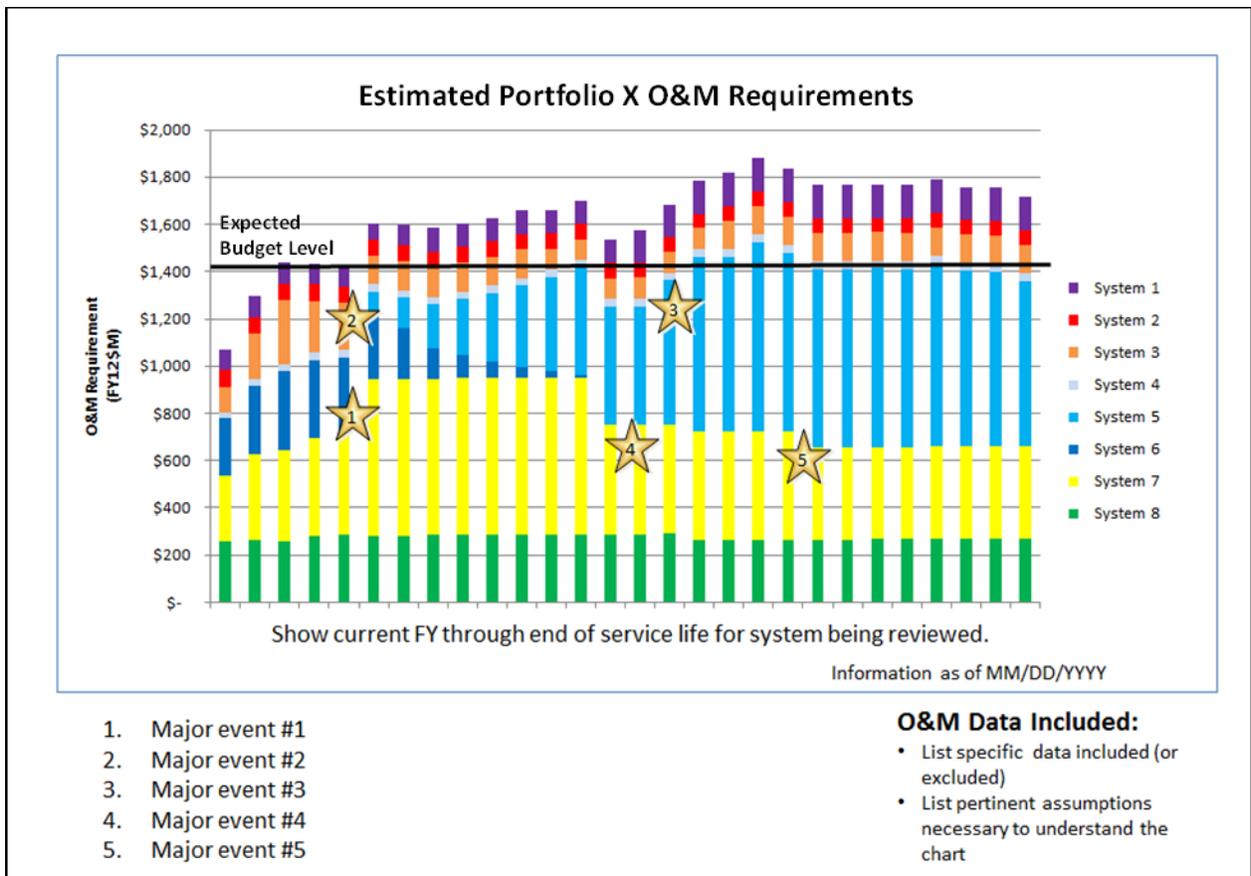


Figure 17 – Notional example of a Portfolio Affordability Chart (O&M funding requirements)

Figure 18 is a notional example of a Program Funding and Quantities chart which depicts a program’s required funding compared to its programmed funding by appropriation, with any funding shortfalls highlighted in red. The required funding reflects the LCCE at the time of the decision, normally the CAPE ICE, the CCE, POE or the SCP. Weapon system O&M is an important element of the chart. Note 2 on the bottom of the chart highlights costs included in the funding and requirements. The top of the chart lists the acquisition to O&S cost ratio, which includes discrete listings of total required O&S cost funding and total required acquisition cost in BY dollars. See <https://ebiz.acq.osd.mil/DABSchedule/Questions.aspx?text=IPT> for detailed information on this chart and/or to obtain the current format.

Program Funding & Quantities		Acquisition to O&S Cost Ratio						(BY yyyy)	Curr Est	Δ Current	Δ Original
		Total Req'd Acq (BYXX\$M): 4,456						30%	PAUC: 55.7M	+4.6%	+10.2%
		Total Req'd O&S (BYXX\$M): 10,358						70%	APUC: 50.4M	-3.2%	+60.2%
(\$ in Millions / Then Year)	Prior	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY17-21	To Comp	Prog Total
RDT&E											
Primary Line Items: APPN 0400D - BA 7 - PE 1160403BB; APPN 0400E - BA 5 - PE 0604262N; APPN 3600F - BA 5 - PE 0401318F											
Prior \$ (PB 16)	108.0	32.4	44.2	45.1	37.9	12.4	5.3	3.2	103.9	-	288.5
Current \$ (BES 17)	108.0	30.0	43.1	45.6	38.3	12.5	5.4	3.2	105.0	-	286.1
Delta \$ (Current - Prior)	-	(2.4)	(1.1)	0.5	0.4	0.1	0.1	-	1.1	-	(2.4)
Required ¹ \$	108.0	32.4	44.2	45.6	46.0	15.0	6.5	4.0	117.1	-	301.7
Delta \$ (Current - Required)	-	(2.4)	(1.1)	-	(7.7)	(2.5)	(1.1)	(0.8)	(12.1)	-	(15.6)
PROCUREMENT											
Primary Line Items: APPN 0300D - BA 2 - BLI 1000CV2200; APPN 1506N - BA 1 - BLI 0164; APPN 3010F - BA 4 - BLI V022A0											
Prior \$ (PB 16)	-	99.9	-	-	-	-	-	-	-	-	-
Current \$ (BES 17)	-	99.5	-	-	-	-	-	-	-	-	-
Delta \$ (Current - Prior)	-	(0.4)	-	-	-	-	-	-	-	-	-
Required ¹ \$	-	99.9	-	-	-	-	-	-	-	-	-
Delta \$ (Current - Required)	-	(0.4)	-	-	-	-	-	-	-	-	-
MILCON											
Prior \$ (PB 16)	-	-	-	-	-	-	-	-	-	-	-
Current \$ (BES 17)	-	-	-	-	-	-	-	-	-	-	-
Delta \$ (Current - Prior)	-	-	-	-	-	-	-	-	-	-	-
Required ¹ \$	-	-	1.4	1.7	-	2.0	2.1	3.0	8.8	12.6	22.8
Delta \$ (Current - Required)	-	-	-	-	-	-	-	-	-	-	-
SYSTEM O&M²											
Primary Line Items: APPN 0100D - BA 1 - PE 1120172BB; APPN 1106N - BA 1 - PE 0706312M											
Prior \$ (PB 16)	-	6.1	8.3	10.4	26.5	37.8	55.0	91.4	221.1	-	235.5
Current \$ (BES 17)	-	6.1	8.3	11.4	29.2	41.6	60.5	98.6	241.2	-	255.6
Delta \$ (Current - Prior)	-	-	-	1.0	2.7	3.8	5.5	7.2	20.1	-	20.1
Required ¹ \$	-	6.1	8.3	11.4	29.2	41.6	60.5	98.6	241.2	5,904.8	6,160.4
Delta \$ (Current - Required)	-	-	-	-	-	-	-	-	-	(5,904.8)	(5,904.8)
TOTAL											
Prior \$ (PB 16)	108.0	138.4	204.2	257.3	369.2	670.9	690.2	457.7	2,445.3	2,272.6	5,168.5
Current \$ (BES 17)	108.0	135.6	201.0	261.8	376.6	579.0	598.5	642.9	2,458.8	1,967.1	4,870.5
Delta \$ (Current - Prior)	-	(2.8)	(3.2)	4.5	7.4	(91.9)	(91.7)	185.2	13.5	(305.5)	(298.0)
Required ¹ \$	108.0	138.4	204.3	261.8	387.4	586.7	604.9	649.1	2,489.9	7,891.4	10,832.0
Delta \$ (Current - Required)	-	(2.8)	(3.3)	-	(10.8)	(7.7)	(6.4)	(6.2)	(31.1)	(5,924.3)	(5,961.5)
QUANTITIES³											
Prior Qty (PB 16)	0	2	3	4	6	12	12	0	34	41	80
Current Qty (BES 17)	0	2	3	4	6	10	10	10	40	35	80
Delta Qty (Current - Prior)	0	0	0	0	0	(2)	(2)	10	6	(6)	0
Required ¹ Qty	0	2	3	4	6	9	9	9	37	38	80
Delta Qty (Current - Required)	0	0	0	0	0	1	1	1	3	(3)	0

O&M funding differs from the O&S cost in large part due to the fact that personnel costs included in O&S costs are funded through the MILPERS appropriation (not depicted on this chart), and other costs that may be funded through other appropriations

Note 1. Requirement Source: [e.g., OSD CAPE ICE, May 2013]
 Note 2. O&M requirement assumes [e.g., a service life to 2035; includes ctr field mx, petro/oil/lube, spare/repair parts, depot mx, sustaining engineering & software mx.] This line does not include \$8.3M (FY 17-21) of Acquisition-related O&M for program office expenses, nor does it include O&M-funded disposal costs.
 Note 3. Quantities in FY15-16 are funded with RDT&E. Version BES 17.0

Figure 18 – Notional example of a Program Funding and Quantities Chart

Figure 19 is a notional example of a Sustainment Quad Chart. Programs use this chart at DAES reviews, OIPTs, DABs and other programmatic reviews as a summary of sustainment strategy, requirements, metrics, schedule, and O&S cost information. The lower right quadrant labeled O&S Data contains a summary of the annual O&S cost per system and the total O&S

cost compared to its antecedent. The chart compares the system to its antecedent according to the six CAPE O&S cost elements. The example depicts a more expensive new system on an annual O&S cost basis, for which the Component must ensure affordability is attainable for the entire capability portfolio. Similarly, the total O&S cost in BY\$ and TY\$ is included for both the new program and the antecedent. In this example, the new system O&S costs exceed the antecedent system O&S costs. A program must be able to explain the cost drivers and understand how the higher costs fit into the overall Component portfolio. This chart is required for MDAPs at program reviews; the general format is equally applicable to MAIS programs, although the program should tailor the specific information to describe MAIS program metrics. For specific directions on completing this chart in preparation for an OSD-level review, see Appendix D.

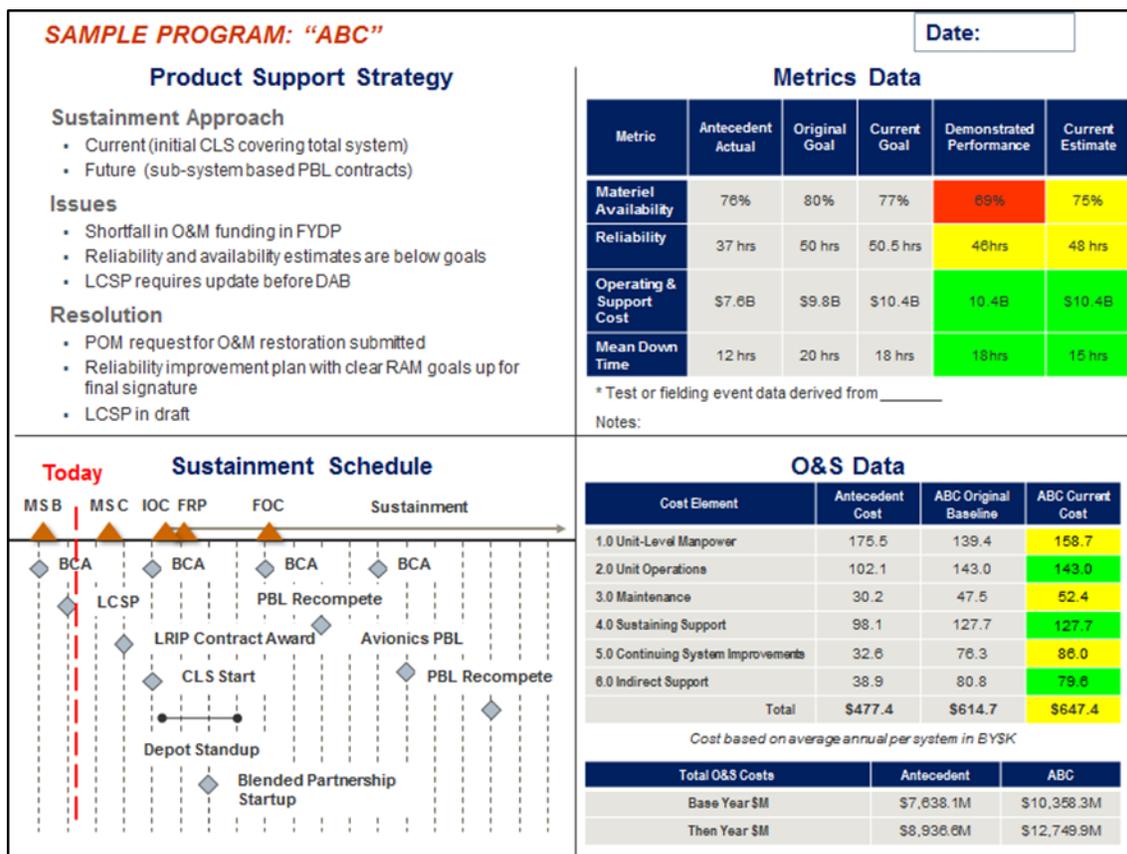


Figure 19 – Notional example of a Sustainment Quad Chart

Figure 20 is a notional example of an O&M and O&S Crosswalk Chart. It is important to note that the Program Funding and Quantities Chart and the Sustainment Quad Chart use a different cost basis (TY\$ O&M on the Program Funding and Quantities Chart rather than BY\$ total O&S on the Sustainment Quad Chart). Because of this difference, the crosswalk chart provides a means to compare the O&M funded elements of sustainment to the total O&S cost. In this example, the Crosswalk Chart allows the program to highlight the extent to which the MILPERS, RDT&E, and Procurement appropriations supplement O&M in funding the life cycle O&S requirements. For specific directions on completing this chart in preparation for an OSD-level review, see Appendix E.

ABC Program, Milestone X - O&M and O&S Crosswalk Chart		
Program Funding & Quantities (O&M) vs. Sustainment Quad (O&S)		
	Program Funding & Quantities Chart	Sustainment Quad Chart
Purpose of Chart	Assess O&M Affordability	Assess O&S Cost
Terms of Reference	Weapon System Total O&M (TY \$M)	Total O&S Cost (TY \$M)
Quantity of Assets Included in the Analysis ^{/1}	80 ^{/2}	80 ^{/2}
Unit Level Manpower (OSD CAPE Element: 1.0) ^{/3}		3058.5M
Unit Operations - Energy (2.1.1)	919.1M	919.1M
Unit Operations - Support Services; TAD/TDY (2.2)		1953.9M
Maintenance (3.0)	1010.0M	1010.0M
Sustaining Support (4.0)	1595.9M	1595.9M
Sustaining Support - System Specific Training (4.1)		942.7M
Continuing System Improvements - HW Mods (5.1)	1061.5M	1061.5M
Continuing System Improvements - SW Maint and Mods (5.2)		634.4M
Indirect Support (6.0)	1573.9M	1573.9M
Total Cost	\$6,160.4M	\$12,749.9M^{/4}
Notes:		
1. Indicate the planned system life cycle; this example assumes a 20 year system life cycle.		
2. Quantity of systems; indicate any differences between the Funding and Sustainment charts.		
3. Use the CAPE cost estimating structure; expand elements as necessary to highlight sub-elements.		
4. O&S cost potentially includes RDT&E, Procurement, O&M, MILPERS and MILCON, funded activities.		
In this example the \$12,749.9M O&S = \$6160.4M (O&M) + \$634.4M (Procurement) + \$5955.1M (MILPERS).		
5. Indicate cost source, e.g. CAPE Independent Cost Estimate for "ABC Program," Milestone X, October 10, 2011.		

Figure 20 – Notional example of an O&M and O&S Crosswalk Chart

Figure 21 is the template for depicting Should Cost initiatives with Program Objectives and Milestones (POAM) created by the Office of the Director, Acquisition Resources and Analysis (ODir., ARA). The Should Cost template is provided to streamline the ACAT I PM's effort of preparing Should Cost information for presentation to the milestone reviews. The Should Cost templates can be found at <http://bbp.dau.mil/bbp2focus.html>. PMs for ACAT II and III programs are encouraged to use the same templates to facilitate communication of their Should Cost estimate and initiatives. For specific directions on completing this chart in preparation for an OSD-level review, see Appendix F.

Should Cost Initiative POAM

\$M	Prior	Current Year	Budget Year	BY+1	Total All Years
Current Budget for target process	45.0	50.0	62.0	85.0	679.0
Will Cost (ICE) for target process	22.0	25.0	15.0	15.0	105.0
Should Cost for target process	21.0	20.0	12.8	13.0	86.8
Delta as % of Will Cost	5%	20%	15%	13%	17%
Actual Costs / New Estimates	21.5	21.0	TBD	TBD	TBD

Key Events/Schedule (Plan):

- Event
 - Target Date (Should Cost)
 - Target Date (Will Cost)
 - Short description explaining change in schedule
- Event
 - Target Date (Should Cost)
 - Target Date (Will Cost)
 - Short description explaining change in schedule

Initiative Name:

- Short Narrative Description of Basis for Should Cost Estimates: (List reasons should cost estimate is below will cost, with dollar impact)
 -
 -
- Adjustments and Impacts to Spend Plan
 -
 -
- Contract Implications
 - Incentive/fee structure, timing of evaluations & savings realized
 -
- Risks
 - List risks to achieving these savings
 -

Instructions:

- Prepare one backup slide for each significant initiative (which need not always be largest dollar value)
- Which initiatives could be extensible to other programs?
- Which do most to affect long term costs?

Figure 21 – Template for documentation of an O&S Should Cost Initiative

4.2.3. Track the Costs

Should Cost initiatives are of little value if they fail to help the program meet the affordability cap, or if the program cannot specifically relate impacts caused by reduced funding levels to readiness (availability). The following sections provide the PSM with ways to assess the success of Should Cost initiatives.

4.2.3.1. Assess the Impact of Funding Reductions

PSM Tip

The IPS elements are the PSM's levers of control to deliver effective product support and manage O&S costs.

Cost analysis is a critical part of O&S cost management. PSMs should integrate cost analysis with the LCSP’s supportability analysis. The IPS elements are the levers that enable programs to deliver effective product support, and because they also influence the drivers of O&S cost, they are the levers of management control over O&S cost.

A logical alignment from PSS to the LCSP, and from the PSS to the IPS elements, is important in O&S cost management because designing and deploying each product support element requires the program to allocate resources. Alternatively, if a program experiences an unplanned funding cut, the PSM must be able to trace the impact of the resource shortfall through the IPS elements to determine the program’s ability to continue to satisfy the sustainment requirements.

Figure 22, depicts the logical alignment among IPS elements, cost categories and appropriations, needed to support well-substantiated funding requests and to evaluate the impact of funding changes to sustainment requirements.

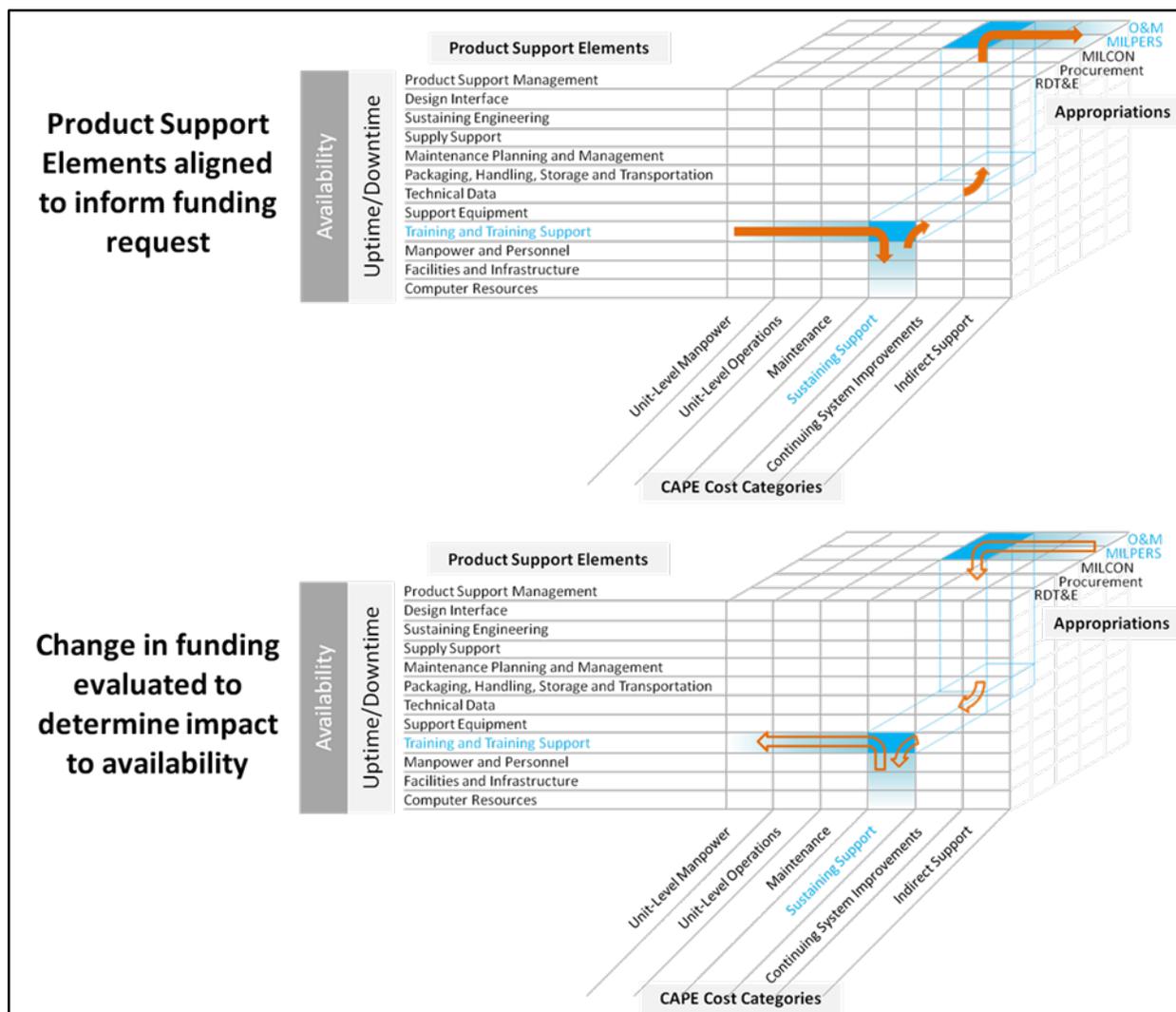


Figure 22 – Association among IPS Elements, Cost Categories and Funding Appropriations

In the example in Figure 22, the top half of the graphic represents the analysis that the program should conduct as part of developing the Should Cost initiatives. The example shown depicts that Training and Training Support is an important part of determining a program's availability metric. The cost of Training and Training Support falls under CAPE Element 4.0 Sustaining Support, directly tied to the MILPERS and O&M appropriations. The bottom half of the graphic looks at the same information in a different way and is more useful once a program is in the Operations and Support phase of the life cycle. This view looks at which CAPE cost elements and IPS elements are impacted if there are reductions in the amount of funding available to a program in a specific appropriation. By having this information explicitly mapped, a PSM can more easily assess readiness impacts due to budget cuts. In this example, knowing that Training and Training Support link to Sustaining Support and that these are linked to the O&M and MILPERS accounts can assist a program in quantitatively assessing the impact that a cut in O&M funding is likely to have on a system's training and training support.

The mechanics of associating IPS elements to O&S costs involve mapping of the elements to cost categories, and documenting the assumptions taken in developing the map. Close collaboration between the program's logisticians, systems engineers, and cost estimators is essential. Appendix B provides a comprehensive mapping among IPS elements; O&S cost categories and funding appropriations.

During Cost Benefit Analysis (CBA) and especially the AoA, program sponsors will ensure that all SE-related LCC analyses project O&S costs for the viable materiel solutions. PMs and PSMs (or the Study team if the program office has not been established) may initiate early analysis of the most significant costs to ensure that the design interface efforts between product support and SE focuses on areas of greatest potential impact to affordability. Additionally, by beginning cost analysis on the IPS elements prior to MS B, PMs and PSMs will be better able to prioritize, plan for, and contract for the product support analysis required during EMD to fully design an affordable product support package.

OTTER USE CASE

While in the Engineering and Manufacturing Development phase the OTTER program took a 10% cut to Procurement funding throughout the FYDP. There are no systems fielded, but the PM asked the PSM if the cut will impact sustainment. The PSM used the detailed map of IPS elements to the cost estimate elements and the different appropriations to quickly inform the PM that a reduction in Procurement funding in the FYDP will impact the development of technical manuals and the purchase of initial spares, resulting in an availability shortfall for the first fielded units. The PM used this information to determine how best to absorb the funding reductions while keeping the program within cost and schedule constraints.

4.2.3.2. Data Reporting

Once the affordability goal or affordability cap is set for a program, DoD leadership expects the PM to report progress toward meeting the requirement at subsequent program reviews. It is important that O&S data is reported/collected so that the PM or Component can evaluate the success of the O&S cost management effort. The following sections provide the PSM with data sources for acquiring cost data.

4.2.3.2.1. Contract Requirements

Many Should Cost initiatives will involve some sort of contract. In these cases, it is important to establish data reporting requirements that link the cost of the contract to specific work performance. For example, if a program awarded a PBL contract for supply, it is not enough to know only the total dollar value of the contract. The program must also know what parts the contractor has supplied and the frequency within a given timeframe. This information will allow the program to assess vendor performance and take appropriate action if performance gaps develop. If the contractor cannot meet the PBL objectives, then the logistics strategy may need to be re-evaluated. Conversely, analysis of the metric data may show that the cost of the PBL contract was high as compared to the amount of work actually required; in this case, the PM may need to reconsider the logistics strategy before another contract award to ensure best value to the government. Specific contract metrics can inform future Should Cost initiatives for current and future programs.

Sections L and M of the Request for Proposal (RFP) describe the data reporting requirements in the context of the government's evaluation criteria. The PM, in conjunction with financial and contracting advisors, must decide what metric data are important to collect, considering both immediate and long-term data needs for cost tracking and analysis. Since the collection and reporting of data requirements will add cost to the contract, it is important to focus on the metrics that will be most useful to the program. Once the program awards the contract, the data requirements become part of the Contract Data Requirements List (CDRL).

The 2008 update of the DoDI 5000.02 mandated that the Cost and Software Data Reporting (CSDR) systems collect and report sustainment-related contractor costs. Both WSARA and the USD (AT&L) BBP memos have echoed the need for reporting of cost information, including sustainment costs. In April 2011, the OSD CAPE posted the 1921-4 format (also known as the Contractor Sustainment Report) to the DoD forms website to provide a consistent method to collect contractor sustainment costs. In May 2012, the OSD CAPE approved the Data Item Description (DID) (DI-FNCL-81831) which provides additional detail on the 1921-4 requirements. The 1921-4 is incorporated within the greater requirements of the 2794 CSDR Contract Plan. The CSDR requirement applies to all contracts over \$50 million, regardless of contract type, and requires reporting on the total contract value, not selected Contract Line Item Numbers (CLIN) or delivery orders. Each program office develops its overall CSDR plan. The plan is then agreed to by the CSDR Working Group, whose voting members may include the service cost center, service cost estimating center, CAPE analysts and other stakeholders. The Director of the Defense Cost and Resource Center (DCARC) approves the plan and forwards it to the CAPE Deputy Director for Cost Assessment for signature. The program office puts the signed plan in the RFP and on contract, along with the CDRL requiring the report. The body of

the 1921-4 format is broken into the CAPE O&S Cost Element Structure and allows for reporting of nonrecurring and recurring costs to date, as well as at completion. In accordance with the CSDR Contract Plan, contractors must use this format to submit actual sustainment cost data on both a recurring and nonrecurring basis on Government contracts. (The format may also be used to submit proposed cost data in response to Government solicitations.) Reporting at this detailed level is important to provide additional insight into how, when, and where contractors are incurring costs. This can help with the identification of cost drivers and with overall contract management.

4.2.3.2.2. VAMOSOC Databases

Another data source for tracking O&S costs is through the Components' VAMOSOC systems. DoD Directive (DoDD) 5000.4-M, *Cost Analysis Guidance and Procedures*, requires each Component to provide a single source of authoritative, processed financial and logistics data organized by system or infrastructure.

The VAMOSOC systems are an invaluable asset to the Program Office and the cost estimators. Programs can use the information provided by each system to help build Will Cost estimates as well as inform Should Cost estimates.

The Army OSMIS database is the historical record in cost per mile or cost per hour of all major Army weapons systems. OSMIS supports three classes of customers: Budgeting/Programming, Logistics, and the Acquisition communities. For the Budgeting/Programming Community, OSMIS provides unique input to the Army's Training Resource Model and Flying Hour Program, which in turn develops the Major Commands OPTEMPO training budgets. For the Logistics community, OSMIS provides key historic performance information at the end item perspective to support logistics models, such as the Integrated Logistics Analysis Program and the Revolving Funds Model. OSMIS supports the building and validation of logistics budget documents, measures historic rebuild and washout rates for parts, and supports many special study requests to improve Army logistics management. More information on Army OSMIS is available at <https://www.osmisweb.army.mil/>.

PSM Tip

The VAMOSC databases provide the PSM with O&S cost information for existing and historical weapons systems.

The Naval VAMOSC management information system is a web-based database that collects and reports US Navy and Marine Corps historical O&S costs. VAMOSC provides the direct O&S costs of weapons systems, some linked indirect costs (e.g., ship depot overhead), and related performance information, such as flying hour metrics, steaming hours, age of aircraft, and fuel usage. The VAMOSC Military Personnel databases contain personnel costs and attribute data. VAMOSC has recently added databases covering Navy Department civilian personnel and Navy facilities physical characteristics and operating costs. More information on Naval VAMOSC is available at <https://www.vamosc.navy.mil>.

The AFTOC system is a net-enabled Decision Support System that “turns data into information.” AFTOC provides routine, timely visibility into almost all unclassified Air Force costs, including major Air Force systems, Major Commands, Air Force appropriations, cost and logistics and programmatic data. The database provides a single source of processed Air Force weapons systems and infrastructure information for historical and current year, and it is a permanent archive of the data. More information on AFTOC is available at <https://aftoc.hill.af.mil/>.

5. Conclusion

This guidebook provides information and examples to assist the PSM/PM with managing the O&S costs of its programs to meet operational and suitability requirements while minimizing O&S costs; and thus achieve affordable systems. Will Cost estimates help to set the baselines, and Should Cost initiatives are a key tool to managing O&S costs of DoD programs. Further questions on the materials contained in this guidebook should be directed to the Office of the Deputy Assistant Secretary of Defense for Materiel Readiness (ODASD(MR)).

Appendix A – Frequently Asked Questions

Question: What is the difference between operating and support, operations and support, and operating and maintenance?

Answer: Operating and Support is typically used when talking about the cost estimate for sustainment – operating and support cost. Operations and Support is used to refer to the sustainment phase of the life cycle – Operations and Support phase. Operations and Maintenance (O&M) is most commonly used to refer to a funding appropriation – Operations and Maintenance appropriation. More information on the appropriations is available in section 2.1.2.

Question: What phases of the life cycle offer the most opportunities to influence O&S cost?

Answer: O&S costs are most easily influenced early in the design phase, before the system is built. The opportunities decrease as the life cycle progresses. The phases listed from greatest to least influence are: Technology Maturity and Risk Reduction, Engineering and Manufacturing Development, Production and Deployment, Operations and Support. Information on how PSM's can participate in Design Interface with the Systems Engineering community can be found in Section 4.2.1.2.

Question: How do I know if my program is affordable?

Answer: A program is affordable if the expected yearly costs to acquire and sustain the program are less than or equal to the funding the Service has available for that program. Programs must work with their service and programming communities to understand how their program fits among the capability portfolio resource priorities. The Portfolio Affordability Chart (found in Appendix C) can be a helpful tool for discussing affordability. More information on affordability can be found in Section 3.

Question: How are the O&S Affordability Goal and Cap documented? Should it be part of the Life Cycle Sustainment Plan (LCSP)?

Answer: Affordability Goals and Caps are documented in the milestone Acquisition Decision Memoranda (ADM) for Milestone A and B respectively. The goals and caps are also recorded in the Defense Acquisition Management Information Retrieval (DAMIR) system. (In the future, there will be separate data inputs in DAMIR to record the information and allow tracking against progress.) The Affordability Goal/Cap should be captured in the LCSP as well as O&S Should Cost initiatives to achieve the Goal/Cap. More information on O&S Affordability Goals/Caps can be found in sections 3.3 and 3.4.

Question: What is the difference between Will Cost and Should Cost?

Answer: A Will Cost estimate is a historically informed independent cost estimate used to establish budgets. A Should Cost estimate includes the impact of specific cost control initiatives the program plans to use to keep its cost at or below the Will Cost. More information can be found in Sections 2.1 and 4.0.

Question: How do I know what areas should be the focus of my Should Cost initiatives?

Answer: Should Cost initiatives can focus on any cost drivers impacting the program's total cost. The O&S Cost Management Guidebook details 2 methods that a program can use to develop O&S Should Cost initiatives. The first is an iterative process of progressively increasing the accuracy and precision of the O&S cost information through methodical assessment of the design factors that influence cost. This discussion can be found in section 4.2.1.2. The second method analyzes historical costs for similar systems in order to understand cost-driving elements. This discussion can be found in section 4.2.1.5.

Question: What types of costs fall outside of the program's control? How should a program deal with these costs if they are significant?

Answer: Examples of costs that fall outside the program's control include inflation factors, infrastructure factors, statutes, and Acts of Congress. Costs that fall outside of the program's control should be treated as assumptions or constraints in sustainment planning. These costs may be partially offset through internally controlled Should Cost initiatives. A discussion on this topic can be found in section 4.2.1.2.

Question: The PSM uses the Integrated Product Support elements and the cost estimators use the CAPE O&S Cost Element Structure, but everything is paid through appropriations. How do these different structures align and complement one another?

Answer: Understanding how these elements work together is an important aspect of the PSM's job and will assist in any communication with the cost estimating team. Mapping the cost estimates into the IPS elements allows the PSM to understand where cost drivers exist and where the focus of Should Cost initiatives should be. Mapping the IPS elements into the CAPE cost element structure allows the cost estimator to assist the budgeters in requesting the right type of funds. Figure 13 in section 4.2.3.1 illustrates the alignment of these different structures.

Question: Does OSD have an O&S model that I can use to develop O&S Cost estimates and conduct what-if drills if requirements are not funded?

Answer: The CAPE is the OSD organization responsible for promulgating cost estimating guidance. The CAPE does not advocate the use of any specific O&S cost estimating tool because it would be difficult to find a single tool that would be applicable to all the different types of systems in the DoD. The individual Service Cost Agencies or SYSCOM level cost estimating activities may use commercially available or internally developed cost models. PSMs should

work with the program's cost estimating team to perform cost focused sensitivity analysis, excursions, or other what-if analyses.

Question: Does OSD have any tools for comparing O&S cost estimates to actuals, which would help in defending budgets in the out years?

Answer: The Visibility and Management of Operating and Support Costs (VAMOSOC) databases exist to capture O&S cost actuals. The Navy uses Naval VAMOSOC; the Army has the Operating and Support Management Information System (OSMIS); the Air Force uses the Air Force Total Ownership Cost (AFTOC) database. More information on these systems, and links to their websites, can be found in section 4.2.3.2.2. PSM's can compare their estimate to these actuals but should work with the cost estimators to create a properly normalized comparison.

Question: Where can I find instructions for completing the O&S-related DAB charts?

Answer: Instructions for the Program Funding & Quantities (Spruill) chart can be found at <https://ebiz.acq.osd.mil/DABSchedule/Questions.aspx?text=IPT>. Instructions for the Portfolio Affordability Chart are included in Appendix C; instructions for the Sustainment Quad Chart are found in Appendix D; instructions for The O&M and O&S Crosswalk Chart are at Appendix E; instructions for The O&S Should Cost Initiatives and Estimates Chart are included at Appendix F.

Question: How do I fill out the O&M section on the Program Funding & Quantities (Spruill) chart? What do I include for requirements and funding? What should I include in the Acq/O&S ratio box? What should I include in the remarks?

Answer: The current format and directions for the Program Funding & Quantities chart can be found at <https://ebiz.acq.osd.mil/DABSchedule/Questions.aspx?text=IPT>.

Appendix B - Mapping among IPS Elements, O&S Cost Categories, and Funding Appropriations

The following map of the IPS Elements, O&S Cost Categories, and Funding Appropriations was performed using a spreadsheet and is provided here as a starting point for the PSM in beginning an analysis of a program's most significant costs. The developers of the map assumed that weak as well as strong association among product support elements and cost categories were worthy of highlighting. Additionally, the map is not explicitly tied to any one phase in the acquisition process, so the user will note multiple appropriations listed in cells where the developers highlighted an association.

In the future, the intention is to publish this information in the form of a relational database that will be available to all interested users. The sub-elements of the IPS elements have evolved in the time since the developers created the mapping. All of the

information will be updated and associations reconsidered during the construction of the relational database.

		CAPE O&S Cost Element Structure																									
		1	1.1	1.2	1.3	2	2.1	2.1.1	2.1.2	2.1.3	2.2	2.3	3	3.1	3.1.1	3.1.2	3.1.3	3.1.4	3.1.5	3.2	3.2.1	3.2.2	3.2.3	3.2.4	3.2.5	3.2.6	
		Unit-Level Manpower	Operations	Unit Level Maintenance	Other Unit Level	Unit Operations	Operating Material	Energy (POL, Electricity)	Training and Munitions and Expendable Stores	Other Operational Material	Support Services	Temporary Duty	Maintenance	Organizational Maintenance and Support	Organizational-Level Consumables	Organizational-Level Repair arts	Organizational-Level DLRs	Contract Maintenance Services	Other Unit Maintenance	Intermediate Maintenance	Intermediate Level Consumable Parts	Intermediate Level Repair Parts	Intermediate Level DLRs	Government Labor	Contractor Maintenance	Other Intermediate Maintenance	
O&M=A; MILPERS=B; RDT&E=C; Procurement=D; MILCON=E; Family Housing=F																											
Integrated Product Support Element																											
Product Support Management		AB	AB	AB	AB	AB	AB				AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB						
1.1	Warfighter and maintainer requirements capture																										
1.2	Alliance Management																										
1.2.1	Public Private Partnership (PPP)/Third Party Logistics (3PL) management																										
1.2.2	International Partners																										
1.2.3	Foreign Military Sales (FMS)																										
1.3	Contract Development and Management	AB	AB	AB	AB	AB					AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB						
1.3.1	Develop and maintain a Product Support Agreement (PSA) with the Warfighter	AB	AB	AB	AB	AB					AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB						
1.3.2	Develop and maintain PSAs with the Product Support Integrators												AB	AB	AB	AB	AB	AB	AB	AB	AB						
1.4	Supportability Test and Evaluation																										
1.5	Development and maintenance of Business Case Analyses																										
1.6	Logistics Trade Studies	AB	AB	AB	AB								AB	AB	AB	AB	AB	AB	AB	AB	AB						
1.7	Product Support Performance Management	AB	AB	AB	AB								AB	AB	AB	AB	AB	AB	AB	AB	AB						
1.7.1	Manage balanced performance metrics																										
1.7.2	Sustainment metrics reporting	AB	AB	AB	AB								AB	AB	AB	AB	AB	AB	AB	AB	AB						
1.8	Product Support Budgeting and Funding	AB	AB	AB	AB								AB	AB	AB	AB	AB	AB	AB	AB	AB						
1.8.1	Budget execution	AB	AB	AB	AB								AB	AB	AB	AB	AB	AB	AB	AB	AB						
1.8.2	Budget management	AB	AB	AB	AB								AB	AB	AB	AB	AB	AB	AB	AB	AB						
1.8.3	Mid-year review justification	AB	AB	AB	AB								AB	AB	AB	AB	AB	AB	AB	AB	AB						

		CAPE O&S Cost Element Structure																							
		3.3	3.3.1	3.3.2	3.3.3	4	4.1	4.1.1	4.1.2	4.2	4.3	4.4	4.5	5	5.1	5.2	5.2.1	5.2.2	6	6.1	6.2	6.2.1	6.2.2	6.2.3	6.3
		Depot Maintenance	Government Depot Repair	Contractor Depot Repair	Other Depot Maintenance	Sustaining Support	System Specific Training	System Specific Operator Training	System Specific Non-Operator Training	Support Equipment Replacement	Operating Equipment Replacement	Sustaining Engineering & Program Management	Other Sustaining Support	Continuing System Improvements	Hardware Modifications or Modernization	Software Maintenance and Modifications	Correction of Deficiencies	Software Enhancements	Indirect Support	Installation Support	Personnel Support	Personnel Administration	Personnel Benefits	Medical Support	General Training & Education
O&M=A; MILPERS=B; RDT&E=C; Procurement=D; MILCON=E; Family Housing=F																									
Integrated Product Support Element																									
Product Support Management		AB				AB	AB			AB	AB	AB	AB	AB	AB	AB			ABD	AB	ABD	AB	AB	AB	AB
1.1	Warfighter and maintainer requirements capture											AB							ABD		ABD				
1.2	Alliance Management										AB								AB		AB				
1.2.1	Public Private Partnership (PPP)/Third Party Logistics (3PL) management										AB								AB		AB				
1.2.2	International Partners										AB								AB		AB				
1.2.3	Foreign Military Sales (FMS)										AB								AB		AB				
1.3	Contract Development and Management	AB				AB	AB			AB	AB	AB	AB	AB	AB	AB			AB	AB	AB				
1.3.1	Develop and maintain a Product Support Agreement (PSA) with the Warfighter	AB				AB	AB			AB		AB	AB	AB	AB	AB			AB	AB	AB				
1.3.2	Develop and maintain PSAs with the Product Support Integrators	AB			AB	AB						AB							AB						
1.4	Supportability Test and Evaluation					AB						AB	AB												
1.5	Development and maintenance of Business Case Analyses					AB						AB							AB		AB				
1.6	Logistics Trade Studies	AB				AB						AB							AB		AB				
1.7	Product Support Performance Management	AB				AB						AB							AB	AB	AB				
1.7.1	Manage balanced performance metrics					AB						AB							AB	AB	AB				
1.7.2	Sustainment metrics reporting	AB				AB						AB							AB	AB	AB				
1.8	Product Support Budgeting and Funding	AB				AB						AB							AB	AB	AB				
1.8.1	Budget execution	AB				AB						AB							AB	AB	AB				
1.8.2	Budget management	AB				AB						AB							AB	AB	AB				
1.8.3	Mid-year review justification	AB				AB						AB							AB	AB	AB				

		CAPE O&S Cost Element Structure																									
		1	1.1	1.2	1.3	2	2.1	2.1.1	2.1.2	2.1.3	2.2	2.3	3	3.1	3.1.1	3.1.2	3.1.3	3.1.4	3.1.5	3.2	3.2.1	3.2.2	3.2.3	3.2.4	3.2.5	3.2.6	
		Unit-Level Manpower	Operations	Unit Level Maintenance	Other Unit Level	Unit Operations	Operating Material	Energy (POL, Electricity)	Training and Munitions and Expendable Stores	Other Operational Material	Support Services	Temporary Duty	Maintenance	Organizational Maintenance and Support	Organizational-Level Consumables	Organizational-Level Repair arts	Organizational-Level DLRs	Contract Maintenance Services	Other Unit Maintenance	Intermediate Maintenance	Intermediate Level Consumable Parts	Intermediate Level Repair Parts	Intermediate Level DLRs	Government Labor	Contractor Maintenance	Other Intermediate Maintenance	
Integrated Product Support Element																											
1.9	Total Ownership Cost (TOC) Management																										
1.10	Planning Management																										
1.10.1	IPT Management																										
1.10.2	Logistics Assessment (LA) Management																										
1.10.3	Life Cycle Sustainment Plan (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																										

		CAPE O&S Cost Element Structure																							
		3.3	3.3.1	3.3.2	3.3.3	4	4.1	4.1.1	4.1.2	4.2	4.3	4.4	4.5	5	5.1	5.2	5.2.1	5.2.2	6	6.1	6.2	6.2.1	6.2.2	6.2.3	6.3
		Depot Maintenance	Government Depot Repair	Contractor Depot Repair	Other Depot Maintenance	Sustaining Support	System Specific Training	System Specific Operator Training	System Specific Non-Operator Training	Support Equipment Replacement	Operating Equipment Replacement	Sustaining Engineering & Program Management	Other Sustaining Support	Continuing System Improvements	Hardware Modifications or Modernization	Software Maintenance and Modifications	Correction of Deficiencies	Software Enhancements	Indirect Support	Installation Support	Personnel Support	Personnel Administration	Personnel Benefits	Medical Support	General Training & Education
Integrated Product Support Element																									
1.9	Total Ownership Cost (TOC) Management					AB						AB								AB		AB			
1.10	Planning Management					AB						AB								AB		AB			
1.10.1	IPT Management					AB						AB								AB		AB			
1.10.2	Logistics Assessment (LA) Management					AB						AB								AB		AB			
1.10.3	Life Cycle Sustainment Plan (LSCP) development and management					AB						AB								AB		AB			
1.10.4	Milestone Gate Review Management					AB						AB								AB		AB			
1.11	Portfolio Transfer Planning and Transfer Execution					AB						AB													
1.12	Logistics Policy Implementation					AB						AB								AB		AB			
1.13	Configuration Management					AB						AB		AB	AB	AB				AB		AB			
1.13.1	Configuration identification and baseline maintenance					AB						AB		AB	AB	AB				AB		AB			

		CAPE O&S Cost Element Structure																									
		1	1.1	1.2	1.3	2	2.1	2.1.1	2.1.2	2.1.3	2.2	2.3	3	3.1	3.1.1	3.1.2	3.1.3	3.1.4	3.1.5	3.2	3.2.1	3.2.2	3.2.3	3.2.4	3.2.5	3.2.6	
		Unit-Level Manpower	Operations	Unit Level Maintenance	Other Unit Level	Unit Operations	Operating Material	Energy (POL, Electricity)	Training and Munitions and Expendable Stores	Other Operational Material	Support Services	Temporary Duty	Maintenance	Organizational Maintenance and Support	Organizational-Level Consumables	Organizational-Level Repair arts	Organizational-Level DLRs	Contract Maintenance Services	Other Unit Maintenance	Intermediate Maintenance	Intermediate Level Consumable Parts	Intermediate Level Repair Parts	Intermediate Level DLRs	Government Labor	Contractor Maintenance	Other Intermediate Maintenance	
Integrated Product Support Element																											
1.13.2	Configuration control																										
1.13.3	Configuration Status Accounting																										
1.13.4	Configuration auditing																										
1.14	Performance based Life Cycle Product Support (PBL)																										
1.15	Continuous Process Improvement (Lean Six Sigma, Theory of Constraints, etc)	AB	AB	AB	AB	AB	AB				AB	AB	AB	AB	A	A	A	A	AB	AB							

		CAPE O&S Cost Element Structure																							
	O&M=A; MILPERS=B; RDT&E=C; Procurement=D; MILCON=E; Family Housing=F	3.3	3.3.1	3.3.2	3.3.3	4	4.1	4.1.1	4.1.2	4.2	4.3	4.4	4.5	5	5.1	5.2	5.2.1	5.2.2	6	6.1	6.2	6.2.1	6.2.2	6.2.3	6.3
		Depot Maintenance	Government Depot Repair	Contractor Depot Repair	Other Depot Maintenance	Sustaining Support	System Specific Training	System Specific Operator Training	System Specific Non-Operator Training	Support Equipment Replacement	Operating Equipment Replacement	Sustaining Engineering & Program Management	Other Sustaining Support	Continuing System Improvements	Hardware Modifications or Modernization	Software Maintenance and Modifications	Correction of Deficiencies	Software Enhancements	Indirect Support	Installation Support	Personnel Support	Personnel Administration	Personnel Benefits	Medical Support	General Training & Education
Integrated Product Support Element																									
1.13.2	Configuration control					AB						AB			AB	AB	AB			AB		AB			
1.13.3	Configuration Status Accounting					AB						AB			AB	AB	AB			AB		AB			
1.13.4	Configuration auditing					AB						AB			AB	AB	AB			AB		AB			
1.14	Performance based Life Cycle Product Support (PBL)					AB						AB								AB		AB			
1.15	Continuous Process Improvement (Lean Six Sigma, Theory of Constraints, etc)	AB				AB	AB			AB	AB	AB	AB	AB	AB	AB	AB			AB	AB	AB	AB	AB	AB

		CAPE O&S Cost Element Structure																									
		1	1.1	1.2	1.3	2	2.1	2.1.1	2.1.2	2.1.3	2.2	2.3	3	3.1	3.1.1	3.1.2	3.1.3	3.1.4	3.1.5	3.2	3.2.1	3.2.2	3.2.3	3.2.4	3.2.5	3.2.6	
		Unit-Level Manpower	Operations	Unit Level Maintenance	Other Unit Level	Unit Operations	Operating Material	Energy (POL, Electricity)	Training and Munitions and Expendable Stores	Other Operational Material	Support Services	Temporary Duty	Maintenance	Organizational Maintenance and Support	Organizational-Level Consumables	Organizational-Level Repair arts	Organizational-Level DLRs	Contract Maintenance Services	Other Unit Maintenance	Intermediate Maintenance	Intermediate Level Consumable Parts	Intermediate Level Repair Parts	Intermediate Level DLRs	Government Labor	Contractor Maintenance	Other Intermediate Maintenance	
Integrated Product Support Element																											
Design Interface		AB		AB									AB	AB					A	AB	AB						
2.1	Standardization and interoperability	AB		AB									AB	AB					A	AB	AB						
2.2	Engineering data analysis	AB		AB									AB	AB					A	AB	AB						
2.3	Net-centric capability management																										
2.4	Reliability, availability, maintainability (RAM) design																										
2.5	Producibility																										
2.6	Supportability/Sustainability																										
2.7	Deployability management																										
2.8	Human Systems Integration (HSI)																										
2.8.1	Human Factors Engineering																										
2.8.2	Personnel																										
2.8.3	Habitability																										
2.8.4	Training																										

		CAPE O&S Cost Element Structure																							
O&M=A; MILPERS=B; RDT&E=C; Procurement=D; MILCON=E; Family Housing=F		3.3	3.3.1	3.3.2	3.3.3	4	4.1	4.1.1	4.1.2	4.2	4.3	4.4	4.5	5	5.1	5.2	5.2.1	5.2.2	6	6.1	6.2	6.2.1	6.2.2	6.2.3	6.3
		Depot Maintenance	Government Depot Repair	Contractor Depot Repair	Other Depot Maintenance	Sustaining Support	System Specific Training	System Specific Operator Training	System Specific Non-Operator Training	Support Equipment Replacement	Operating Equipment Replacement	Sustaining Engineering & Program Management	Other Sustaining Support	Continuing System Improvements	Hardware Modifications or Modernization	Software Maintenance and Modifications	Correction of Deficiencies	Software Enhancements	Indirect Support	Installation Support	Personnel Support	Personnel Administration	Personnel Benefits	Medical Support	General Training & Education
Integrated Product Support Element																									
Design Interface		AB				ABCD						ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD			ABCD	
2.1	Standardization and interoperability	AB				ABCD						ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD			ABCD	
2.2	Engineering data analysis	AB				ABCD						ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD			ABCD	
2.3	Net-centric capability management					ABCD						ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD			ABCD	
2.4	Reliability, availability, maintainability (RAM) design					ABCD						ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD			ABCD	
2.5	Producibility					ABCD						ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD			ABCD	
2.6	Supportability/Sustainability					ABCD						ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD			ABCD	
2.7	Deployability management					ABCD						ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD			ABCD	
2.8	Human Systems Integration (HSI)					ABCD						ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD			ABCD	
2.8.1	Human Factors Engineering											ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD			ABCD	
2.8.2	Personnel											ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD			ABCD	
2.8.3	Habitability											ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD			ABCD	
2.8.4	Training					ABCD						ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD			ABCD	

		CAPE O&S Cost Element Structure																									
		1	1.1	1.2	1.3	2	2.1	2.1.1	2.1.2	2.1.3	2.2	2.3	3	3.1	3.1.1	3.1.2	3.1.3	3.1.4	3.1.5	3.2	3.2.1	3.2.2	3.2.3	3.2.4	3.2.5	3.2.6	
		Unit-Level Manpower	Operations	Unit Level Maintenance	Other Unit Level	Unit Operations	Operating Material	Energy (POL, Electricity)	Training and Munitions and Expendable Stores	Other Operational Material	Support Services	Temporary Duty	Maintenance	Organizational Maintenance and Support	Organizational-Level Consumables	Organizational-Level Repair arts	Organizational-Level DLRs	Contract Maintenance Services	Other Unit Maintenance	Intermediate Maintenance	Intermediate Level Consumable Parts	Intermediate Level Repair Parts	Intermediate Level DLRs	Government Labor	Contractor Maintenance	Other Intermediate Maintenance	
Integrated Product Support Element																											
2.8.5	Safety and Occupational Health plan development and management																										
2.9	Environmental management																										
2.10	Warfighter/machine/software/interface/usability management	AB	AB																								
2.11	Survivability and vulnerability management	AB	AB																								
2.12	Affordability																										
2.13	Open Systems Architecture (OSA)	AB		AB									AB	AB				A	AB	AB							
2.14	Corrosion control and prevention	AB		AB									AB	AB				A	AB	AB							
2.15	Nondestructive inspection	AB		AB									AB	AB				A	AB	AB							
2.16	Hazardous material management	AB		AB									AB	AB				A	AB	AB							
2.17	Energy management																										

		CAPE O&S Cost Element Structure																							
		3.3	3.3.1	3.3.2	3.3.3	4	4.1	4.1.1	4.1.2	4.2	4.3	4.4	4.5	5	5.1	5.2	5.2.1	5.2.2	6	6.1	6.2	6.2.1	6.2.2	6.2.3	6.3
		Depot Maintenance	Government Depot Repair	Contractor Depot Repair	Other Depot Maintenance	Sustaining Support	System Specific Training	System Specific Operator Training	System Specific Non-Operator Training	Support Equipment Replacement	Operating Equipment Replacement	Sustaining Engineering & Program Management	Other Sustaining Support	Continuing System Improvements	Hardware Modifications or Modernization	Software Maintenance and Modifications	Correction of Deficiencies	Software Enhancements	Indirect Support	Installation Support	Personnel Support	Personnel Administration	Personnel Benefits	Medical Support	General Training & Education
O&M=A; MILPERS=B; RDT&E=C; Procurement=D; MILCON=E; Family Housing=F																									
Integrated Product Support Element																									
2.8.5	Safety and Occupational Health plan development and management					ABCD						ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD			ABCD			
2.9	Environmental management					ABCD						ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD			ABCD			
2.10	Warfighter/machine/software/interface/usability management					ABCD						ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD			ABCD			
2.11	Survivability and vulnerability management					ABCD						ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD			ABCD			
2.12	Affordability					AB						AB					ABCD	ABCD	AB			AB			
2.13	Open Systems Architecture (OSA)	AB				ABCD						ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD			ABCD			
2.14	Corrosion control and prevention	AB				ABCD						ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD			ABCD			
2.15	Nondestructive inspection	AB				ABCD						ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD			ABCD			
2.16	Hazardous material management	AB				ABCD						AB		AB	AB	AB	AB	AB	AB			AB			
2.17	Energy management					ABCD						ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD			ABCD			

		CAPE O&S Cost Element Structure																									
		1	1.1	1.2	1.3	2	2.1	2.1.1	2.1.2	2.1.3	2.2	2.3	3	3.1	3.1.1	3.1.2	3.1.3	3.1.4	3.1.5	3.2	3.2.1	3.2.2	3.2.3	3.2.4	3.2.5	3.2.6	
		Unit-Level Manpower	Operations	Unit Level Maintenance	Other Unit Level	Unit Operations	Operating Material	Energy (POL, Electricity)	Training and Munitions and Expendable Stores	Other Operational Material	Support Services	Temporary Duty	Maintenance	Organizational Maintenance and Support	Organizational-Level Consumables	Organizational-Level Repair arts	Organizational-Level DLRs	Contract Maintenance Services	Other Unit Maintenance	Intermediate Maintenance	Intermediate Level Consumable Parts	Intermediate Level Repair Parts	Intermediate Level DLRs	Government Labor	Contractor Maintenance	Other Intermediate Maintenance	
Integrated Product Support Element																											
Sustaining Engineering		AB	AB	AB	AB								AB	AB	A	A	A	A	AB	AB	AB	AB	AB	AB	AB		
3.1	Post deployment ongoing operational data analyses	AB	AB	AB	AB								AB	A				A	AB	AB	AB	AB	AB	AB	AB		
3.2	Engineering considerations												AB														
3.2.1	Relation to Systems Engineering												AB														
3.2.2	Engineering and Technical Support												AB														
3.3	Analyses	AB	AB	AB	AB								AB	AB				A	AB	AB							
3.3.1	Safety hazards	AB	AB	AB	AB								AB	AB				A	AB	AB							
3.3.2	Failure causes and effects												AB														
3.3.3	Reliability and maintainability trends												AB														
3.3.4	Operational usage profiles changes												AB														
3.4	Root cause analysis of in-service problems such as:	AB	AB	AB	AB								AB	AB	A	A	A	A	AB	AB							
3.4.1	Operational hazards	AB	AB	AB	AB								AB	AB	A	A	A	A	AB	AB							
3.4.2	Corrosion effects	AB		AB	AB								AB	AB	A	A	A	A	AB	AB							

		CAPE O&S Cost Element Structure																								
		3.3	3.3.1	3.3.2	3.3.3	4	4.1	4.1.1	4.1.2	4.2	4.3	4.4	4.5	5	5.1	5.2	5.2.1	5.2.2	6	6.1	6.2	6.2.1	6.2.2	6.2.3	6.3	
		Depot Maintenance	Government Depot Repair	Contractor Depot Repair	Other Depot Maintenance	Sustaining Support	System Specific Training	System Specific Operator Training	System Specific Non-Operator Training	Support Equipment Replacement	Operating Equipment Replacement	Sustaining Engineering & Program Management	Other Sustaining Support	Continuing System Improvements	Hardware Modifications or Modernization	Software Maintenance and Modifications	Correction of Deficiencies	Software Enhancements	Indirect Support	Installation Support	Personnel Support	Personnel Administration	Personnel Benefits	Medical Support	General Training & Education	
O&M=A; MILPERS=B; RDT&E=C; Procurement=D; MILCON=E; Family Housing=F																										
Integrated Product Support Element																										
Sustaining Engineering		AB	AB	AB	AB	ABCD						ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD							ABCD
3.1	Post deployment ongoing operational data analyses	AB	AB	AB	AB	AB						AB							AB		AB					
3.2	Engineering considerations	AB				ABCD						ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD					ABCD
3.2.1	Relation to Systems Engineering	AB				ABCD						ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD					ABCD
3.2.2	Engineering and Technical Support	AB				ABCD						ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD					ABCD
3.3	Analyses	AB				ABCD						ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD					ABCD
3.3.1	Safety hazards	AB				ABCD						ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD					ABCD
3.3.2	Failure causes and effects	AB				ABCD						ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD					ABCD
3.3.3	Reliability and maintainability trends	AB				ABCD						ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD					ABCD
3.3.4	Operational usage profiles changes	AB				ABCD						ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD					ABCD
3.4	Root cause analysis of in-service problems such as:	AB				ABCD						ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD					ABCD
3.4.1	Operational hazards	AB				ABCD						ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD					ABCD
3.4.2	Corrosion effects	AB				ABCD						ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD					ABCD

		CAPE O&S Cost Element Structure																									
		1	1.1	1.2	1.3	2	2.1	2.1.1	2.1.2	2.1.3	2.2	2.3	3	3.1	3.1.1	3.1.2	3.1.3	3.1.4	3.1.5	3.2	3.2.1	3.2.2	3.2.3	3.2.4	3.2.5	3.2.6	
		Unit-Level Manpower	Operations	Unit Level Maintenance	Other Unit Level	Unit Operations	Operating Material	Energy (POL, Electricity)	Training and Munitions and Expendable Stores	Other Operational Material	Support Services	Temporary Duty	Maintenance	Organizational Maintenance and Support	Organizational-Level Consumables	Organizational-Level Repair arts	Organizational-Level DLRs	Contract Maintenance Services	Other Unit Maintenance	Intermediate Maintenance	Intermediate Level Consumable Parts	Intermediate Level Repair Parts	Intermediate Level DLRs	Government Labor	Contractor Maintenance	Other Intermediate Maintenance	
Integrated Product Support Element																											
3.4.3	Reliability degradation												AB														
3.4.4	Special Considerations for Software Sustainment Engineering												AB														
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																										

		CAPE O&S Cost Element Structure																							
O&M=A; MILPERS=B; RDT&E=C; Procurement=D; MILCON=E; Family Housing=F		3.3	3.3.1	3.3.2	3.3.3	4	4.1	4.1.1	4.1.2	4.2	4.3	4.4	4.5	5	5.1	5.2	5.2.1	5.2.2	6	6.1	6.2	6.2.1	6.2.2	6.2.3	6.3
		Depot Maintenance	Government Depot Repair	Contractor Depot Repair	Other Depot Maintenance	Sustaining Support	System Specific Training	System Specific Operator Training	System Specific Non-Operator Training	Support Equipment Replacement	Operating Equipment Replacement	Sustaining Engineering & Program Management	Other Sustaining Support	Continuing System Improvements	Hardware Modifications or Modernization	Software Maintenance and Modifications	Correction of Deficiencies	Software Enhancements	Indirect Support	Installation Support	Personnel Support	Personnel Administration	Personnel Benefits	Medical Support	General Training & Education
Integrated Product Support Element																									
3.4.3	Reliability degradation	AB				ABCD						ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD		ABCD				
3.4.4	Special Considerations for Software Sustainment Engineering	AB				ABCD						ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD		ABCD				
3.5	Development of required design changes to resolve operational issues					ABCD						ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD		ABCD				
3.6	Materiel Improvement Plan (MIP) review boards					ABCD						ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD		ABCD				
3.7	DMSMS mitigation					ABCD						ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD		ABCD				
3.7.1	Parts obsolescence					ABCD						ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD		ABCD				
3.7.2	Technology Refresh					ABCD						ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD		ABCD				
3.7.3	Technology insertion					ABCD						ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD		ABCD				
3.8	Engineering dispositions					ABCD						ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD		ABCD				
3.9	Technical manual and technical order updates					ABCD						ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD		ABCD				

		CAPE O&S Cost Element Structure																									
	O&M=A; MILPERS=B; RDT&E=C; Procurement=D; MILCON=E; Family Housing=F	1	1.1	1.2	1.3	2	2.1	2.1.1	2.1.2	2.1.3	2.2	2.3	3	3.1	3.1.1	3.1.2	3.1.3	3.1.4	3.1.5	3.2	3.2.1	3.2.2	3.2.3	3.2.4	3.2.5	3.2.6	
		Unit-Level Manpower	Operations	Unit Level Maintenance	Other Unit Level	Unit Operations	Operating Material	Energy (POL, Electricity)	Training and Munitions and Expendable Stores	Other Operational Material	Support Services	Temporary Duty	Maintenance	Organizational Maintenance and Support	Organizational-Level Consumables	Organizational-Level Repair Parts	Organizational-Level DLRs	Contract Maintenance Services	Other Unit Maintenance	Intermediate Maintenance	Intermediate Level Consumable Parts	Intermediate Level Repair Parts	Intermediate Level DLRs	Government Labor	Contractor Maintenance	Other Intermediate Maintenance	
Integrated Product Support Element																											
3.10	Repair or upgrade vs. disposal or retirement																										
3.11	Maintenance evaluation automation	AB		AB	AB								AB	AB	A	A	A	A	AB	AB	AB	AB	AB	AB	AB		
3.12	Failure, Reporting, Analysis and Corrective Action	AB		AB	AB								AB	AB	A	A	A	A	AB	AB	AB	AB	AB	AB	AB		

		CAPE O&S Cost Element Structure																							
O&M=A; MILPERS=B; RDT&E=C; Procurement=D; MILCON=E; Family Housing=F		3.3	3.3.1	3.3.2	3.3.3	4	4.1	4.1.1	4.1.2	4.2	4.3	4.4	4.5	5	5.1	5.2	5.2.1	5.2.2	6	6.1	6.2	6.2.1	6.2.2	6.2.3	6.3
		Depot Maintenance	Government Depot Repair	Contractor Depot Repair	Other Depot Maintenance	Sustaining Support	System Specific Training	System Specific Operator Training	System Specific Non-Operator Training	Support Equipment Replacement	Operating Equipment Replacement	Sustaining Engineering & Program Management	Other Sustaining Support	Continuing System Improvements	Hardware Modifications or Modernization	Software Maintenance and Modifications	Correction of Deficiencies	Software Enhancements	Indirect Support	Installation Support	Personnel Support	Personnel Administration	Personnel Benefits	Medical Support	General Training & Education
Integrated Product Support Element																									
3.10	Repair or upgrade vs. disposal or retirement					AB						AB			ABCD	ABCD	ABCD			AB					AB
3.11	Maintenance evaluation automation	AB	AB	AB	AB	AB						AB								AB					AB
3.12	Failure, Reporting, Analysis and Corrective Action	AB	AB	AB	AB	AB						AB			AB	AB	AB			AB					AB

		CAPE O&S Cost Element Structure																									
		1	1.1	1.2	1.3	2	2.1	2.1.1	2.1.2	2.1.3	2.2	2.3	3	3.1	3.1.1	3.1.2	3.1.3	3.1.4	3.1.5	3.2	3.2.1	3.2.2	3.2.3	3.2.4	3.2.5	3.2.6	
		Unit-Level Manpower	Operations	Unit Level Maintenance	Other Unit Level	Unit Operations	Operating Material	Energy (POL, Electricity)	Training and Munitions and Expendable Stores	Other Operational Material	Support Services	Temporary Duty	Maintenance	Organizational Maintenance and Support	Organizational-Level Consumables	Organizational-Level Repair arts	Organizational-Level DLRs	Contract Maintenance Services	Other Unit Maintenance	Intermediate Maintenance	Intermediate Level Consumable Parts	Intermediate Level Repair Parts	Intermediate Level DLRs	Government Labor	Contractor Maintenance	Other Intermediate Maintenance	
Integrated Product Support Element																											
Supply Support		AB		AB									ABD	ABD	AD	AD	AD	AD	ABD	ABD	ABD	ABD	ABD	ABD	AD	AD	AD
4.1	Initial provisioning												ABD	AD	AD	AD	AD	AD	AD	AD	AD	AD	AD	AD	AD	AD	AD
4.2	Routine replenishment management, including buffer and safety stock	AB		AB									AB	AB	A	A	A	A	AB	ABD	ABD	ABD	ABD	ABD	ABD	ABD	ABD
4.3	Demand forecasting and Readiness Based Sparing (RBS)	AB		AB									AB	AB	A	A	A	A	AB	AB	AB	AB	AB	AB	AB		
4.4	Bills of Material management and maintenance	AB		AB									AB	AB	A	A	A	A	AB	AB	AB	AB	AB	AB	AB		
4.5	Support equipment initial provisioning												AD	AD	AD	AD	AD	AD	AD	AD	AD	AD	AD	AD	AD	AD	AD
4.6	Support equipment routine replenishment provisioning												A	A	A	A	A	A	A	AD	AD	AD	AD	AD	AD	AD	AD
4.7	Reparable, repair part, and consumable procurement												A	A	A	A	A	A	A	AD	AD	AD	AD	AD	AD	AD	AD
4.8	Cataloging	AB		AB									AB	AB					AB	AB	AB	AB	AB	AB	AB	AB	AB
4.9	Receiving	AB		AB									AB	AB					AB	AB	AB	AB	AB	AB	AB	AB	AB
4.10	Storage	AB		AB									AB	AB					AB	AB	AB	AB	AB	AB	AB	AB	AB
4.11	Inventory management	AB		AB									AB	AB					AB	AB	AB	AB	AB	AB	AB	AB	AB
4.12	Transfer	AB		AB									AB	AB					AB	AB	AB	AB	AB	AB	AB	AB	AB
4.13	Issuance	AB		AB									AB	AB					AB	AB	AB	AB	AB	AB	AB	AB	AB

		CAPE O&S Cost Element Structure																								
	O&M=A; MILPERS=B; RDT&E=C; Procurement=D; MILCON=E; Family Housing=F	Depot Maintenance	Government Depot Repair	Contractor Depot Repair	Other Depot Maintenance	Sustaining Support	System Specific Training	System Specific Operator Training	System Specific Non-Operator Training	Support Equipment Replacement	Operating Equipment Replacement	Sustaining Engineering & Program Management	Other Sustaining Support	Continuing System Improvements	Hardware Modifications or Modernization	Software Maintenance and Modifications	Correction of Deficiencies	Software Enhancements	Indirect Support	Installation Support	Personnel Support	Personnel Administration	Personnel Benefits	Medical Support	General Training & Education	
		3.3	3.3.1	3.3.2	3.3.3	4	4.1	4.1.1	4.1.2	4.2	4.3	4.4	4.5	5	5.1	5.2	5.2.1	5.2.2	6	6.1	6.2	6.2.1	6.2.2	6.2.3	6.3	
Integrated Product Support Element																										
Supply Support		ABD	ABD	ABD	ABD	AB						AB							ABC		ABC					
4.1	Initial provisioning	ABD	ABD	ABD	ABD	AB						AB							ABC		ABC					
4.2	Routine replenishment management, including buffer and safety stock	ABD	ABD	ABD	ABD	AB						AB							AB		AB					
4.3	Demand forecasting and Readiness Based Sparing (RBS)	AB	AB	AB	AB	AB						AB							AB		AB					
4.4	Bills of Material management and maintenance	AB	AB	AB	AB	AB						AB							AB		AB					
4.5	Support equipment initial provisioning	AD	AD	AD	AD	AB						AB							AB		AB					
4.6	Support equipment routine replenishment provisioning	AD	AD	AD	AD	AB						AB							AB		AB					
4.7	Reparable, repair part, and consumable procurement	AD	AD	AD	AD	AB						AB							AB		AB					
4.8	Cataloging	AB	AB	AB	AB	AB						AB							AB		AB					
4.9	Receiving	AB	AB	AB	AB	AB						AB							AB		AB					
4.10	Storage	AB	AB	AB	AB	AB						AB							AB		AB					
4.11	Inventory management	AB	AB	AB	AB	AB						AB							AB		AB					
4.12	Transfer	AB	AB	AB	AB	AB						AB							AB		AB					
4.13	Issuance	AB	AB	AB	AB	AB						AB							AB		AB					

		CAPE O&S Cost Element Structure																										
		1	1.1	1.2	1.3	2	2.1	2.1.1	2.1.2	2.1.3	2.2	2.3	3	3.1	3.1.1	3.1.2	3.1.3	3.1.4	3.1.5	3.2	3.2.1	3.2.2	3.2.3	3.2.4	3.2.5	3.2.6		
		Unit-Level Manpower	Operations	Unit Level Maintenance	Other Unit Level	Unit Operations	Operating Material	Energy (POL, Electricity)	Training and Munitions and Expendable Stores	Other Operational Material	Support Services	Temporary Duty	Maintenance	Organizational Maintenance and Support	Organizational-Level Consumables	Organizational-Level Repair arts	Organizational-Level DLRs	Contract Maintenance Services	Other Unit Maintenance	Intermediate Maintenance	Intermediate Level Consumable Parts	Intermediate Level Repair Parts	Intermediate Level DLRs	Government Labor	Contractor Maintenance	Other Intermediate Maintenance		
Integrated Product Support Element																												
4.14	Redistribution	AB	AB										AB	AB					AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
4.15	Disposal	AB	AB										AB	AB					AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
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	AB	AB										AB	AB					AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
4.19	Buffer Management																											
4.20	Warranty Management	AB	AB										AB	AB					AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
4.21	Supply Chain Assurance	AB	AB										AB	AB					AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
4.21.1	Counterfeit material prevention																											
4.21.2	Malicious hardware and software prevention	AB	AB										AB	AB					AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
4.21.3	Unauthorized technology transfer prevention																											

		CAPE O&S Cost Element Structure																							
		3.3	3.3.1	3.3.2	3.3.3	4	4.1	4.1.1	4.1.2	4.2	4.3	4.4	4.5	5	5.1	5.2	5.2.1	5.2.2	6	6.1	6.2	6.2.1	6.2.2	6.2.3	6.3
		Depot Maintenance	Government Depot Repair	Contractor Depot Repair	Other Depot Maintenance	Sustaining Support	System Specific Training	System Specific Operator Training	System Specific Non-Operator Training	Support Equipment Replacement	Operating Equipment Replacement	Sustaining Engineering & Program Management	Other Sustaining Support	Continuing System Improvements	Hardware Modifications or Modernization	Software Maintenance and Modifications	Correction of Deficiencies	Software Enhancements	Indirect Support	Installation Support	Personnel Support	Personnel Administration	Personnel Benefits	Medical Support	General Training & Education
O&M=A; MILPERS=B; RDT&E=C; Procurement=D; MILCON=E; Family Housing=F																									
Integrated Product Support Element																									
4.14	Redistribution	AB	AB	AB	AB	AB						AB								AB	AB				
4.15	Disposal	AB	AB	AB	AB	AB						AB								AB	AB				
4.16	Material pricing						AB					AB								AB	AB				
4.17	Total Asset Visibility/AIT						AB					AB								AB	AB				
4.17.1	Serialized Item Management (SIM)						AB					AB								AB	AB				
4.17.2	Item Unique Identification (IUID)						AB					AB								AB	AB				
4.17.3	Radio Frequency Identification (RFID)						AB					AB								AB	AB				
4.18	Shelf Life Management	AB	AB	AB	AB	AB						AB								AB	AB				
4.19	Buffer Management						AB					AB								AB	AB				
4.20	Warranty Management	AB	AB	AB	AB	AB						AB								AB	AB				
4.21	Supply Chain Assurance	AB	AB	AB	AB	AB						AB								AB	AB				
4.21.1	Counterfeit material prevention											AB								AB	AB				
4.21.2	Malicious hardware and software prevention	AB	AB	AB	AB	AB						AB								AB	AB				
4.21.3	Unauthorized technology transfer prevention											AB								AB	AB				

		CAPE O&S Cost Element Structure																									
		1	1.1	1.2	1.3	2	2.1	2.1.1	2.1.2	2.1.3	2.2	2.3	3	3.1	3.1.1	3.1.2	3.1.3	3.1.4	3.1.5	3.2	3.2.1	3.2.2	3.2.3	3.2.4	3.2.5	3.2.6	
		Unit-Level Manpower	Operations	Unit Level Maintenance	Other Unit Level	Unit Operations	Operating Material	Energy (POL, Electricity)	Training and Munitions and Expendable Stores	Other Operational Material	Support Services	Temporary Duty	Maintenance	Organizational Maintenance and Support	Organizational-Level Consumables	Organizational-Level Repair arts	Organizational-Level DLRs	Contract Maintenance Services	Other Unit Maintenance	Intermediate Maintenance	Intermediate Level Consumable Parts	Intermediate Level Repair Parts	Intermediate Level DLRs	Government Labor	Contractor Maintenance	Other Intermediate Maintenance	
O&M=A; MILPERS=B; RDT&E=C; Procurement=D; MILCON=E; Family Housing=F																											
Integrated Product Support Element																											
Maintenance Planning and Management		AB		AB																	AB				AB	AB	
5.1	Maintenance Concept Design																										
5.2	Core capability management																										
5.3	Title X 50/50 management																										
5.4	Public-Private Partnerships																										
5.5	Maintenance execution	AB		AB																	AB				AB	AB	
5.6	Level of repair analysis – hardware																										
5.7	Level of repair analysis – software																										
5.8	Failure Modes Effects and Criticality Analysis (FMECA) Required repair times determination																										
5.9	OPTEMPO variance management																										
5.10	Routine versus battle-damage repair management																										

		CAPE O&S Cost Element Structure																								
		3.3	3.3.1	3.3.2	3.3.3	4	4.1	4.1.1	4.1.2	4.2	4.3	4.4	4.5	5	5.1	5.2	5.2.1	5.2.2	6	6.1	6.2	6.2.1	6.2.2	6.2.3	6.3	
		Depot Maintenance	Government Depot Repair	Contractor Depot Repair	Other Depot Maintenance	Sustaining Support	System Specific Training	System Specific Operator Training	System Specific Non-Operator Training	Support Equipment Replacement	Operating Equipment Replacement	Sustaining Engineering & Program Management	Other Sustaining Support	Continuing System Improvements	Hardware Modifications or Modernization	Software Maintenance and Modifications	Correction of Deficiencies	Software Enhancements	Indirect Support	Installation Support	Personnel Support	Personnel Administration	Personnel Benefits	Medical Support	General Training & Education	
		O&M=A; MILPERS=B; RDT&E=C; Procurement=D; MILCON=E; Family Housing=F																								
Integrated Product Support Element																										
Maintenance Planning and Management		AB	AB	AB	AB	AB						AB								AB	AB					
5.1	Maintenance Concept Design					AB						AB								AB	AB					
5.2	Core capability management	AB	AB			AB						AB								AB	AB					
5.3	Title X 50/50 management	AB	AB			AB						AB								AB	AB					
5.4	Public-Private Partnerships	AB	AB			AB						AB								AB	AB					
5.5	Maintenance execution	AB	AB	AB	AB	AB						AB								AB	AB					
5.6	Level of repair analysis – hardware					AB						AB								AB	AB					
5.7	Level of repair analysis – software					AB						AB								AB	AB					
5.8	Failure Modes Effects and Criticality Analysis (FMECA) Required repair times determination					AB						AB								AB	AB					
5.9	OPTEMPO variance management					AB						AB								AB	AB					
5.10	Routine versus battle-damage repair management					AB						AB								AB	AB					

		CAPE O&S Cost Element Structure																									
		1	1.1	1.2	1.3	2	2.1	2.1.1	2.1.2	2.1.3	2.2	2.3	3	3.1	3.1.1	3.1.2	3.1.3	3.1.4	3.1.5	3.2	3.2.1	3.2.2	3.2.3	3.2.4	3.2.5	3.2.6	
		Unit-Level Manpower	Operations	Unit Level Maintenance	Other Unit Level	Unit Operations	Operating Material	Energy (POL, Electricity)	Training and Munitions and Expendable Stores	Other Operational Material	Support Services	Temporary Duty	Maintenance	Organizational Maintenance and Support	Organizational-Level Consumables	Organizational-Level Repair arts	Organizational-Level DLRs	Contract Maintenance Services	Other Unit Maintenance	Intermediate Maintenance	Intermediate Level Consumable Parts	Intermediate Level Repair Parts	Intermediate Level DLRs	Government Labor	Contractor Maintenance	Other Intermediate Maintenance	
Integrated Product Support Element																											
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																										

		CAPE O&S Cost Element Structure																								
		3.3	3.3.1	3.3.2	3.3.3	4	4.1	4.1.1	4.1.2	4.2	4.3	4.4	4.5	5	5.1	5.2	5.2.1	5.2.2	6	6.1	6.2	6.2.1	6.2.2	6.2.3	6.3	
		Depot Maintenance	Government Depot Repair	Contractor Depot Repair	Other Depot Maintenance	Sustaining Support	System Specific Training	System Specific Operator Training	System Specific Non-Operator Training	Support Equipment Replacement	Operating Equipment Replacement	Sustaining Engineering & Program Management	Other Sustaining Support	Continuing System Improvements	Hardware Modifications or Modernization	Software Maintenance and Modifications	Correction of Deficiencies	Software Enhancements	Indirect Support	Installation Support	Personnel Support	Personnel Administration	Personnel Benefits	Medical Support	General Training & Education	
	O&M=A; MILPERS=B; RDT&E=C; Procurement=D; MILCON=E; Family Housing=F																									
Integrated Product Support Element																										
5.11	Built-in and manual testability management					AB						AB								AB		AB				
5.12	Inter-service, organic, and contractor mix of repair responsibilities					AB						AB								AB		AB				
5.13	Condition Based Maintenance Plus (CBM+); Diagnostics, Prognostics & Health Management					AB						AB								AB		AB				
5.14	Reliability Centered Maintenance (RCM)					AB						AB								AB		AB				
5.15	Depot Workload Allocation, Planning, Activation, and Execution	AB	AB	AB	AB	AB						AB								AB		AB				

		CAPE O&S Cost Element Structure																									
		1	1.1	1.2	1.3	2	2.1	2.1.1	2.1.2	2.1.3	2.2	2.3	3	3.1	3.1.1	3.1.2	3.1.3	3.1.4	3.1.5	3.2	3.2.1	3.2.2	3.2.3	3.2.4	3.2.5	3.2.6	
		Unit-Level Manpower	Operations	Unit Level Maintenance	Other Unit Level	Unit Operations	Operating Material	Energy (POL, Electricity)	Training and Munitions and Expendable Stores	Other Operational Material	Support Services	Temporary Duty	Maintenance	Organizational Maintenance and Support	Organizational-Level Consumables	Organizational-Level Repair arts	Organizational-Level DLRs	Contract Maintenance Services	Other Unit Maintenance	Intermediate Maintenance	Intermediate Level Consumable Parts	Intermediate Level Repair Parts	Intermediate Level DLRs	Government Labor	Contractor Maintenance	Other Intermediate Maintenance	
O&M=A; MILPERS=B; RDT&E=C; Procurement=D; MILCON=E; Family Housing=F																											
Integrated Product Support Element																											
Packaging, Handling, Storage, and Transportation (PHS&T)		AB		AB									AB	AB					AB	AB	AB	AB	AB	AB	AB	AB	AB
6.1	Short and long term preservation	AB		AB									AB	AB					AB	AB	AB	AB	AB	AB	AB	AB	AB
6.2	Packaging requirements determination																										
6.3	Containerization requirements determination																										
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																										

		CAPE O&S Cost Element Structure																							
O&M=A; MILPERS=B; RDT&E=C; Procurement=D; MILCON=E; Family Housing=F		3.3	3.3.1	3.3.2	3.3.3	4	4.1	4.1.1	4.1.2	4.2	4.3	4.4	4.5	5	5.1	5.2	5.2.1	5.2.2	6	6.1	6.2	6.2.1	6.2.2	6.2.3	6.3
		Depot Maintenance	Government Depot Repair	Contractor Depot Repair	Other Depot Maintenance	Sustaining Support	System Specific Training	System Specific Operator Training	System Specific Non-Operator Training	Support Equipment Replacement	Operating Equipment Replacement	Sustaining Engineering & Program Management	Other Sustaining Support	Continuing System Improvements	Hardware Modifications or Modernization	Software Maintenance and Modifications	Correction of Deficiencies	Software Enhancements	Indirect Support	Installation Support	Personnel Support	Personnel Administration	Personnel Benefits	Medical Support	General Training & Education
Integrated Product Support Element																									
Packaging, Handling, Storage, and Transportation (PHS&T)		AB	AB	AB	AB	AB						AB								AB		AB			
6.1	Short and long term preservation	AB	AB	AB	AB	AB						AB								AB		AB			
6.2	Packaging requirements determination											AB								AB		AB			
6.3	Containerization requirements determination											AB								AB		AB			
6.4	Shelf life requirements determination											AB								AB		AB			
6.5	Handling requirements determination											AB								AB		AB			
6.6	Transportation requirements determination											AB								AB		AB			
6.7	Environmental control requirements determination											AB								AB		AB			
6.8	Physical shock control requirements determination											AB								AB		AB			

		CAPE O&S Cost Element Structure																									
 O&M=A; MILPERS=B; RDT&E=C; Procurement=D; MILCON=E; Family Housing=F		1	1.1	1.2	1.3	2	2.1	2.1.1	2.1.2	2.1.3	2.2	2.3	3	3.1	3.1.1	3.1.2	3.1.3	3.1.4	3.1.5	3.2	3.2.1	3.2.2	3.2.3	3.2.4	3.2.5	3.2.6	
		Unit-Level Manpower	Operations	Unit Level Maintenance	Other Unit Level	Unit Operations	Operating Material	Energy (POL, Electricity)	Training and Munitions and Expendable Stores	Other Operational Material	Support Services	Temporary Duty	Maintenance	Organizational Maintenance and Support	Organizational-Level Consumables	Organizational-Level Repair arts	Organizational-Level DLRs	Contract Maintenance Services	Other Unit Maintenance	Intermediate Maintenance	Intermediate Level Consumable Parts	Intermediate Level Repair Parts	Intermediate Level DLRs	Government Labor	Contractor Maintenance	Other Intermediate Maintenance	
Integrated Product Support Element																											
6.9	Static shock control requirements determination																										
6.10	Security classification requirements determination																										
6.11	Container Reutilization	AB	AB										AB	AB					AB	AB	AB	AB	AB	AB	AB	AB	AB
6.12	Marking	AB	AB										AB	AB					AB	AB	AB	AB	AB	AB	AB	AB	AB

		CAPE O&S Cost Element Structure																							
 O&M=A; MILPERS=B; RDT&E=C; Procurement=D; MILCON=E; Family Housing=F		3.3	3.3.1	3.3.2	3.3.3	4	4.1	4.1.1	4.1.2	4.2	4.3	4.4	4.5	5	5.1	5.2	5.2.1	5.2.2	6	6.1	6.2	6.2.1	6.2.2	6.2.3	6.3
		Depot Maintenance	Government Depot Repair	Contractor Depot Repair	Other Depot Maintenance	Sustaining Support	System Specific Training	System Specific Operator Training	System Specific Non-Operator Training	Support Equipment Replacement	Operating Equipment Replacement	Sustaining Engineering & Program Management	Other Sustaining Support	Continuing System Improvements	Hardware Modifications or Modernization	Software Maintenance and Modifications	Correction of Deficiencies	Software Enhancements	Indirect Support	Installation Support	Personnel Support	Personnel Administration	Personnel Benefits	Medical Support	General Training & Education
Integrated Product Support Element																									
6.9	Static shock control requirements determination											AB								AB		AB			
6.10	Security classification requirements determination											AB								AB		AB			
6.11	Container Reutilization	AB	AB	AB	AB	AB						AB								AB		AB			
6.12	Marking	AB	AB	AB	AB	AB						AB								AB		AB			

		CAPE O&S Cost Element Structure																									
		1	1.1	1.2	1.3	2	2.1	2.1.1	2.1.2	2.1.3	2.2	2.3	3	3.1	3.1.1	3.1.2	3.1.3	3.1.4	3.1.5	3.2	3.2.1	3.2.2	3.2.3	3.2.4	3.2.5	3.2.6	
		Unit-Level Manpower	Operations	Unit Level Maintenance	Other Unit Level	Unit Operations	Operating Material	Energy (POL, Electricity)	Training and Munitions and Expendable Stores	Other Operational Material	Support Services	Temporary Duty	Maintenance	Organizational Maintenance and Support	Organizational-Level Consumables	Organizational-Level Repair arts	Organizational-Level DLRs	Contract Maintenance Services	Other Unit Maintenance	Intermediate Maintenance	Intermediate Level Consumable Parts	Intermediate Level Repair Parts	Intermediate Level DLRs	Government Labor	Contractor Maintenance	Other Intermediate Maintenance	
O&M=A; MILPERS=B; RDT&E=C; Procurement=D; MILCON=E; Family Housing=F																											
Integrated Product Support Element																											
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																										
7.7.1	S1000D Implementation																										

		CAPE O&S Cost Element Structure																							
 O&M=A; MILPERS=B; RDT&E=C; Procurement=D; MILCON=E; Family Housing=F		3.3	3.3.1	3.3.2	3.3.3	4	4.1	4.1.1	4.1.2	4.2	4.3	4.4	4.5	5	5.1	5.2	5.2.1	5.2.2	6	6.1	6.2	6.2.1	6.2.2	6.2.3	6.3
		Depot Maintenance	Government Depot Repair	Contractor Depot Repair	Other Depot Maintenance	Sustaining Support	System Specific Training	System Specific Operator Training	System Specific Non-Operator Training	Support Equipment Replacement	Operating Equipment Replacement	Sustaining Engineering & Program Management	Other Sustaining Support	Continuing System Improvements	Hardware Modifications or Modernization	Software Maintenance and Modifications	Correction of Deficiencies	Software Enhancements	Indirect Support	Installation Support	Personnel Support	Personnel Administration	Personnel Benefits	Medical Support	General Training & Education
Integrated Product Support Element																									
Technical Data		ABCD	ABCD	ABCD	ABCD	ABCD						ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD
7.1	Engineering data maintenance	ABCD	ABCD	ABCD	ABCD	ABCD							ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD
7.2	Specifications determination	ABCD	ABCD	ABCD	ABCD	ABCD							ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD
7.3	Standards management	ABCD	ABCD	ABCD	ABCD	ABCD							ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD
7.4	Data Item Descriptions (DID) management	ABCD	ABCD	ABCD	ABCD	ABCD							ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD
7.5	Technical standards development and management	ABCD	ABCD	ABCD	ABCD	ABCD							ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD
7.6	Embedded Technical Data Systems	ABCD	ABCD	ABCD	ABCD	ABCD							ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD
7.7	Technical manuals (TMs) including Interactive Electronic Technical Manuals	ABCD	ABCD	ABCD	ABCD	ABCD							ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD
7.7.1	\$1000D Implementation	ABCD	ABCD	ABCD	ABCD	ABCD							ABCD		ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD

		CAPE O&S Cost Element Structure																									
		1	1.1	1.2	1.3	2	2.1	2.1.1	2.1.2	2.1.3	2.2	2.3	3	3.1	3.1.1	3.1.2	3.1.3	3.1.4	3.1.5	3.2	3.2.1	3.2.2	3.2.3	3.2.4	3.2.5	3.2.6	
		Unit-Level Manpower	Operations	Unit Level Maintenance	Other Unit Level	Unit Operations	Operating Material	Energy (POL, Electricity)	Training and Munitions and Expendable Stores	Other Operational Material	Support Services	Temporary Duty	Maintenance	Organizational Maintenance and Support	Organizational-Level Consumables	Organizational-Level Repair arts	Organizational-Level DLRs	Contract Maintenance Services	Other Unit Maintenance	Intermediate Maintenance	Intermediate Level Consumable Parts	Intermediate Level Repair Parts	Intermediate Level DLRs	Government Labor	Contractor Maintenance	Other Intermediate Maintenance	
Integrated Product Support Element																											
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																										

		CAPE O&S Cost Element Structure																							
		Depot Maintenance	Government Depot Repair	Contractor Depot Repair	Other Depot Maintenance	Sustaining Support	System Specific Training	System Specific Operator Training	System Specific Non-Operator Training	Support Equipment Replacement	Operating Equipment Replacement	Sustaining Engineering & Program Management	Other Sustaining Support	Continuing System Improvements	Hardware Modifications or Modernization	Software Maintenance and Modifications	Correction of Deficiencies	Software Enhancements	Indirect Support	Installation Support	Personnel Support	Personnel Administration	Personnel Benefits	Medical Support	General Training & Education
	O&M=A; MILPERS=B; RDT&E=C; Procurement=D; MILCON=E; Family Housing=F	3.3	3.3.1	3.3.2	3.3.3	4	4.1	4.1.1	4.1.2	4.2	4.3	4.4	4.5	5	5.1	5.2	5.2.1	5.2.2	6	6.1	6.2	6.2.1	6.2.2	6.2.3	6.3
Integrated Product Support Element																									
7.8	Engineering drawings management	ABCD	ABCD	ABCD	ABCD	ABCD						ABCD			ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD
7.9	Data rights management	ABCD	ABCD	ABCD	ABCD	ABCD						ABCD			ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD
7.10	Data delivery	ABCD	ABCD	ABCD	ABCD	ABCD						ABCD			ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD
7.11	Proprietary data management	ABCD	ABCD	ABCD	ABCD	ABCD						ABCD			ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD
7.12	Data validation	ABCD	ABCD	ABCD	ABCD	ABCD						ABCD			ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD
7.13	Data storage and backup	ABCD	ABCD	ABCD	ABCD	ABCD						ABCD			ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD	ABCD

		CAPE O&S Cost Element Structure																									
		1	1.1	1.2	1.3	2	2.1	2.1.1	2.1.2	2.1.3	2.2	2.3	3	3.1	3.1.1	3.1.2	3.1.3	3.1.4	3.1.5	3.2	3.2.1	3.2.2	3.2.3	3.2.4	3.2.5	3.2.6	
		Unit-Level Manpower	Operations	Unit Level Maintenance	Other Unit Level	Unit Operations	Operating Material	Energy (POL, Electricity)	Training and Munitions and Expendable Stores	Other Operational Material	Support Services	Temporary Duty	Maintenance	Organizational Maintenance and Support	Organizational-Level Consumables	Organizational-Level Repair Parts	Organizational-Level DLRs	Contract Maintenance Services	Other Unit Maintenance	Intermediate Maintenance	Intermediate Level Consumable Parts	Intermediate Level Repair Parts	Intermediate Level DLRs	Government Labor	Contractor Maintenance	Other Intermediate Maintenance	
Integrated Product Support Element																											
Support Equipment		AB	AB	AB		AB					AB		AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
8.1	Manual and automatic test equipment management	AB	AB			AB					AB		AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
8.2	Equipment design																										
8.3	Equipment commonality management																										
8.4	Maintenance concept integration																										
8.5	Ground handling and maintenance equipment management	AB		AB		AB					AB		AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
8.6	Equipment capacity determination	AB		AB		AB					AB		AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
8.7	Air conditioners requirement determination and management	AB		AB		AB					AB		AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
8.8	Generators requirement determination and management	AB		AB		AB					AB		AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB

		CAPE O&S Cost Element Structure																							
O&M=A; MILPERS=B; RDT&E=C; Procurement=D; MILCON=E; Family Housing=F		3.3	3.3.1	3.3.2	3.3.3	4	4.1	4.1.1	4.1.2	4.2	4.3	4.4	4.5	5	5.1	5.2	5.2.1	5.2.2	6	6.1	6.2	6.2.1	6.2.2	6.2.3	6.3
		Depot Maintenance	Government Depot Repair	Contractor Depot Repair	Other Depot Maintenance	Sustaining Support	System Specific Training	System Specific Operator Training	System Specific Non-Operator Training	Support Equipment Replacement	Operating Equipment Replacement	Sustaining Engineering & Program Management	Other Sustaining Support	Continuing System Improvements	Hardware Modifications or Modernization	Software Maintenance and Modifications	Correction of Deficiencies	Software Enhancements	Indirect Support	Installation Support	Personnel Support	Personnel Administration	Personnel Benefits	Medical Support	General Training & Education
Integrated Product Support Element																									
Support Equipment		ABC	ABC	ABC	ABC	ABCD						ABCD		ABCD	ABCD	ABCD				ABCD					
8.1	Manual and automatic test equipment management	AB	AB	AB	AB	AB				AB			AB						AB		AB				
8.2	Equipment design	ABC	ABC	ABC	ABC	ABC						ABC		ABC	ABC	ABC	ABC	ABC	ABC	ABC	ABC				
8.3	Equipment commonality management					ABCD						ABCD		ABCD	ABCD	ABCD	ABCD			ABCD		ABCD			
8.4	Maintenance concept integration											ABC								ABC		ABC			
8.5	Ground handling and maintenance equipment management	AB	AB	AB	AB	AB							AB							AB		AB			
8.6	Equipment capacity determination	AB	AB	AB	AB	AB							AB							AB		AB			
8.7	Air conditioners requirement determination and management	AB	AB	AB	AB	AB							AB							AB		AB			
8.8	Generators requirement determination and management	AB	AB	AB	AB	AB							AB							AB		AB			

		CAPE O&S Cost Element Structure																									
		1	1.1	1.2	1.3	2	2.1	2.1.1	2.1.2	2.1.3	2.2	2.3	3	3.1	3.1.1	3.1.2	3.1.3	3.1.4	3.1.5	3.2	3.2.1	3.2.2	3.2.3	3.2.4	3.2.5	3.2.6	
		Unit-Level Manpower	Operations	Unit Level Maintenance	Other Unit Level	Unit Operations	Operating Material	Energy (POL, Electricity)	Training and Munitions and Expendable Stores	Other Operational Material	Support Services	Temporary Duty	Maintenance	Organizational Maintenance and Support	Organizational-Level Consumables	Organizational-Level Repair arts	Organizational-Level DLRs	Contract Maintenance Services	Other Unit Maintenance	Intermediate Maintenance	Intermediate Level Consumable Parts	Intermediate Level Repair Parts	Intermediate Level DLRs	Government Labor	Contractor Maintenance	Other Intermediate Maintenance	
Integrated Product Support Element																											
8.9	Tools requirement determination and management	AB		AB		AB					AB		AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
8.10	Metrology and calibration equipment requirement de	AB		AB		AB					AB		AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
8.11	Deployability requirement determination management	AB		AB		AB					AB		AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
8.12	Automatic Test Systems	AB		AB		AB					AB		AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
8.13	Support Equipment Integrated Product Support	AB		AB		AB					AB		AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB

		CAPE O&S Cost Element Structure																							
O&M=A; MILPERS=B; RDT&E=C; Procurement=D; MILCON=E; Family Housing=F		3.3	3.3.1	3.3.2	3.3.3	4	4.1	4.1.1	4.1.2	4.2	4.3	4.4	4.5	5	5.1	5.2	5.2.1	5.2.2	6	6.1	6.2	6.2.1	6.2.2	6.2.3	6.3
		Depot Maintenance	Government Depot Repair	Contractor Depot Repair	Other Depot Maintenance	Sustaining Support	System Specific Training	System Specific Operator Training	System Specific Non-Operator Training	Support Equipment Replacement	Operating Equipment Replacement	Sustaining Engineering & Program Management	Other Sustaining Support	Continuing System Improvements	Hardware Modifications or Modernization	Software Maintenance and Modifications	Correction of Deficiencies	Software Enhancements	Indirect Support	Installation Support	Personnel Support	Personnel Administration	Personnel Benefits	Medical Support	General Training & Education
Integrated Product Support Element																									
8.9	Tools requirement determination and management	AB	AB	AB	AB	AB						AB								AB		AB			
8.10	Metrology and calibration equipment requirement de	AB	AB	AB	AB	AB						AB								AB		AB			
8.11	Deployability requirement determination management	AB	AB	AB	AB	AB						AB								AB		AB			
8.12	Automatic Test Systems	AB	AB	AB	AB	AB						AB								AB		AB			
8.13	Support Equipment Integrated Product Support	AB	AB	AB	AB	AB						AB								AB		AB			

		CAPE O&S Cost Element Structure																									
		1	1.1	1.2	1.3	2	2.1	2.1.1	2.1.2	2.1.3	2.2	2.3	3	3.1	3.1.1	3.1.2	3.1.3	3.1.4	3.1.5	3.2	3.2.1	3.2.2	3.2.3	3.2.4	3.2.5	3.2.6	
		Unit-Level Manpower	Operations	Unit Level Maintenance	Other Unit Level	Unit Operations	Operating Material	Energy (POL, Electricity)	Training and Munitions and Expendable Stores	Other Operational Material	Support Services	Temporary Duty	Maintenance	Organizational Maintenance and Support	Organizational-Level Consumables	Organizational-Level Repair arts	Organizational-Level DLRs	Contract Maintenance Services	Other Unit Maintenance	Intermediate Maintenance	Intermediate Level Consumable Parts	Intermediate Level Repair Parts	Intermediate Level DLRs	Government Labor	Contractor Maintenance	Other Intermediate Maintenance	
O&M=A; MILPERS=B; RDT&E=C; Procurement=D; MILCON=E; Family Housing=F																											
Integrated Product Support Element																											
Training & Training Support		AB	AB	AB	AB	ABCD	ABCD	AB	ABCD	AB	AB	AB	ABCD	ABCD	ABCD	ABCD	ABCD	AB	AB	ABCD	ABCD	ABCD	ABCD	AB	AB	AB	AB
9.1	Initial, formal, informal, and On the Job Training (OJT) individual, crew, and unit New Equipment Training (NET)	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
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	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
9.4	Initial, formal, informal, and OJT individual, crew, and unit Displaced Equipment Training (DET)	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB

		CAPE O&S Cost Element Structure																								
		3.3	3.3.1	3.3.2	3.3.3	4	4.1	4.1.1	4.1.2	4.2	4.3	4.4	4.5	5	5.1	5.2	5.2.1	5.2.2	6	6.1	6.2	6.2.1	6.2.2	6.2.3	6.3	
		Depot Maintenance	Government Depot Repair	Contractor Depot Repair	Other Depot Maintenance	Sustaining Support	System Specific Training	System Specific Operator Training	System Specific Non-Operator Training	Support Equipment Replacement	Operating Equipment Replacement	Sustaining Engineering & Program Management	Other Sustaining Support	Continuing System Improvements	Hardware Modifications or Modernization	Software Maintenance and Modifications	Correction of Deficiencies	Software Enhancements	Indirect Support	Installation Support	Personnel Support	Personnel Administration	Personnel Benefits	Medical Support	General Training & Education	
O&M=A; MILPERS=B; RDT&E=C; Procurement=D; MILCON=E; Family Housing=F																										
Integrated Product Support Element																										
Training & Training Support		AB	AB	AB	AB	ABCD	ABCD	ABCD	ABCD			ABCD	AB							AB	AB	AB	AB	AB	AB	AB
9.1	Initial, formal, informal, and On the Job Training (OJT) individual, crew, and unit New Equipment Training (NET)	AB	AB	AB	AB	ABC	AB	AB	AB			ABC	AB							AB	AB	AB	AB	AB	AB	
9.2	Initial, formal, informal, and OJT individual, crew, and unit Institutional training											AB								AB						AB
9.3	Initial, formal, informal, and OJT individual, crew, and unit Sustainment training	AB	AB	AB	AB	AB	AB	AB	AB			AB	AB							AB	AB	AB	AB	AB	AB	AB
9.4	Initial, formal, informal, and OJT individual, crew, and unit Displaced Equipment Training (DET)	AB	AB	AB	AB	AB	AB	AB	AB			AB	AB							AB	AB	AB	AB	AB	AB	

		CAPE O&S Cost Element Structure																									
		Unit-Level Manpower	Operations	Unit Level Maintenance	Other Unit Level	Unit Operations	Operating Material	Energy (POL, Electricity)	Training and Munitions and Expendable Stores	Other Operational Material	Support Services	Temporary Duty	Maintenance	Organizational Maintenance and Support	Organizational-Level Consumables	Organizational-Level Repair arts	Organizational-Level DLRs	Contract Maintenance Services	Other Unit Maintenance	Intermediate Maintenance	Intermediate Level Consumable Parts	Intermediate Level Repair Parts	Intermediate Level DLRs	Government Labor	Contractor Maintenance	Other Intermediate Maintenance	
		1	1.1	1.2	1.3	2	2.1	2.1.1	2.1.2	2.1.3	2.2	2.3	3	3.1	3.1.1	3.1.2	3.1.3	3.1.4	3.1.5	3.2	3.2.1	3.2.2	3.2.3	3.2.4	3.2.5	3.2.6	
O&M=A; MILPERS=B; RDT&E=C; Procurement=D; MILCON=E; Family Housing=F																											
Integrated Product Support Element																											
9.5	Embedded training insertion and management	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
9.6	Computer Based Training	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
9.7	Distance Learning	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
9.8	Training Equipment					AB CD	AB CD		AB CD				AB CD	AB CD	AB CD	AB CD	AB CD			AB CD	AB CD	AB CD	AB CD	AB	AB	AB	AB
9.9	Train the Trainer	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
9.10	Simulator Sustainment	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB

		CAPE O&S Cost Element Structure																							
 O&M=A; MILPERS=B; RDT&E=C; Procurement=D; MILCON=E; Family Housing=F		3.3	3.3.1	3.3.2	3.3.3	4	4.1	4.1.1	4.1.2	4.2	4.3	4.4	4.5	5	5.1	5.2	5.2.1	5.2.2	6	6.1	6.2	6.2.1	6.2.2	6.2.3	6.3
		Depot Maintenance	Government Depot Repair	Contractor Depot Repair	Other Depot Maintenance	Sustaining Support	System Specific Training	System Specific Operator Training	System Specific Non-Operator Training	Support Equipment Replacement	Operating Equipment Replacement	Sustaining Engineering & Program Management	Other Sustaining Support	Continuing System Improvements	Hardware Modifications or Modernization	Software Maintenance and Modifications	Correction of Deficiencies	Software Enhancements	Indirect Support	Installation Support	Personnel Support	Personnel Administration	Personnel Benefits	Medical Support	General Training & Education
Integrated Product Support Element																									
9.5	Embedded training insertion and management	AB	AB	AB	AB	AB	AB	AB	AB			AB	AB						AB	AB	AB	AB	AB	AB	AB
9.6	Computer Based Training	AB	AB	AB	AB	AB	AB	AB	AB			AB	AB						AB	AB	AB	AB	AB	AB	AB
9.7	Distance Learning	AB	AB	AB	AB	AB	AB	AB	AB			AB	AB						AB	AB	AB	AB	AB	AB	AB
9.8	Training Equipment					ABCD	ABCD	ABCD	ABCD			ABCD							AB						AB
9.9	Train the Trainer	AB	AB	AB	AB	AB	AB	AB	AB			AB	C	AB					AB	AB	AB	AB	AB	AB	AB
9.10	Simulator Sustainment	AB	AB	AB	AB	AB	AB	AB	AB			AB	AB						AB	AB	AB	AB	AB	AB	AB

		CAPE O&S Cost Element Structure																									
		1	1.1	1.2	1.3	2	2.1	2.1.1	2.1.2	2.1.3	2.2	2.3	3	3.1	3.1.1	3.1.2	3.1.3	3.1.4	3.1.5	3.2	3.2.1	3.2.2	3.2.3	3.2.4	3.2.5	3.2.6	
		Unit-Level Manpower	Operations	Unit Level Maintenance	Other Unit Level	Unit Operations	Operating Material	Energy (POL, Electricity)	Training and Munitions and Expendable Stores	Other Operational Material	Support Services	Temporary Duty	Maintenance	Organizational Maintenance and Support	Organizational-Level Consumables	Organizational-Level Repair arts	Organizational-Level DLRs	Contract Maintenance Services	Other Unit Maintenance	Intermediate Maintenance	Intermediate Level Consumable Parts	Intermediate Level Repair Parts	Intermediate Level DLRs	Government Labor	Contractor Maintenance	Other Intermediate Maintenance	
Integrated Product Support Element																											
Manpower and Personnel																											
10	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																										

		CAPE O&S Cost Element Structure																							
		3.3	3.3.1	3.3.2	3.3.3	4	4.1	4.1.1	4.1.2	4.2	4.3	4.4	4.5	5	5.1	5.2	5.2.1	5.2.2	6	6.1	6.2	6.2.1	6.2.2	6.2.3	6.3
		Depot Maintenance	Government Depot Repair	Contractor Depot Repair	Other Depot Maintenance	Sustaining Support	System Specific Training	System Specific Operator Training	System Specific Non-Operator Training	Support Equipment Replacement	Operating Equipment Replacement	Sustaining Engineering & Program Management	Other Sustaining Support	Continuing System Improvements	Hardware Modifications or Modernization	Software Maintenance and Modifications	Correction of Deficiencies	Software Enhancements	Indirect Support	Installation Support	Personnel Support	Personnel Administration	Personnel Benefits	Medical Support	General Training & Education
	O&M=A; MILPERS=B; RDT&E=C; Procurement=D; MILCON=E; Family Housing=F																								
Integrated Product Support Element																									
Manpower and Personnel						AB														AB		AB			
10	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					AB														AB		AB			
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					AB														AB		AB			

		CAPE O&S Cost Element Structure																									
		1	1.1	1.2	1.3	2	2.1	2.1.1	2.1.2	2.1.3	2.2	2.3	3	3.1	3.1.1	3.1.2	3.1.3	3.1.4	3.1.5	3.2	3.2.1	3.2.2	3.2.3	3.2.4	3.2.5	3.2.6	
		Unit-Level Manpower	Operations	Unit Level Maintenance	Other Unit Level	Unit Operations	Operating Material	Energy (POL, Electricity)	Training and Munitions and Expendable Stores	Other Operational Material	Support Services	Temporary Duty	Maintenance	Organizational Maintenance and Support	Organizational-Level Consumables	Organizational-Level Repair arts	Organizational-Level DLRs	Contract Maintenance Services	Other Unit Maintenance	Intermediate Maintenance	Intermediate Level Consumable Parts	Intermediate Level Repair Parts	Intermediate Level DLRs	Government Labor	Contractor Maintenance	Other Intermediate Maintenance	
O&M=A; MILPERS=B; RDT&E=C; Procurement=D; MILCON=E; Family Housing=F																											
Integrated Product Support Element																											
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																										

		CAPE O&S Cost Element Structure																								
		3.3	3.3.1	3.3.2	3.3.3	4	4.1	4.1.1	4.1.2	4.2	4.3	4.4	4.5	5	5.1	5.2	5.2.1	5.2.2	6	6.1	6.2	6.2.1	6.2.2	6.2.3	6.3	
		Depot Maintenance	Government Depot Repair	Contractor Depot Repair	Other Depot Maintenance	Sustaining Support	System Specific Training	System Specific Operator Training	System Specific Non-Operator Training	Support Equipment Replacement	Operating Equipment Replacement	Sustaining Engineering & Program Management	Other Sustaining Support	Continuing System Improvements	Hardware Modifications or Modernization	Software Maintenance and Modifications	Correction of Deficiencies	Software Enhancements	Indirect Support	Installation Support	Personnel Support	Personnel Administration	Personnel Benefits	Medical Support	General Training & Education	
O&M=A; MILPERS=B; RDT&E=C; Procurement=D; MILCON=E; Family Housing=F																										
Integrated Product Support Element																										
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					AB						AB								AB		AB				
10.4	Wartime versus peacetime personnel requirements determination and management					AB						AB								AB		AB				
10.5	Additional personnel identification and justification process management					AB						AB								AB		AB				

		CAPE O&S Cost Element Structure																									
		1	1.1	1.2	1.3	2	2.1	2.1.1	2.1.2	2.1.3	2.2	2.3	3	3.1	3.1.1	3.1.2	3.1.3	3.1.4	3.1.5	3.2	3.2.1	3.2.2	3.2.3	3.2.4	3.2.5	3.2.6	
		Unit-Level Manpower	Operations	Unit Level Maintenance	Other Unit Level	Unit Operations	Operating Material	Energy (POL, Electricity)	Training and Munitions and Expendable Stores	Other Operational Material	Support Services	Temporary Duty	Maintenance	Organizational Maintenance and Support	Organizational-Level Consumables	Organizational-Level Repair arts	Organizational-Level DLRs	Contract Maintenance Services	Other Unit Maintenance	Intermediate Maintenance	Intermediate Level Consumable Parts	Intermediate Level Repair Parts	Intermediate Level DLRs	Government Labor	Contractor Maintenance	Other Intermediate Maintenance	
O&M=A; MILPERS=B; RDT&E=C; Procurement=D; MILCON=E; Family Housing=F																											
Integrated Product Support Element																											
Facilities & Infrastructure																											
11.1	Facilities Plan Management									ABE		ABE	ABE						ABE	ABE							ABE
11.1.1	Facilities and facility improvement studies design and execution for every IPS Element (i.e., Maintenance Planning and Management, Computer Resources, Training & Training Support, etc.)									ABE		ABE	ABE						ABE	ABE							ABE
11.1.2	Location selection																										
11.1.3	Space requirements determination																										
11.1.4	Environmental requirements determination																										
11.1.5	Security requirements determination																										

		CAPE O&S Cost Element Structure																							
		3.3	3.3.1	3.3.2	3.3.3	4	4.1	4.1.1	4.1.2	4.2	4.3	4.4	4.5	5	5.1	5.2	5.2.1	5.2.2	6	6.1	6.2	6.2.1	6.2.2	6.2.3	6.3
		Depot Maintenance	Government Depot Repair	Contractor Depot Repair	Other Depot Maintenance	Sustaining Support	System Specific Training	System Specific Operator Training	System Specific Non-Operator Training	Support Equipment Replacement	Operating Equipment Replacement	Sustaining Engineering & Program Management	Other Sustaining Support	Continuing System Improvements	Hardware Modifications or Modernization	Software Maintenance and Modifications	Correction of Deficiencies	Software Enhancements	Indirect Support	Installation Support	Personnel Support	Personnel Administration	Personnel Benefits	Medical Support	General Training & Education
	O&M=A; MILPERS=B; RDT&E=C; Procurement=D; MILCON=E; Family Housing=F																								
Integrated Product Support Element																									
Facilities & Infrastructure						AB						AB													
11.1	Facilities Plan Management	ABE			ABE	ABE						ABE	ABE							ABE	ABE	AB			
11.1.1	Facilities and facility improvement studies design and execution for every IPS Element (i.e., Maintenance Planning and Management, Computer Resources, Training & Training Support, etc.)	ABE			ABE	ABE						ABE	ABE							ABE	ABE	AB			
11.1.2	Location selection					AB						AB								AB		AB			
11.1.3	Space requirements determination					AB						AB								AB		AB			
11.1.4	Environmental requirements determination					AB						AB								AB		AB			
11.1.5	Security requirements determination					AB						AB								AB		AB			

		CAPE O&S Cost Element Structure																									
		1	1.1	1.2	1.3	2	2.1	2.1.1	2.1.2	2.1.3	2.2	2.3	3	3.1	3.1.1	3.1.2	3.1.3	3.1.4	3.1.5	3.2	3.2.1	3.2.2	3.2.3	3.2.4	3.2.5	3.2.6	
		Unit-Level Manpower	Operations	Unit Level Maintenance	Other Unit Level	Unit Operations	Operating Material	Energy (POL, Electricity)	Training and Munitions and Expendable Stores	Other Operational Material	Support Services	Temporary Duty	Maintenance	Organizational Maintenance and Support	Organizational-Level Consumables	Organizational-Level Repair arts	Organizational-Level DLRs	Contract Maintenance Services	Other Unit Maintenance	Intermediate Maintenance	Intermediate Level Consumable Parts	Intermediate Level Repair Parts	Intermediate Level DLRs	Government Labor	Contractor Maintenance	Other Intermediate Maintenance	
Integrated Product Support Element																											
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																										

		CAPE O&S Cost Element Structure																							
		3.3	3.3.1	3.3.2	3.3.3	4	4.1	4.1.1	4.1.2	4.2	4.3	4.4	4.5	5	5.1	5.2	5.2.1	5.2.2	6	6.1	6.2	6.2.1	6.2.2	6.2.3	6.3
		Depot Maintenance	Government Depot Repair	Contractor Depot Repair	Other Depot Maintenance	Sustaining Support	System Specific Training	System Specific Operator Training	System Specific Non-Operator Training	Support Equipment Replacement	Operating Equipment Replacement	Sustaining Engineering & Program Management	Other Sustaining Support	Continuing System Improvements	Hardware Modifications or Modernization	Software Maintenance and Modifications	Correction of Deficiencies	Software Enhancements	Indirect Support	Installation Support	Personnel Support	Personnel Administration	Personnel Benefits	Medical Support	General Training & Education
	O&M=A; MILPERS=B; RDT&E=C; Procurement=D; MILCON=E; Family Housing=F																								
Integrated Product Support Element																									
11.1.6	Utilities requirements determination					AB						AB								AB		AB			
11.1.7	Storage requirements determination					AB						AB								AB		AB			
11.1.8	Equipment requirements determination					AB						AB								AB		AB			
11.1.9	Existing versus new facilities determination					AB						AB								AB		AB			
11.2	Site activation					AB						AB								AB		AB			

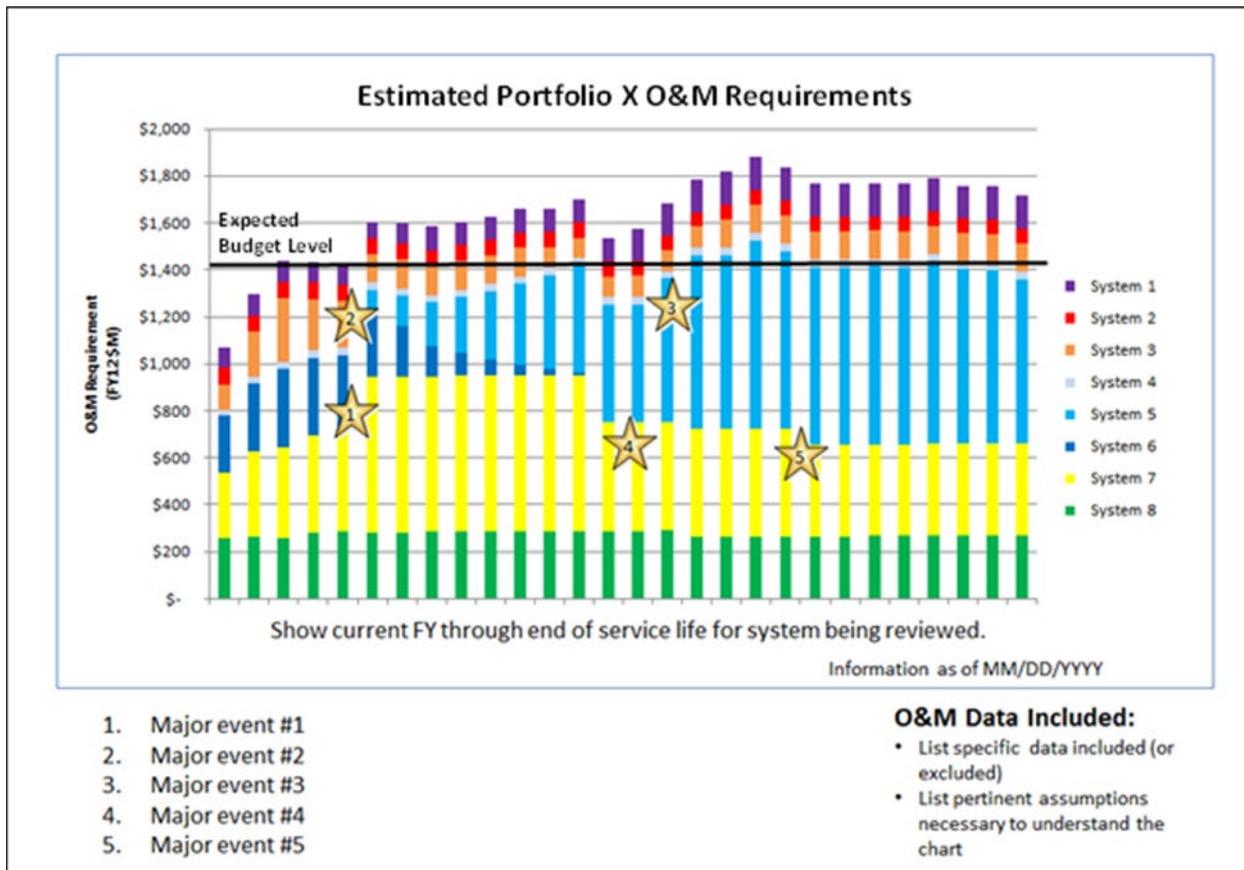
		CAPE O&S Cost Element Structure																									
		1	1.1	1.2	1.3	2	2.1	2.1.1	2.1.2	2.1.3	2.2	2.3	3	3.1	3.1.1	3.1.2	3.1.3	3.1.4	3.1.5	3.2	3.2.1	3.2.2	3.2.3	3.2.4	3.2.5	3.2.6	
		Unit-Level Manpower	Operations	Unit Level Maintenance	Other Unit Level	Unit Operations	Operating Material	Energy (POL, Electricity)	Training and Munitions and Expendable Stores	Other Operational Material	Support Services	Temporary Duty	Maintenance	Organizational Maintenance and Support	Organizational-Level Consumables	Organizational-Level Repair arts	Organizational-Level DLRs	Contract Maintenance Services	Other Unit Maintenance	Intermediate Maintenance	Intermediate Level Consumable Parts	Intermediate Level Repair Parts	Intermediate Level DLRs	Government Labor	Contractor Maintenance	Other Intermediate Maintenance	
Integrated Product Support Element																											
Computer Resources																											
12.1	Manage and update the Program's Computer Resources	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	ABD	ABD	AB	AB	AB	ABD	ABD	ABD	AB	AB	AB	AB	ABD	ABD	ABD
12.1.1	Mission critical computer hardware/software operation and support	AB	AB	AB	AB	AB					AB	AB	ABD	ABD				ABD	ABD	ABD						ABD	ABD
12.1.2	Management reports development and maintenance	AB	AB	AB	AB	AB					AB	AB	AB	AB				AB	AB	AB						AB	AB
12.1.3	Disaster recovery planning and execution	AB	AB	AB	AB	AB					AB	AB	AB	AB				AB	AB	AB						AB	AB
12.1.4	Computer resource working group standup and management	AB	AB	AB	AB	AB					AB	AB	AB	AB				AB	AB	AB						AB	AB
12.1.5	Computer programs and software baselines management	AB	AB	AB	AB	AB					AB	AB	AB	AB				AB	AB	AB						AB	AB
12.1.6	Computer programs and software modifications management												AB														
12.1.7	Software licenses management																										
12.1.8	Software and hardware obsolescence management																										

		CAPE O&S Cost Element Structure																							
		3.3	3.3.1	3.3.2	3.3.3	4	4.1	4.1.1	4.1.2	4.2	4.3	4.4	4.5	5	5.1	5.2	5.2.1	5.2.2	6	6.1	6.2	6.2.1	6.2.2	6.2.3	6.3
		Depot Maintenance	Government Depot Repair	Contractor Depot Repair	Other Depot Maintenance	Sustaining Support	System Specific Training	System Specific Operator Training	System Specific Non-Operator Training	Support Equipment Replacement	Operating Equipment Replacement	Sustaining Engineering & Program Management	Other Sustaining Support	Continuing System Improvements	Hardware Modifications or Modernization	Software Maintenance and Modifications	Correction of Deficiencies	Software Enhancements	Indirect Support	Installation Support	Personnel Support	Personnel Administration	Personnel Benefits	Medical Support	General Training & Education
O&M=A; MILPERS=B; RDT&E=C; Procurement=D; MILCON=E; Family Housing=F																									
Integrated Product Support Element																									
Computer Resources						AB						AB													
12.1	Manage and update the Program's Computer Resources	ABD	AB	ABD	ABD	ABCD	ABD	ABD	ABD	AB	AB	ABD	ABCD	ABD	AB	ABD	AB	AB	ABD	ABD	ABD	AB	AB	AB	AB
12.1.1	Mission critical computer hardware/software operation and support	ABD		ABD	ABD	ABD	ABD	ABD	ABD			ABD	ABD	ABD		ABD			ABD	ABD	ABD				
12.1.2	Management reports development and maintenance	AB		AB	AB	AB	AB	AB	AB			AB	AB	AB		AB			AB	AB	AB				
12.1.3	Disaster recovery planning and execution	AB		AB	AB	AB	AB	AB	AB			AB	AB	AB		AB			AB	AB	AB				
12.1.4	Computer resource working group standup and management	AB		AB	AB	AB	AB	AB	AB			AB	AB	AB		AB			AB	AB	AB				
12.1.5	Computer programs and software baselines management	AB		AB	AB	AB	AB	AB	AB			AB	AB	AB		AB			AB	AB	AB				
12.1.6	Computer programs and software modifications management	AB			AB	AB						AB		AB		AB			AB		AB				
12.1.7	Software licenses management					AB						AB							AB		AB				
12.1.8	Software and hardware obsolescence management					AB						AB		AB	AB	AB			AB		AB				

		CAPE O&S Cost Element Structure																									
		1	1.1	1.2	1.3	2	2.1	2.1.1	2.1.2	2.1.3	2.2	2.3	3	3.1	3.1.1	3.1.2	3.1.3	3.1.4	3.1.5	3.2	3.2.1	3.2.2	3.2.3	3.2.4	3.2.5	3.2.6	
		Unit-Level Manpower	Operations	Unit Level Maintenance	Other Unit Level	Unit Operations	Operating Material	Energy (POL, Electricity)	Training and Munitions and Expendable Stores	Other Operational Material	Support Services	Temporary Duty	Maintenance	Organizational Maintenance and Support	Organizational-Level Consumables	Organizational-Level Repair arts	Organizational-Level DLRs	Contract Maintenance Services	Other Unit Maintenance	Intermediate Maintenance	Intermediate Level Consumable Parts	Intermediate Level Repair Parts	Intermediate Level DLRs	Government Labor	Contractor Maintenance	Other Intermediate Maintenance	
Integrated Product Support Element																											
12.1.9	Defense Information Switch Network (DISN) or other network connect																										
12.1.10	Specifications determination																										
12.1.11	Flow/logic diagrams determination																										
12.1.12	Computer Software Configuration Item (CSCI)																										
12.1.12.1	CSCI test descriptions																										
12.1.12.2	CSCI operating environments																										
12.1.12.3	CSCI user/maintainer manuals																										
12.1.12.4	CSCI computer code																										
12.1.13	Automated Identification Technology management																										
12.1.14	Electronic Data Interchange (EDI) management																										
12.1.15	Service Level Agreements (SLAs) management																										
12.2	Electromagnetic Interference (EMI), Electromagnetic Pulse (EMP)																										
12.3	System Security/Information Assurance	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB

		CAPE O&S Cost Element Structure																							
	O&M=A; MILPERS=B; RDT&E=C; Procurement=D; MILCON=E; Family Housing=F	3.3	3.3.1	3.3.2	3.3.3	4	4.1	4.1.1	4.1.2	4.2	4.3	4.4	4.5	5	5.1	5.2	5.2.1	5.2.2	6	6.1	6.2	6.2.1	6.2.2	6.2.3	6.3
		Depot Maintenance	Government Depot Repair	Contractor Depot Repair	Other Depot Maintenance	Sustaining Support	System Specific Training	System Specific Operator Training	System Specific Non-Operator Training	Support Equipment Replacement	Operating Equipment Replacement	Sustaining Engineering & Program Management	Other Sustaining Support	Continuing System Improvements	Hardware Modifications or Modernization	Software Maintenance and Modifications	Correction of Deficiencies	Software Enhancements	Indirect Support	Installation Support	Personnel Support	Personnel Administration	Personnel Benefits	Medical Support	General Training & Education
Integrated Product Support Element																									
12.1.9	Defense Information Switch Network (DISN) or other network connect					AB						AB								AB		AB			
12.1.10	Specifications determination					ABC						AB	ABC							AB		AB			
12.1.11	Flow/logic diagrams determination					AB						AB								AB		AB			
12.1.12	Computer Software Configuration Item (CSCI)					ABC						AB	ABC												
12.1.12.1	CSCI test descriptions					ABC						AB	ABC												
12.1.12.2	CSCI operating environments					ABC						AB	ABC												
12.1.12.3	CSCI user/maintainer manuals					AB						AB													
12.1.12.4	CSCI computer code					AB						AB													
12.1.13	Automated Identification Technology management					AB						AB													
12.1.14	Electronic Data Interchange (EDI) management					AB						AB													
12.1.15	Service Level Agreements (SLAs) management					AB						AB													
12.2	Electromagnetic Interference (EMI), Electromagnetic Pulse (EMP)											AB													
12.3	System Security/Information Assurance	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB

Appendix C – The Portfolio Affordability Chart



Portfolio Chart Instructions

Chart Purpose: The Portfolio Affordability Chart provides a picture of the program being reviewed within the context of other programs of the same type. For example, the chart may represent Navy submarines or Army combat vehicles. The idea is to show the estimated O&S costs of a certain portfolio, how it matches to the anticipated funding levels, and how the particular program being reviewed affects the overall portfolio.

NOTES:

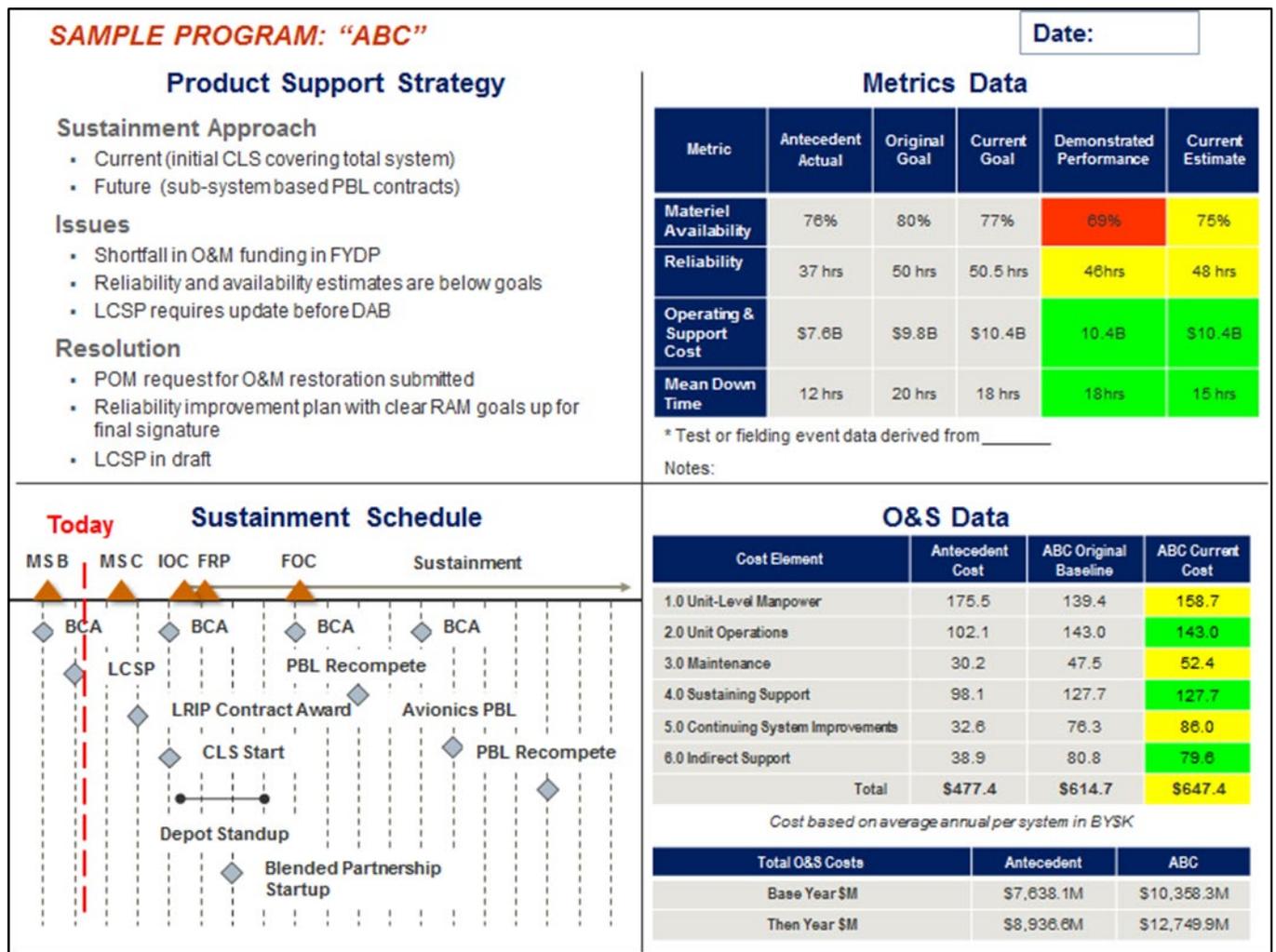
1. Chart shows O&M only, not total O&S.
2. All costs shown should be in base year dollars of the program being reviewed.
3. The black horizontal line represents anticipated O&M budget each year.
4. Figure should show all FY from current year through the end of the service life of the system being reviewed.
5. Stars represent timing of specific events within the portfolio. Each star is matched to a description of the event in the section under the figure to the left side. The number of events will vary depending on the portfolio being represented. Possible events include Milestone decisions, IOC, FOC, etc.

- The section under the figure to the right is completed to provide specific details on what O&M costs are (or are not) included or if there are specific assumptions to make known to the reader.

Given the nature of the information required for this chart, it is highly likely that the chart will need to be the responsibility of the Office of the PEO or Resource Sponsor, not an individual program office. If this chart shows that the portfolio is unaffordable, the Service should be prepared to discuss the possible tradeoffs that will make the portfolio affordable.

The portfolio affordability chart is only one part of the full affordability analysis to be provided at major reviews. Charts showing a roll-up of all Component fiscal demands and the individual program under review also need to be included.

Appendix D – The Sustainment Quad Chart



Sustainment Chart Instructions

Chart Purpose: 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 shall generate a sustainment quad chart for all DAES reviews, OIPTs, DABs and other program reviews, driving focus on better buying power in sustainment decisions.

NOTE: The template uses a notional program labeled ABC and includes reference to its antecedent (predecessor) program. Replace “ABC” and “antecedent” when using the template to build an actual chart.

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 life cycle. Highlight the key aspects relevant to the specific program life cycle phase. For example, an 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, BCA, Product Support Arrangement (PSA) 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 Courses of Action. Goal is NO unresolved sustainment issues before the OIPT.
- **Resolution**
 - Identify planned resolutions to noted issues.

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 life cycle. Sustainment elements must be synchronized with the integrated master schedule.

Field:

- **Top Bar (Milestones)**
 - Include prior year's completion of significant past sustainment events (e.g. Independent Logistics Assessment (ILA), BCA, Core Logistics Analysis /Source of Repair Analysis (CLA/SoRA).
 - Future years should cover FYDP and post-FYDP significant events:
 - Contracts.
 - Major milestones and decision reviews.
 - Initial Operating Capability (IOC) and First Unit Equipped (FUE) dates.
 - LCSP/PBL related decision support (e.g. BCA updates).
 - Interim Contractor Support – Contractor Logistics Support (ICS-CLS), organic transition dates.
 - Include vertical line for current date.
- **Events**
 - Include key life cycle sustainment events: BCAs, PBL decisions, ICS-CLS, organic transitions, Core Logistics determinations/depot standup, sustainment re-competes.

Top Right Quad: Metrics Data

Purpose: Display current estimates of sustainment performance versus 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 life cycle decision at hand and sufficient to meet materiel availability goals throughout the life cycle. Metrics data should reflect the most recent sustainment performance and estimates.

Fields:

- **Metrics**
 - At a minimum include Materiel Availability, Reliability, O&S Cost (in BY\$) and Mean Down Time, per CJCSI 3170 and program Defense Acquisition Management Information Retrieval (DAMIR) submission. Other relevant sustainment metrics are allowed as needed.
- **Antecedent Actual**
 - Include the four metrics for the antecedent system that the Major Defense Acquisition Program (MDAP) is replacing.
 - Antecedent is the system cited in the SAR.
- **Original Goal**
 - Values for each metric based on the original sustainment requirements or the original DAMIR sustainment metrics submission. For older MDAPs 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.
- **Current Goal**
 - Value for each metric according to the current baseline.
 - Goal is equivalent to threshold for programs with sustainment KPP/KSAs.
 - Cite rationale for any changes.
- **Demonstrated Performance**
 - Actual performance to date.
 - PM assigns color rating based on estimate versus current goal:
 - Green – At or exceeding goal.

- Yellow – < 10% adverse delta from goal.
 - Red – > 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 – At or exceeding goal.
 - Yellow – < 10% adverse delta from goal.
 - Red – > 10% adverse delta from goal.
- **Test or Fielding Event Data Derived From**
 - Cite the event (Developmental Test (DT), Limited User Test (LUT), Operational Evaluation (OPEVAL), IOT&E, etc.) or modeling and simulation tool that led to the current estimate.
- **Notes**
 - Include any relevant or additional information concerning metrics definitions.

Bottom Right Quad: O&S Data

Purpose: Highlight and compare operating and support costs (estimates/actuals) and support an assessment that the program is affordable throughout the life cycle.

Fields:

Field structure reflects the SAR O&S section:

- **Cost Element**
 - Refer to 2007 CAPE Operating and Support Cost-Estimating Guide for individual cost elements.
 - These definitions should be consistent with the SAR O&S cost section (which should be based on identical definitions). Cost estimating assumptions, constraints, ground rules, limitations, methodologies, and results must match the current cost estimate.
- **Antecedent Cost**
 - Cost of the existing system according to the CAPE cost elements.
 - Average annual cost per operating unit (either per system or entire fleet of systems).
 - Use the SAR as the basis for determining the unit.
- **Program Original Baseline**
 - Per the 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 the CAPE cost elements, according to the most recent estimate (POE, SCP, ICE).
 - 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 – At or below original baseline.
 - Yellow – < 10% adverse delta from goal.
 - Red – > 10% adverse delta from goal.
- **Total O&S Costs**

- Comparison of antecedent program versus current Total O&S present cost totals in both TY dollars and BY dollars.
 - Base on most recent O&S estimate, not the last SAR.
 - Provide notes explaining any major differences with respect to the CAPE estimate.
- **Notes**
 - If the quantity of the MDAP being acquired is significantly different than antecedent system, match quantities in O&S totals and notate total quantities of each.

Appendix E – The O&M and O&S Crosswalk Chart

ABC Program, Milestone X - O&M and O&S Crosswalk Chart Program Funding & Quantities (O&M) vs. Sustainment Quad (O&S)		
	Program Funding & Quantities Chart	Sustainment Quad Chart
Purpose of Chart	Assess O&M Affordability	Assess O&S Cost
Terms of Reference	Weapon System Total O&M (TY \$M)	Total O&S Cost (TY \$M)
Quantity of Assets Included in the Analysis ^{/1}	80 ^{/2}	80 ^{/2}
Unit Level Manpower (OSD CAPE Element: 1.0) ^{/3}		3058.5M
Unit Operations - Energy (2.1.1)	919.1M	919.1M
Unit Operations - Support Services; TAD/TDY (2.2)		1953.9M
Maintenance (3.0)	1010.0M	1010.0M
Sustaining Support (4.0)	1595.9M	1595.9M
Sustaining Support - System Specific Training (4.1)		942.7M
Continuing System Improvements - HW Mods (5.1)	1061.5M	1061.5M
Continuing System Improvements - SW Maint and Mods (5.2)		634.4M
Indirect Support (6.0)	1573.9M	1573.9M
Total Cost	\$6,160.4M	\$12,749.9M^{/4}
Notes:		
1. Indicate the planned system life cycle; this example assumes a 20 year system life cycle.		
2. Quantity of systems; indicate any differences between the Funding and Sustainment charts.		
3. Use the CAPE cost estimating structure; expand elements as necessary to highlight sub-elements.		
4. O&S cost potentially includes RDT&E, Procurement, O&M, MILPERS and MILCON, funded activities. In this example the \$12,749.9M O&S = \$6160.4M (O&M) + \$634.4M (Procurement) + \$5955.1M (MILPERS).		
5. Indicate cost source, e.g. CAPE Independent Cost Estimate for "ABC Program," Milestone X, October 10, 2011.		

Operation & Maintenance and Operating & Support Crosswalk Chart Instructions

Background: Senior Leaders continue to emphasize the need to base acquisition decisions on affordability and cost across the life cycle. In light of the Department’s emerging fiscal environment, it is especially important that we assess costs, funding and requirements necessary to develop, acquire and sustain our warfighting capabilities and systems, at our desired materiel readiness rates.

Purpose: Use the O&M-O&S Crosswalk Chart to compare a weapon system’s total O&M requirements, to its total O&S cost estimate. The desired outcome is enhanced awareness and cost-related decision support for acquisition milestones and Defense Acquisition Executive Summaries.

Program Funding & Quantities Chart Column: This column details the quantity of assets, along with the weapon system total TY O&M requirements on the Program Funding & Quantities Chart per the CAPE O&S cost estimating structure. Only include O&M-funded O&S requirements.

Sustainment Quad Chart Column: This column details the quantity of assets, along with the total life cycle O&S costs in TY \$M from the program Sustainment Quad Chart per the CAPE O&S cost estimating structure. Include Procurement, Military Pay and O&M-funded O&S requirements.

Notes:

1. Indicate the life cycle; the example assumes a 20-year life cycle.
2. Indicate the quantity of systems; detail any quantity differences between the Program Funding & Quantities Chart and the Sustainment Quad Chart.
3. Use the entire CAPE O&S cost estimating structure; expand as necessary to highlight sub elements.
4. Add the Military Pay and Procurement-funded elements to the O&M elements; the sum should equal the total O&S costs TY \$M from the Sustainment Quad. O&S cost can include RDT&E, Procurement, O&M, MILPERS and MILCON funded activities.
5. Indicate cost source, e.g. CAPE ICE for “ABC Program,” Milestone X, October 10, 2011.

Appendix F – The O&S Should Cost Initiatives and Estimates Chart

Should Cost Initiative POAM					
\$M	Prior	Current Year	Budget Year	BY+1	Total All Years
Current Budget for target process	45.0	50.0	62.0	85.0	679.0
Will Cost (ICE) for target process	22.0	25.0	15.0	15.0	105.0
Should Cost for target process	21.0	20.0	12.8	13.0	86.8
Delta as % of Will Cost	5%	20%	15%	13%	17%
Actual Costs / New Estimates	21.5	21.0	TBD	TBD	TBD

Key Events/Schedule (Plan):

Event

- Target Date (Should Cost)
- Target Date (Will Cost)
 - Short description explaining change in schedule

Event

- Target Date (Should Cost)
- Target Date (Will Cost)
 - Short description explaining change in schedule

Initiative Name:

Short Narrative Description of Basis for Should Cost Estimates:
(List reasons should cost estimate is below will cost, with dollar impact)

-
-

Adjustments and Impacts to Spend Plan

-
-

Contract Implications

- Incentive/fee structure, timing of evaluations & savings realized
-

Risks

- List risks to achieving these savings
-

Instructions:

- Prepare one backup slide for each significant initiative (which need not always be largest dollar value)
- Which initiatives could be extensible to other programs?
- Which do most to affect long term costs?

A chart with this type of detailed content should be provided for each major Should Cost initiative that has been developed for the phase the program is entering.

Key Elements Include:

- Should-Cost estimate of target activity/process compared with Will Cost for that activity/process, as well as Will Cost for entire program (this provides an indication of how significant the savings are in the context of the entire program). Example shows Acquisition Will Cost, but initiatives could highlight O&S savings as well or instead.
- Focus on near-term costs/savings of initiative but inclusion of Total for all years.
- Provide description of initiative with basis for achieving savings.
- Spend plan with phasing of key obligations and outlays and decision points when savings could be realized.
- Contract methods and timing involved.
- Primary risks to executing plan.
- Schedule to show key events that must take place to execute the initiative and aid in assessing progress.

Appendix G - Training Courses Offered at Defense Acquisition University

The following business, cost estimating, and financial management courses are currently offered through the Defense Acquisition University (DAU). These courses may be found at <http://icatalog.dau.mil/onlinecatalog/tabnav.aspx?tab=BCF> and <http://icatalog.dau.mil/onlinecatalog/tabnavcl.aspx?tab=CLB>.

- Acquisition Business Management Application (BCF 225)
- Acquisition Business Management Concepts (BCF 220)
- Acquisition Reporting for MDAPs and MAIS (BCF 209)
- Advanced Concepts in Cost Analysis (BCF 302)
- Applied Cost Analysis (BCF 107)
- Business Case Analysis (CLL 015)
- Business, Cost Estimating, and Financial Management Workshop (BCF 301)
- Contractor Business Strategies (BCF 205)
- Cost Analysis (CLB 007)
- Cost Risk Analysis (BCF 206)
- Cost Risk Analysis Introduction (CLB 024)
- Databases for the Cost Estimate (CLB 033)
- Designing for Supportability in DoD Weapons Systems (CLL 008)
- Developing an LCSP (CLL 005)
- EVMS Validation and Surveillance (EVM 262)
- Fundamentals of Business Financial Management (BCF 103)
- Fundamentals of Cost Analysis (BCF 106)
- Fundamentals of Earned Value Management (BCF 102)
- Indirect Costs (CLC 008)
- Intellectual Property and Data Rights (CLE 068)
- Intermediate Cost Analysis (BCF 204)
- Intermediate Earned Value Management (EVM 201)
- Life Cycle Cost Analysis Tools (CLL 041)
- Life Cycle Product Support (LOG 340)
- Logisticians Responsibilities During Technical Reviews (CLL 003)
- Operating and Support Cost Analysis (BCF 215)
- Operating And Support Cost Estimating For The Product Support Manager (CLL 035)
- Performance Based Life Cycle Product Support (CLL 011)
- Performance Based Logistics (LOG 235)
- Principles of Schedule Management (EVM 263)
- Product Support Requirements Identification (CLL 039)
- Reliability, Availability, and Maintainability (LOG 103)
- Supportability Analysis (CLL 012)
- Supportability Analysis (LOG 211)
- Title 10 U.S.C. 2464 Core Statute Implementation (CLL 023)

Appendix H – Additional References

DAB template website: <https://ebiz.acq.osd.mil/DABSchedule/Questions.aspx?text=IPT>

Defense Acquisition Guidebook, <https://dag.dau.mil/Pages/Default.aspx>

Department of Defense Integrated Product Support Element Guidebook, November 2011, <https://acc.dau.mil/ips-guidebook>

Department of Defense Integrated Product Support Implementation Roadmap, <https://dap.dau.mil/dodpsroadmap/Pages/Default.aspx>

Department of Defense Logistics Assessment Guidebook July 2011, http://www.acq.osd.mil/log/mr/library/Logistics_Assessment_Guidebook_July2011.pdf

Department of Defense Open Systems Architecture Contract Guidebook for Program Managers v1.1 December 2011, <https://acc.dau.mil/OSAGuidebook>

Department of Defense Product Support Analytical Tools Database, <https://acc.dau.mil/psa-tools>

Department of Defense Product Support Business Case Analysis Guidebook April 2011, <https://acc.dau.mil/bca-guidebook>
Department of Defense Product Support Manager Guidebook April 2011, <https://acc.dau.mil/psm-guidebook>

Department of Defense Weapon System Acquisition Reform (WSAR) Product Support Assessment, November 2009, <https://acc.dau.mil/psa>
Document Streamlining – Life-Cycle Sustainment Plan (LCSP), USD(AT&L) memorandum dated September 14, 2011, <https://acc.dau.mil/CommunityBrowser.aspx?id=472389>

DoD Reliability, Availability, Maintainability, and Cost Rationale Report Manual dated June 1, 2009, <https://acc.dau.mil/CommunityBrowser.aspx?id=298606>

DoDI 5000.02, Interim Operation of the Defense Acquisition System, 2013, http://www.dtic.mil/whs/directives/corres/pdf/500002_interim.pdf

Key Product Support Definitions, <https://acc.dau.mil/CommunityBrowser.aspx?id=653814>

OMB Circular A-94, http://www.whitehouse.gov/omb/circulars_a094.

Systems Engineering Plan USD(AT&L) Document Streamlining memorandum dated April 20, 2011, [https://dap.dau.mil/policy/Lists/Policy%20Documents/Attachments/3284/2011Apr20_TDS_AS_SEP%20Memo%20PDUSD\(ATL\)%20Signed.pdf](https://dap.dau.mil/policy/Lists/Policy%20Documents/Attachments/3284/2011Apr20_TDS_AS_SEP%20Memo%20PDUSD(ATL)%20Signed.pdf)

Appendix I – Glossary of Terms

All “costs” contained herein may be assumed to encompass monetary costs that can be measured in dollars or some other normally recognizable national currency that is convertible into US Dollars. This document is limited to a financial application of the meaning of cost, and, accordingly, excludes other cost-reliant resources (i.e. time, opportunity, political and diplomatic capital) that can be expended and often quantifiably measured as costs to the owner of these assets.

This glossary includes common cost-related terms and is intended to be used by DoD personnel any time that a term or definition relating to O&S Costs is referenced in policy, guidance, or other Department documents and activities. The standardized use of terminology and full use of this single source glossary by Department personnel will reduce ambiguity amongst different communities, streamline activities, and address many of the standardization issues associated with acquisition activities that are currently performed by geographically and functionally segregated organizations. Recognizing that other financial definitions also exist in statute, policy, and guidance, users should follow applicable laws and regulations as required.

Activity Based Costing (ABC): a cost methodology that assigns costs to products or Components based on the resources that they consume (reference The Economist, www.economist.com/node/13933812).

Acquisition-related O&M cost: activities paid for via O&M appropriations that support the development, production, and deployment phases and activities of a program. O&M appropriations that support fielded systems are not included, but rather are O&S Costs (reference the DAG).

Affordable Supportability Operational Effectiveness (ASOE): Application of systems engineering to life cycle sustainment to determine the optimal balance between performance (technical and supportability), life cycle cost, schedule, and process efficiency. It illustrates the interrelationship between technical performance, availability, process efficiency, and life cycle cost and provides the context for the trade space available to a PM to maximize a system’s Operational Effectiveness (OE), with an emphasis not only on the system’s ability to execute its mission or its reliability and maintainability, but also on the cost effective responsiveness of the supply chain. It focuses on the top level affordable operational effectiveness outcome and associated metrics which can be measured to assess system efficiency and effectiveness. (Sources: Defense Acquisition University (DAU) Glossary, 15h Edition and DAG 5.2)

Affordability: Affordability is the degree to which the program’s LCC is in alignment with the long-range investment, sustainment, force structure plans and resources of the DoD or the individual DoD Components. Conducting a program at a cost constrained by the maximum resources the DoD or DoD Component can allocate for that capability. Affordability informs key program decisions; and O&S cost is a significant factor in determining whether a program is affordable throughout its life cycle. (Source: DAU Glossary, 15th Edition.)

Affordability Analysis: Includes the determination that the O&S cost of an acquisition program is in agreement with long-range resource and force structure plans. O&S cost estimates used in the analysis come from the OSD CAPE office, the CCA, and the Program Office. The estimates from the CCA and the Program Office are typically reconciled into a single SCP before reconciliation with the CAPE estimate. The analysis can be used to demonstrate the degree to which program resource requirements match projected funding and manpower in the context of the Component's long-range investment, sustainment and force structure plans, 7 also known as the planning horizon, as required by the DoDI 5000.02.

Allocable Cost: A cost is allocable to a government contract if it (a) is incurred specifically for the contract; (b) benefits both the contract and other work, and can be distributed to them in reasonable proportion to the benefits received; or (c) is necessary to the overall operation of the business, although a direct relationship to any particular cost objective cannot be shown. (Source FAR, Section 31.201)

Analogy Cost Estimate: An estimate of costs based on historical data of a similar (analogous) item. (Source: DAU Glossary, 15th Edition.)

Analysis of Alternatives (AoA): The AoA assesses potential materiel solutions to satisfy the capability need documented in the validated ICD. It focuses on identification and analysis of alternatives, Measures of Effectiveness (MOEs), cost, schedule, Concepts of Operations (CONOPS), and overall risk, including the sensitivity of each alternative to possible changes in key assumptions or variables. The AoA also assesses critical technologies associated with each proposed materiel solution, including technology maturity, integration risk, manufacturing feasibility, and, where necessary, technology maturation and demonstration needs. The AoA will also address the fully burdened cost of energy for each alternative when appropriate. The AoA is normally conducted during the Materiel Solution Analysis (MSA) phase of the Defense Acquisition Management System (DAMS), is a key input to the CDD, and supports the materiel solution decision at MS A. The AoA may be updated for MS B and MS C reviews if there are changes to the design of the system that impact AoA assumptions. (Sources: DoDI 5000.02 and *JCIDS Manual*)

Appropriation: Statutory authority provided by an act of Congress that permits federal agencies to incur obligations and make payments from the Treasury. An appropriation usually follows enactment of authorizing legislation. An appropriation act is the most common means of providing Budget Authority (BA). Appropriations do not represent cash actually set aside in the Treasury; they represent limitations of amounts that agencies may obligate during a specified time period. Major appropriation types are:

- RDT&E appropriations fund the efforts performed by contractors and government activities required for the R&D of equipment, material, computer application software, and their Test and Evaluation (T&E) including IOT&E and Live Fire Test and Evaluation (LFT&E). RDT&E also funds the operation of dedicated R&D installation activities for the conduct of R&D programs
- Procurement appropriations fund those acquisition programs that have been approved for production (to include Low Rate Initial Procurement (LRIP) of acquisition objective

quantities), and all costs integral and necessary to deliver a useful end item intended for operational use or inventory upon delivery.

- O&M appropriations fund expenses such as civilian salaries, travel, minor construction projects, operating military forces, training and education, depot maintenance, stock funds, and base operations support.
- MILPERS appropriations fund costs of salaries and other compensation for active and retired military personnel and reserve forces based on end strength.
- MILCON appropriations fund major projects such as bases, schools, missile storage facilities, maintenance facilities, medical/dental clinics, libraries, and military family housing. (Source: DAU Glossary, 15th Edition)

Average Procurement Unit Cost (APUC): APUC is calculated by dividing total procurement cost by the number of full, end-use items procured. Total procurement cost includes flyaway, rollaway, sailaway cost (that is, recurring and nonrecurring costs associated with production of the item, such as hardware/software, SE, engineering changes and warranties) plus the costs of procuring technical data (TD), training, support equipment, and initial spares (reference DAG).

Best Value: Expected outcome of an acquisition that, in the Government’s estimation, provides the greatest overall benefit in response to the requirement. (Source: Federal Acquisition Regulation (FAR), Section 2.10.)

Budget Authority (BA): Authority provided by law to enter into obligations that will result in immediate or future outlays. It may be classified by the period of availability, by the timing of congressional action, or by the manner of determining the amount available. (Source: DAU Glossary, 15th Edition)

Budget Estimate: Cost estimate prepared for inclusion in the DoD budget to support acquisition programs. (Source: DAU Glossary, 15th Edition)

Business Case Analysis (BCA): The evaluation of alternative solutions for obtaining best value while achieving operational performance requirements balancing cost, schedule, performance, and risk. is a type of economic analysis that a program may use when deciding among a number of product support alternatives. The BCA is a structured approach to identify the cost, benefits and risks of the alternatives. To ensure accurate results, the BCA depends on O&S cost data and supportability analysis results. (Source: DAU Glossary, 15th Edition definition)

Commissaries and exchanges cost: appropriated costs of employee salaries at defense commissaries and exchanges (reference 2007 CAPE O&S Cost Estimating Guide).

Computer Resources: (IPS Element) the facilities, hardware, software, documentation, manpower, and personnel needed to operate and support mission-critical computer hardware/software systems (reference Product Support Manager Guidebook).

Consumable: an item or material that is used up; example: fuel filters. Contrast with repairable (reference: dictionary.com).

Continuing system improvements cost: costs of hardware and software modifications and updates that occur after the system is fielded to keep the system operating and operationally enabled to meet basic operational requirements throughout its life cycle (reference 2007 CAPE O&S Cost Estimating Guide).

Contract maintenance components cost: costs of contract labor, material, and assets used in providing maintenance components to a weapon system, subsystem, support equipment, training device, or simulator at the unit level. To the extent possible, the contract support cost of the primary system, support equipment, training devices, and simulators should be separately identified (reference 2007 CAPE O&S Cost Estimating Guide).

Contractor depot cost: costs of burdened contractor labor, material, and assets used in providing maintenance components to a primary system, subsystem, or associated support equipment. If possible, labor, material and other costs should be considered separately. If significant, the burdened cost of contract labor for contractor industrial engineering, plant technical components, or systems engineering and program management that is a part of the contractor's depot repair efforts should be included with this element (reference 2007 CAPE O&S Cost Estimating Guide).

Contractor maintenance cost: costs of burdened contract labor, material, and assets used in providing maintenance Components to a primary system, simulators, training devices, and associated support equipment (reference 2007 CAPE O&S Cost Estimating Guide).

Contract Performance Report (CPR): an Earned Value Management (EVM) Report that provides status on program performance, cost and schedule. The CPR DID, DI-MGMT-81466, was canceled on June 20, 2012. However, it may still be used on contracts which were in force before July 1, 2012, the date on which the Integrated Program Management Report (IPMR), DI-MGMT-81861, became mandatory for EVM reporting.

Core Depot Maintenance: the depot maintenance capability (including personnel, equipment, and facilities) maintained by the DoD at Government-owned, Government-operated facilities as the ready and controlled source of technical competence and resources necessary to ensure effective and timely response to a mobilization, national defense contingency situation, and other emergency requirements. Depot maintenance for the designated weapon systems and other military equipment is the primary workload assigned to the DoD depots to support core depot maintenance capabilities (reference DoDI 4151.20, January 5, 2007).

Corrections of deficiencies cost: costs to develop, test, and deploy changes that correct defects in defense weapon systems (reference 2007 CAPE O&S Cost Estimating Guide).

Cost Analysis Requirements Description (CARD): a description of the salient features of the acquisition program and of the system itself. It is the common description of the technical and programmatic features of the program, prepared by the Program Office, and used by cost teams preparing the POE, CCE, and ICE (reference DoDI 5000.4-M, "DoD Cost Analysis Guidance and Procedures," dated December 1992).

Cost as An Independent Variable (CAIV): Methodology used to acquire and operate affordable DoD systems by setting aggressive, achievable LCC objectives and managing achievement of these objectives by trading off performance and schedule as necessary. Cost objectives balance mission needs with projected out-year resources, taking into account anticipated process improvements in both DoD and industry. (Source: DAU Glossary, 15th Edition)

Cost Avoidance: An action taken in the immediate time frame that will decrease costs in the future. For example, an engineering improvement that increases the Mean Time Between Failure (MTBF) and thereby decreases operating support costs can be described as a cost avoidance action. It is possible for the engineering change to incur higher costs in the

immediate time frame; however, if the net total LCC is less, it is a cost avoidance action. The amount of the cost avoidance is determined as the difference between two estimated cost patterns, one before the change and the one after. (Source: DAU Glossary, 15th Edition)

Cost Assessment & Program Evaluation (CAPE): The Director, CAPE is the principal staff assistant to the Secretary of Defense for Cost Assessment and Program Evaluation. The Director's principal responsibilities include:

- Analyze and evaluate plans, programs, and budgets in relation to United States (U.S.) defense objectives, projected threats, allied contributions, estimated costs, and resource constraints.
- Review, analyze, and evaluate programs, including classified programs, for executing approved policies.
- Provide leadership in developing and promoting improved analytical tools and methods for analyzing national security planning and the allocation of resources.
- Ensure that the costs of DoD programs, including classified programs, are presented accurately and completely.
- Assess effects of DoD spending on the U.S. economy, and evaluate alternative policies to ensure that DoD programs can be implemented efficiently. (Source: CAPE Website)

Cost-based budget: a budget based on the cost of goods and Components to be received during a given period, regardless if it is paid for before the end of the period. This is based on the cost paid for goods and components received and should not be confused with an expenditure-based budget that is based on the timing of payments executed (reference businessdictionary.com).

Cost Benefit Analysis (CBA): an analytic technique that compares the costs and benefits of investments, programs, or policy actions to determine which alternative or alternatives maximize net benefits. Net benefits of an alternative are determined by subtracting the present value of costs from the present value of benefits (see also DoD Business Case Analysis Guidebook). Synonymous with Business Case Analysis (BCA).

Cost breakdown structure: a system similar to a work breakdown structure (WBS) for subdividing a program into elements and sub-elements, functions and sub-functions, and cost categories to provide for more effective management and control of the program (reference DAU Glossary).

Cost cap: the maximum total dollar amount DoD is willing to commit for acquiring a given capability. A cost cap consists of program acquisition costs only and is maintained in constant dollars. Cost caps are applied to selected baseline programs (reference DAU Glossary).

Cost center: a field activity division or a responsible center for which cost identification is desired (reference DAU Glossary).

Cost driver: the activity or volume measure that most closely determines the costs incurred (reference Accounting Text & Cases, Anthony, Hawkins, Merchant; McGraw-Hill, Twelfth Edition 2007).

Cost effectiveness: a measure of the operational capability added by a system as a function of its LCC (reference DAU Glossary).

Cost element: the lowest level component of a resource activity or cost object (reference ventureline.com).

Cost element structure: a work breakdown structure or framework organized by cost elements that follow defined functions and resource categories (reference CAPE O&S Cost Estimating Guide 1992).

Cost estimate: a judgment or opinion regarding the cost of an object, commodity, or component. A result or product of an estimating procedure that specifies the expected dollar cost required to perform a stipulated task or to acquire an item. A cost estimate may constitute a single value or a range of values (reference DAU Glossary).

Cost estimating methodologies: the four primary cost estimating methodologies used in DoD:

- Comparison/analogy
- Parametric estimates
- Detailed engineering/bottom up
- Extrapolation from actual

(reference 2007 CAPE O&S Cost Estimating Guide).

Cost Estimating Relationship (CER): a mathematical relationship that defines cost as a function of one or more parameters, such as performance, operating characteristics, physical characteristics, and other similar items (reference DAU Glossary).

Cost growth: a term related to the net change of an estimated or actual amount over a base figure previously established. The base must be relatable to a program, project, or contract and be clearly identified, including source, approval authority, specific items included, specific assumptions made, date, and the amount (reference DAU Glossary).

Cost incurred: a cost identified through the use of the accrual method of accounting (reference DAU Glossary).

Cost model: a compilation of cost estimating logic that aggregates cost estimating details into a total cost estimate (reference DAU Glossary).

Cost objective: a function, organizational subdivision, contract, or other work unit for which cost data are desired and for which provision is made to accumulate and measure the cost of processes, products, jobs, capitalized projects, and other similar items (reference DAU Glossary).

Cost overrun: the amount by which a provider (contractor or organic provider) exceeds the estimated cost and/or the final limitation (ceiling) of the contract (reference DAU Glossary).

Cost Performance Integrated Product Team (CPIPT): an IPT established to perform cost performance tradeoffs. This IPT is normally required for MDAPs (reference DAU Glossary).

Cost/Pricing Data: all facts that prudent buyers and sellers would reasonably expect to affect price negotiations significantly as of the date of the price agreement. If applicable, the date of the price agreement may also be an earlier date agreed upon between the parties that are as close as practicable to the date of agreement on price (reference DAU Glossary).

Cost of capital (Cost of money): a type of opportunity cost represented by a required rate of return for a given dollar that investors desire based on the risk of the investment choice for that money. In DoD acquisitions, this “Cost of Money” becomes a line item charge that taxpayers

pay to private industry to account for this opportunity cost of shareholder's money (reference Michael Ehrhardt, Corporate Finance, Thomson Southwestern 2006).

Cost of the end item: sum of the estimated cost of the end item with the estimated costs of all associated government furnished equipment, training manuals, technical data, engineering support, warranty, and other similar items. Spares and support equipment are not included (reference DAG (Chapter 2)).

Cost recovery rate: the rate calculated by dividing total non-materiel costs by total materiel costs. This rate, when added to the standard price of the inventory of a working capital fund activity group, ensures sufficient budgetary resources are available to fund the entire cost of operations (reference DoD FMR 7000.14R, Vol 11B, Ch15).

Cost reimbursement contracts: in general, a category of contracts that provide for payment of allowable incurred costs, to the extent prescribed in the contract. These contracts establish an estimate of total cost for the purpose of obligating funds and establishing a ceiling that the contractor may not exceed (except at its own risk) without the approval of the contracting officer." Normally only "best efforts" of the contractor are involved, such as cost, cost sharing, Cost Plus Fixed Fee (CPFF), Cost Plus Incentive Fee (CPIF), and Cost Plus Award Fee (CPAF) contracts (reference DAU Glossary).

Cost risk: the risk that a program will not meet its acquisition strategy cost objectives or thresholds that were developed using CAIV or cost objectives established by the acquisition authority (reference DAU Glossary).

Cost Savings: An action that will result in a smaller-than-projected level of costs to achieve a specific objective. Incentive contracts where the contractor and government share in any difference in cost below the estimated target cost incurred by the contractor to achieve the objective of the contract is a cost savings. It differs from a cost avoidance in that a cost target has been set from which the amount of savings can be measured. In a cost avoidance, the amount is determined as the difference between two estimated cost patterns. (Source: DAU Glossary, 15th Edition)

Cost Variance (CV): an output of the Earned Value Management System (EVMS) that measures cost overrun or cost underrun relative to the program performance measurement baseline (PMB). It is equal to the difference between Budgeted Cost of Work Performed (BCWP) and Actual Cost of Work Performed (ACWP) – that is, $CV = BCWP - ACWP$ (reference DAU Glossary).

Critical cost growth threshold: a 25-percent increase over the APUC or Program Acquisition Unit Cost (PAUC) in the current Baseline Estimate (BE) for the program or at least a 50-percent increase over the APUC or PAUC in the original BE for the program. See Unit Cost Report (UCR) (reference DAU Glossary).

Customer Wait Time: A measurement of the total elapsed time between submission of a customer order from organizational maintenance and receipt of that order by organizational maintenance (reference DoD 4140.1R).

Dependent support cost: costs of programs which support the families of Component members' and federal employee dependents' education located in overseas military assignments or locations where public education is unavailable (reference 2007 CAPE O&S Cost Estimating Guide).

Depot-Level Repairable (DLR) cost: total cost to repair (labor, material and supply management) a subsystem or component that qualifies for depot-level repair (reference 2007 CAPE O&S Cost Estimating Guide).

Depot maintenance cost: cost of fully burdened labor, material, and overhead incurred in performing major overhauls or other depot-level maintenance on a system, its sub-systems, its components, or other associated equipment at centralized repair depots, contractor repair facilities, or onsite by depot teams (reference 2007 CAPE O&S Cost Estimating Guide).

Design Interface: (IPS Element) the integration of the quantitative design characteristics of systems engineering (reliability, maintainability, etc.) with the functional logistics elements (i.e. integrated product support elements). Design interface reflects the driving relationship of system design parameters to product support resource requirements. 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 to effectively balance design and support costs of the system. The basic items that need to be considered as part of design interface include:

- Reliability
- Maintainability
- Supportability
- IPS Elements
- Affordability
- Availability
- Configuration Management
- Safety requirements
- Environmental and HAZMAT requirements
- Human Systems Integration
- Anti-Tamper
- Survivability
- Disposal
- Legal requirements
- Standardization & Interoperability

(reference 2011 Product Support Manager Guidebook).

Direct cost: costs that can be directly tracked or identified in the cost data for a specific work or material function with a particular definable acquisition item/program (reference AFTOC Terms and Definitions).

Discount Rate: interest rate used in calculating the present value of expected yearly benefits and costs (reference Office of Management and Budget (OMB) Circular A-94).

Disposal cost: costs associated with demilitarization and disposal, or indefinite term storage of a military system at the end of its useful life (reference Department of the Navy TOC Guidebook).

Disposal Phase: the life cycle phase at the end of a program's life cycle.

Economic Analysis (EA): a systematic approach to selecting the most efficient and cost-effective strategy for satisfying an agency's need. An EA evaluates the relative worth of

different technical alternatives, design solutions, and/or acquisition strategies, and provides the means for identifying and documenting the costs and associated benefits of each alternative to determine the most cost-effective solution. EA is often associated with Automated Information System (AIS) acquisition programs (reference DoD Product Support Business Case Analysis Guidebook and DAU Glossary).

Economic Order Quantity (EOQ): the most economical quantity of parts to order at one time, considering the applicable procurement and inventory costs (reference DAU Glossary).

Economies of Scale: reductions in unit cost of output as volume of output increases resulting from the production of additional units, increased specialization of labor, decreased unit costs of materials, better use of management, acquisition of more efficient equipment, and greater use of byproducts (reference DAU Glossary).

Energy (fuel, petroleum, oil, and lubricants (POL), electricity) cost: cost of POL, propulsion fuel, and fuel additives used by systems in performing their normal missions. These costs also include the cost of field-generated electricity and commercial electricity necessary to support the operation of a system. Includes only energy costs for peacetime missions when developing energy cost estimates for acquisition programs (reference 2007 CAPE O&S Cost Estimating Guide).

Earned Value Management (EVM): EVM is a widely accepted industry best practice for project management that is being used across the DoD, the Federal government, and the commercial sector. It is the use of an integrated management system that coordinates the work scope, schedule, and cost goals of a program or contract, and objectively measures progress toward these goals. EVM is a tool used by program managers to: (1) quantify and measure program/contract performance, (2) provide an early warning system for deviation from a baseline, (3) mitigate risks associated with cost and schedule overruns, and (4) provide a means to forecast final cost and schedule outcomes. (Source: Performance Assessments and Root Cause Analyses (PARCA) EVM Site)

Expenses: goods and components for which dollars are spent (reference Webster's dictionary).

Expenses funding policy: costs incurred to operate and maintain the organization, such as personal components, supplies, and utilities; see investment funding policy (reference DoD FMR 7000.14R).

Extrapolation from actual costs: extrapolation method requiring prototype or preproduction actual cost data on the system considered. Primarily used in estimating the production cost of system hardware and assumes a relationship (technical, performance) between cost of prototypes and production units (see Cost Estimating Methodologies).

Facilities and Infrastructure: (IPS Element) consists of the permanent and semi-permanent real property assets required to support a system. It includes facilities for training, equipment

storage, maintenance, supply storage, ammunition storage, and other related items (reference Product Support Manager Guidebook).

Family housing cost: costs to operate and maintain dwelling units, community facilities, roads, driveways, walkways, and utilities used by family housing occupants (reference 2007 CAPE O&S Cost Estimating Guide).

Fixed costs: costs that remain constant, regardless of any change in an organization's activity (reference Investopedia.com).

Fully Burdened Cost of Energy (FBCE): In the acquisition process, FBCE estimates the energy-related costs to sustain specific pieces of equipment, including procurement of energy, the logistics needed to deliver it where and when needed, related infrastructure, and force protection for those logistics forces directly involved in energy delivery. FBCE shall be applied in trade-off analyses conducted for all developmental DoD systems with end items that create a demand for energy in the battlespace. FBCE does not identify savings for programmatic purposes. It is an analytic input to the business case analysis designed to identify the difference in total energy-related costs among competing options. Consistent with Section 138c of title 10, United States Code, and DoDI 5000.02, FBCE estimates shall be made and reported for all ACAT I and II systems that will demand fuel or electric power in operations and will be applied to all phases of acquisition beginning with the preparation of the AoA. An FBCE estimate is also required as part of TOC calculations. FBCE is not additive to TOC, but rather is reported beside it. While TOC estimates are based on the total peace-time life of a system, FBCE estimates are based on short combat scenarios. They provide different but complementary insights. (Source: Defense Acquisition Guidebook 3.1.6)

General training and education cost: cost incurred from central activities for general training and education not associated with a specific weapon or other system (reference 2007 CAPE O&S Cost Estimating Guide).

General and Administrative (G&A) cost: contractor and depot costs necessary for operations but not directly associated with developing a product or providing a component, including any management, financial, or other expense incurred or allocated to a business unit for the general management and administration of the business unit as a whole. This is one example of an indirect or overhead type of cost category (reference DAU Glossary).

Government depot cost: cost that includes government labor, material, and support component costs for depot repair (reference 2007 CAPE O&S Cost Estimating Guide).

Government labor cost: cost of military and government civilian personnel, as defined by OSD Comptroller Composite Pay Tables (reference 2007 CAPE O&S Cost Estimating Guide).

Government material cost: cost of government-furnished equipment (GFE) or other materials used for maintenance and other activities (reference 2007 CAPE O&S Cost Estimating Guide).

Government support components cost: cost of government-provided support components. If used in conjunction with Government Depot Repair, these components must be associated with depot-level maintenance activities (reference 2007 CAPE O&S Cost Estimating Guide).

Hardware modifications and modernization cost: costs associated with developing, producing, installing, and modifying the defense system, support equipment, and training devices. When hardware modifications require changes in system or support software or technical documentation, these costs should be included with hardware modification costs (reference 2007 CAPE O&S Cost Estimating Guide).

Incentive: motivating the contractor in calculable monetary terms to turn out a product that meets significantly advanced performance goals to improve on the contract schedule up to and including final delivery, to substantially reduce costs of the work, to provide a level of support component above pre-agreed minimums or thresholds, or to complete the project under a weighted combination of some or all of these objectives (reference DAU Glossary).

Independent Cost Estimate (ICE): LCCE for MDAP programs produced by an agency or organization that does not have equity in decisions concerning the administration and management of an acquisition program. Department-level ICEs are typically performed by the CAPE. Component-level ICEs are typically performed by CCA. These government cost agencies are independent of acquisition decision-making agencies and offices. The CAPE ICE is also known as the “Will Cost” (reference DAU Glossary and USD AT&L April 22, 2011 Memorandum on Implementation of Will Cost and Should Cost Management).

Indirect costs: costs that, because of their incurrence for common or joint objectives, are not readily subject to treatment as direct costs (reference AFTOC Terms and Definitions).

Indirect support cost: those installation and personnel support costs that cannot be directly identified (in the budget or FYDP) to the units and personnel that operate and support the system being analyzed but nevertheless can be logically attributed to the system and its associated manpower. Normally, indirect support costs are not directly identified with the system under consideration; they are often allocated, either on a per-capita or some other basis (reference CAPE O&S Cost Estimating Guide).

Installation support cost: costs that are directly related to installation infrastructure (reference 2007 CAPE O&S Cost Estimating Guide).

Integrated Master Schedule (IMS): a report used to integrate the program schedule activities with all related components. The IMS DID (DI-MGMT-81466) was canceled in June 2012, but is still in use on contracts in force before July 1, 2012. Beginning July 1, 2012, only the IPMR, DI-MGMT-81861, should be used. Format 6 of the IPMR is the IMS and may be used separately when EVM is not required.

Integrated Product Support (IPS) Elements: Product support is scoped by the IPS elements, which provide a structured and integrated framework for managing product support. The IPS elements include product support management; design interface; sustaining engineering; supply

support; maintenance planning and management; PHS&T; technical data; support equipment; training and training support; manpower/ personnel; facilities and infrastructure; and computer resources. (Source: Product Support Manager (PSM) Guidebook)

Integrated Program Management Report (IPMR): a report used to integrate the cost and schedule performance data with objective technical measures of performance on contracts requiring EVM. Format 6 (IMS) may be used separately when EVM is not required.

Intermediate-level consumables parts cost: cost of government-furnished consumable materials used in maintaining and repairing a primary system, simulators, training devices, and associated support equipment by intermediate-level maintenance activities (reference 2007 CAPE O&S Cost Estimating Guide).

Intermediate-level DLR cost: cost of government-furnished DLR used in maintaining and repairing a primary system, subsystem, components, simulators, training devices, and associated support equipment by intermediate-level maintenance activities (reference 2007 CAPE O&S Cost Estimating Guide).

Intermediate-level repair parts cost: cost of government-furnished repair parts used in maintaining and repairing a primary system, subsystem, components, simulators, training devices, and associated support equipment by intermediate-level maintenance activities (reference 2007 CAPE O&S Cost Estimating Guide).

Intermediate maintenance cost: intermediate maintenance includes all costs of labor, materials, and other costs expended by an intermediate-level maintenance organization in support of a primary system, simulators, training devices, and associated support equipment (reference 2007 CAPE O&S Cost Estimating Guide).

Investment cost: production and deployment costs incurred from the beginning of low-rate initial production through completion of deployment (reference 2007 CAPE O&S Cost Estimating Guide).

Investment funding policy: costs that result in the acquisition of, or an addition to, end items (see expenses funding policy; reference DoD FMR 7000.14R).

Life Cycle Cost (LCC): LCC cost is the sum of all research and development costs, investment costs, O&S costs, and disposal costs attributable to a program. O&S costs often constitute a majority of the program's LCC.

Life Cycle Management (LCM): The implementation, management, and oversight, by the designated PM, of all activities associated with the acquisition, development, production, fielding, sustainment, and disposal of a DoD system across its life cycle." (Source: JCIDS Operation Manual) "

Life Cycle Sustainment Plan (LCSP): The PM's plan for formulating, implementing, and executing the product support strategy. It describes the efforts to ensure that the system's design, as well as the development of the product support package, are integrated and

contribute to achieving life cycle sustainment metrics. (Source: DTM 10-015). It serves as the program's primary management tool to satisfy the Warfighter's sustainment requirements through the delivery of a product support package. (Source: USD AT&L 14 Sep 11 Memo "Document Streamlining - Life-Cycle Sustainment Plan (LCSP)")

Maintainability: the ability of a system to be repaired and restored to service when maintenance is conducted by personnel using specified skill levels and prescribed procedures and resources (e.g., personnel, support equipment, technical data). It includes unscheduled, scheduled maintenance as well as corrosion protection/mitigation and calibration tasks. (Source: Defense Acquisition Guidebook 5.2)

Maintenance Planning and Management: (IPS Element) establishes maintenance concepts and requirements for the life of the system for both hardware and software. Includes, but is not limited to:

- Levels of repair/Source of repair
- Repair times
- Testability requirements
- Support equipment needs
- Training and Training Aids Devices Simulators and Simulations (TADSS)
- Manpower skills
- Facilities
- Inter-Component, organic and contractor mix of repair responsibility
- Inspection Requirements
- Deployment Planning/Site activation
- Development of preventive maintenance programs using reliability-centered maintenance
- CBM+
- Diagnostics/Prognostics and Health Management
- Sustainment
- PBL planning
- Post-production software support

(reference Product Support Manager Guidebook).

Maintenance cost: cost of all maintenance, to include government and contractor costs other than maintenance manpower assigned to operating units (reference 2007 CAPE O&S Cost Estimating Guide).

Manpower and Personnel: (IPS Element) involves the identification and acquisition of personnel (military and civilian) with the skills and grades at authorized levels 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 (reference Product Support Manager Guidebook).

Manpower Estimate: An estimate of the most effective mix of DoD manpower and contract support for an acquisition program. Includes the number of personnel required to operate,

maintain, support, and train for the acquisition upon full operational deployment. Once the Manpower Estimate is approved by the Component manpower authority, it serves as the authoritative source for reporting manpower in other program documentation. Required for all ACAT I programs. (Source: DAU Glossary, 15th Edition)

Medical support cost: costs for military and civilian medical care for active duty personnel and active duty dependents (reference 2007 CAPE O&S Cost Estimating Guide).

Military Construction appropriation (MILCON): MILCON is a series of congressionally mandated appropriations set up to pay for major construction projects using DoD dollars. This appropriation provides for major military construction projects, including acquiring, constructing, installing, and equipping temporary or permanent public works defined as real property "investment costs" on military installations. MILCON follows the Department's Full Funding budget policy, with limited exception (incremental funding). MILCON appropriations are available for obligation purposes for five years (reference DoD FMR 7000.14R).

Military Personnel appropriation (MILPERS): MILPERS is a congressional appropriation that funds salaries and other compensation for uniformed military personnel. MILPERS follows the Department's Annual Funding budget policy. MILPERS appropriations are available for obligation purposes for one year (reference DoD FMR 7000.14R).

Modification: configuration change to a produced Configuration Item (CI). Any modification that is of sufficient cost and complexity that it could itself qualify as an ACAT I through ACAT III program will be considered as a separate acquisition effort for management purposes (reference DoDD 5000.1, DoDI 5000.02).

Modular Design: a design (organization) where functionality is partitioned into discrete, cohesive, and self-contained units with well-defined, open and published interfaces that permit substitution of such units with similar components or products from alternate sources with minimum impact on existing units. (reference A Modular Open Systems Approach (MOSA) to Acquisition document, (USD(AT&L)) OSJTF)

Naval Visibility and Management of Operating and Support Costs (VAMOSOC): The Naval VAMOSOC management information system collects and reports US Navy and Marine Corps historical O&S costs. VAMOSOC provides the direct O&S costs of weapon systems, some linked indirect costs (e.g., ship depot overhead), and related non-cost information such as flying hour metrics, steaming hours, age of aircraft, etc. The Naval VAMOSOC Military Personnel databases contain personnel costs and attribute data. Naval VAMOSOC has recently added databases covering Navy Department civilian personnel and Navy facilities physical characteristics and operating costs. Depending on the specific commodity type and system, these relational databases contain up to 25 years of data presented by fiscal year in alternative hierarchical cost element structures. (Source: Naval VAMOSOC Website)

Net Present Value (NPV): If costs and benefits are expressed in constant dollars, then a real discount rate; i.e., a nominal rate that has been adjusted to exclude expected inflation, should be used to calculate a net present value. If costs and benefits are measured in current dollars,

then a nominal discount rate (which implicitly includes inflation) should be used to calculate the net present value. (Source: DoDI 7041.3, Para E3.4.4.)

Nonrecurring cost: non-repetitive elements of development, investment or sustainment costs that generally do not vary with the quantity being produced or maintained, irrespective of system life cycle phase and the appropriation (reference DoD CSDR Manual, DoD 5000.04-M-1).

Open System Architecture (OSA): is a system that employs modular design, uses widely supported and consensus based standards for its key interfaces, and has been subjected to successful validation and verification tests to ensure the openness of its key interfaces. [A *Modular Open Systems Approach (MOSA) to Acquisition, OSJTF*] An open architecture is defined as a technical architecture that adopts open standards supporting a modular, loosely coupled and highly cohesive system structure that includes publishing of key interfaces within the system and full design disclosure. The key enabler for open architecture is the adoption of an open business model which requires doing business in a transparent way that leverages the collaborative innovation of numerous participants across the enterprise permitting shared risk, maximized asset reuse and reduced total ownership costs. The combination of open architecture and an open business model permit the acquisition of OSAs that yield modular, interoperable systems allowing components to be added, modified, replaced, removed and/or supported by different vendors throughout the life cycle in order to drive opportunities for enhanced competition and innovation.

The following are the core principles of the OSA approach:

1. Modular designs with loose coupling and high cohesion that allow for independent acquisition of system components, i.e., composability;
2. Continuous design disclosure and appropriate use of data rights allowing greater visibility into an unfolding design and flexibility in acquisition alternatives;
3. Enterprise investment strategies that maximize reuse of system designs and reduce TOC;
4. Enhanced transparency of system design through Government, academia, and industry peer reviews;
5. Competition and collaboration through development of alternative solutions and sources;
6. Analysis to determine which components will provide the best return on investment (ROI) to OSA, i.e., which components will change most often due to technology upgrades or parts obsolescence and have the highest associated cost over the life cycle.

Achievement of these six principles requires an affirmative answer to a fundamental question: Can a qualified third party add, modify, replace, remove, or provide support for a component of a system, based on open standards and published interfaces for the component of that system? (reference <https://acc.dau.mil/bbp>)

Operating equipment replacement cost: costs incurred to replace mission equipment or software due to technical obsolescence or a life expectancy that is less than that for the entire system. This may include the costs of periodic technical refreshment in automated systems.

This cost does not include costs incurred from replacement due to loss in combat or accidental attrition (reference 2007 CAPE O&S Cost Estimating Guide).

Operation manpower cost: costs of all military, civilian, and contractor manpower required to operate a system (reference 2007 CAPE O&S Cost Estimating Guide).

Operation and Maintenance (O&M) appropriations: O&M appropriations fund expenses such as civilian salaries, travel, minor construction projects, operating military forces, training and education, depot maintenance, stock funds, and base operations support. O&M funding follows the Department's Annual Funding budget policy. O&M appropriations are available for obligation purposes for one year (reference DoD FMR 7000.14R).

Operations & Support Phase: Operating and Support (O&S) costs are different than the Operations and Support Phase of the life cycle. O&S costs are those costs specifically incurred as a direct result of operating and supporting the system. With this in mind, O&S costs can be incurred anywhere within the life cycle. For example, if a weapon system is operated earlier in the life cycle than the Operations and Support phase such as during the Production and Deployment phase, the costs that are incurred are considered O&S costs. These costs can be paid through different appropriation categories depending on how the units funding is structured in accordance with the standard operating procedures of that unit. The Operations and Support phase is a time period in the life cycle of the weapon system. While there is no hard 'start date', the weapon system begins operations and thus requires implementation of its support plan to meet materiel availability requirements within the most cost-effective manner. This phase can overlap the Production and Deployment phase of the life cycle.

Operating and Support (O&S) costs: all direct and indirect costs of goods and components incurred from initial deployment and fielding of an acquisition item or program through the end of the acquisition item's or program's operational and support activities. These operational and support activities are not bound to a life cycle phase or appropriation category (reference 2007 CAPE O&S Cost Estimating Guide).

Operating and Support (O&S) Cost Key System Attribute (KSA): O&S Cost metrics provide balance to the sustainment solution by ensuring that the O&S costs associated with availability and reliability are considered in making decisions. The O&S Cost KSA is to be completed using Base Year dollars. For consistency and to capitalize on existing efforts in this area, all CAPE O&S cost elements will be used in support of this KSA. Energy costs included in this O&S cost will be set using the base year price for every year of this assessment. Scenario based estimates for fully burdened cost of energy, including fuel and/or electric power will also be calculated and reported as part of this KSA. Costs are to be included regardless of funding source or management control. The O&S value should cover the planned life cycle timeframe, consistent with the timeframe and system population identified in the Materiel Availability (A_M) metric. Sources of reference data, cost models, parametric cost estimating relationships, and other estimating techniques or tools must be identified in supporting analysis. Programs must plan for maintaining the traceability of costs incurred to estimates and must plan for testing and evaluation. The Sponsor shall plan to monitor, collect, and validate operating and support cost

data to support the O&S cost KSA. (Source: JCIDS Manual, page B-E-3, Appendix E, Enclosure B)

Opportunity Cost: maximum worth of a good or input among possible alternative uses (reference OMB Circular A-94).

Organizational maintenance and support cost: costs of materials and other costs used to maintain the primary system, training devices, simulators, and support equipment at the unit level (reference 2007 CAPE O&S Cost Estimating Guide).

Organizational-level consumables cost: costs of material consumed in the maintenance and support of a primary system and its associated support and training equipment at the unit level. To the extent possible, the consumable material cost of the primary system, support equipment, training devices, and simulators should be separately identified (reference 2007 CAPE O&S Cost Estimating Guide).

Organizational-level DLRs cost: net cost the operating unit incurs for DLR spares (also referred to as exchangeable items) and components used to maintain equipment at the unit level. To the extent possible, the DLR costs of the primary system, support equipment, training devices, and simulators should be separately identified (reference 2007 CAPE O&S Cost Estimating Guide).

Organizational-level repair parts cost: cost of materials used to repair primary systems and associated support and training equipment at the unit level. To the extent possible, the repair material cost of the primary system, support equipment, training devices, and simulators should be separately identified (reference 2007 CAPE O&S Cost Estimating Guide).

Other depot maintenance cost: depot maintenance costs not otherwise included (reference 2007 CAPE O&S Cost Estimating Guide).

Other intermediate maintenance cost: intermediate maintenance costs not otherwise accounted for (reference 2007 CAPE O&S Cost Estimating Guide).

Other operational material cost: operating material costs other than energy, training munitions, or expendable stores. The costs identified must be related to the system for which the O&S requirements are being assessed (reference 2007 CAPE O&S Cost Estimating Guide).

Other sustaining support cost: any significant sustaining support costs not otherwise accounted for (reference 2007 CAPE O&S Cost Estimating Guide).

Other unit-level manpower cost: cost of all military, civilian, and contractor manpower that performs administrative, security, logistics, safety, engineering, and other mission support functions at the unit level. These costs include only the costs of manpower positions that exist to wholly or predominately support the system for which the costs are being estimated. For systems that deploy, these costs include the costs of manpower positions that routinely deploy to support the system (reference 2007 CAPE O&S Cost Estimating Guide).

Overhead: See Indirect Costs.

Ownership Cost: an outdated KSA that is a cost metric defined in the JCIDS Manual as the following subset of O&S cost elements from the 2007 CAPE O&S Cost Analysis Guide: 2.0 Unit Operations (2.1.1 (only) Energy (fuel, petroleum, oil, lubricants, electricity)); 3.0 Maintenance (All); 4.0 Sustaining Support (All except 4.1, System Specific Training); 5.0 Continuing System Improvements (All). Ownership cost should not be confused with TOC or O&S Cost (reference Feb 2009 JCIDS Manual). This KSA was replaced by the O&S Cost KSA with the re-release of the January 2011 JCIDS Manual.

Packaging, Handling, Storage, and Transportation (PHS&T): (IPS Element) 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, equipment preservation for 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 (land, rail, air, and sea) (reference Product Support Manager Guidebook).

Parametric cost estimate: cost estimating methodology using statistical relationships between historical costs and other program variables, such as system physical or performance characteristics, contractor output measures, or manpower loading (reference 2007 CAPE O&S Cost Estimating Guide).

Performance Based Logistics (PBL): Performance Based Logistics (PBL) (also known as Performance Based Life Cycle Product Support) is an outcome-based approach..., linked sustainment objectives and resources to system performance, not repair and supply activities; goals and incentives became structured around system performance, not failure; and risk was shifted to the support provider. PBL...delivered higher equipment readiness levels, applied best commercial practices, provided inherent product support integration, and provided a common strategy to bridge the acquisition and sustainment communities.” (Source: Nov 2009 DoD Product Support Assessment). It is similarly defined as “an outcome-based product support strategy that plans and delivers an integrated, affordable performance solution designed to optimize system readiness and affordability.” (Source: DoD Project Proof Point Study Report)

Personnel acquisition cost: costs for recruiting, examining and processing individuals into the military Component and for advertising in support of recruiting activities (reference 2007 CAPE O&S Cost Estimating Guide).

Personnel benefits cost: costs of operating and maintaining family housing child development centers, family centers, family advocacy programs, youth development programs, commissaries and DoD schools (reference 2007 CAPE O&S Cost Estimating Guide).

Personnel not available for duty cost: costs for military personnel placed in the personnel holding account that are not available for assignment to a unit due to medical or disciplinary reasons or are about to be discharged. Includes military personnel not assigned to a unit that

are in transit to the next permanent duty station, to school, or other training (reference 2007 CAPE O&S Cost Estimating Guide).

Personnel support cost: costs of the acquisition, initial training, and quality of life programs necessary to maintain a quality force (reference 2007 CAPE O&S Cost Estimating Guide).

Procurement appropriation: appropriations used to finance investment items and cover all costs necessary to deliver a useful end item intended for operational use or inventory. Items classified as investments and financed with Procurement appropriations include those whose system unit cost exceeds \$250K and all centrally managed end items not purchased from DWCF, regardless of unit cost (e.g., handguns). Includes purchases from the DWCF furnished as part of a system acquisition, system modification, major component life-extension program, or initial spares. The cost of fabricating and installing additions or modifications to existing end items is also funded with procurement appropriations, with certain limited exceptions. Procurement appropriations are normally available for obligation purposes for three years, except for the SCN appropriation, which is available for five years. Procurement follows the Department's Full Funding budget policy (reference DoD FMR 7000.14R).

Product Improvement: The procurement, installation, retrofit, modernization, upgrade, or rebuild of a component or subsystem of a weapon system platform or major end item that would improve the reliability, availability and maintainability, extend the useful life, enhance safety, lower maintenance costs, or provide performance enhancement of the weapon system platform or major end item. (Sources: Pilot program outlined in FY08 NDAA (Public Law 110-181), Sec. 330 as amended by FY13 NDAA (Public Law 112-329), Sec. 332)

Product Support: The term "product support" means the package of support functions required to field and maintain the readiness and operational capability of major weapon systems, subsystems, and components, including all functions related to weapon system readiness (Source: 10 U.S.C §2337), including but not limited to materiel management, distribution, technical data management, maintenance, training, cataloging, configuration management, engineering support, repair parts management, failure reporting and analyses, and reliability growth tracking and the logistics (integrated product support) elements (e.g., support equipment, spares) related to weapon systems readiness. (Source: Directive Type Memorandum (DTM) 10-015)

Product Support Arrangement (PSA): The term "product support arrangement" means a contract, task order, or any type of other contractual arrangement, or any type of agreement or non-contractual arrangement within the Federal Government, for the performance of sustainment or logistics support required for major weapon systems, subsystems, or components. The term includes arrangements for any of the following: Performance-based logistics, Sustainment support, Contractor logistics support, Life cycle product support, or Weapon systems product support (Sources: 10 U.S.C. §2337 and DTM 10-015)

Product Support Business Case Analysis (BCA): The Product Support BCA 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. BCAs may be somewhat different from other decision support analyses through their emphasis of the enterprise wide perspective of stakeholders and decision makers and assessment of the holistic effects impacted by the decision. Other names for a BCA are Economic Analysis, Cost-Benefit Analysis, and Benefit-Cost Analysis. Broadly speaking, a BCA is any documented, objective, value analysis exploring costs, benefits, and risks. The Product Support BCA concludes with a recommendation and associated specific actions and an implementation plan to achieve stated organizational objectives and desired outcomes. One principle application of the Product Support BCA guidebook is to assist the PSM in identifying the product support strategy that achieves the optimal balance between Warfighter capabilities and affordability. (Source: DoD Product Support BCA Guidebook)

Product Support Business Model (PSBM): The 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 will be accomplished over the life cycle. The PSBM effectively describes the methodology by which DoD intends to ensure achievement of optimized product support through balancing maximum weapon system availability with the most affordable and predictable total ownership cost. The model provides a clearly delineated description of the roles, relationships, accountability, responsibility and business agreements among the managers, integrators, and providers of product support. (Source: DoD PSM Guidebook)

Product Support Integrator (PSI): The term “product support integrator” means an entity within the Federal Government or outside the Federal Government charged with integrating all sources of product support, both private and public, defined within the scope of a product support arrangement. (Sources: 10 U.S.C. §2337 and DTM 10-015)

Product Support Management: As an element of 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 life cycle commensurate with the roles and responsibilities of the Product Support Manager position. Note: product support management is not synonymous with product support manager, although the product support manager plays a primary role in executing product support management activities. (Source: DoD IPS Element Guidebook)

Product Support Manager (PSM): The individual responsible for managing the package of support functions required to field and maintain the readiness and operational capability of major weapon systems, subsystems, and components, including all functions related to weapon system readiness, in support of the program manager’s life cycle management responsibilities. (Source: DTM 10-015)

Product Support Provider (PSP): The term “product support provider” means an entity that provides product support functions. The term includes an entity within DoD, an entity within the

private sector, or a partnership between such entities. (Sources: 10 U.S.C §2337 and DTM 10-015)

Product Support Strategy: The business and technical approach to design, acquire, and field the product support package to execute the sustainment strategy. It begins as a broad concept and evolves into a detailed implementation plan documented in the LCSP. (Source: DTM 10-015)

Product Support Strategy Process Model: The 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 onetime 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. The DoD Product Support Strategy Process Model provides a ready reference to the iterative 12 steps for defining and implementing product support strategies. Note: as an implementation process model, this DoD Product Support Strategy Process Model should not be confused with the 12 IPS Elements, nor is it synonymous with the DoD PSBM. (Sources: PSM Guidebook (Section 4) and the PSM Toolkit)

Profit: excess amount realized from the sale of goods or components over the costs sold in a given transaction or over a given period (reference DAU Glossary).

Profit (Excess): profit over and above an established dollar or percentage limit (reference DAU Glossary).

Profit center: discrete, organizationally independent segment of a company that has been charged by its management with profit and loss responsibilities (reference DAU Glossary).

Program Acquisition Cost: estimated cost of RDT&E, procurement, and system-specific military construction necessary to acquire the defense system. Military construction costs include only those projects that directly support and uniquely identify with the system (reference DAU Glossary).

Program Acquisition Unit Cost (PAUC): total cost for development and procurement of (and system-specific military construction for) the acquisition program divided by the number of fully configured end items to be produced for the acquisition program; i.e.:

$$PAUC = (Total\ RDT\&E\ Appropriations + Total\ Procurement\ Appropriations + specific\ MILCON\ Appropriations) / (Total\ Procurement\ Quantity + Total\ RDT\&E\ Produced\ Production\ Representative\ Units)$$

(reference Title 10, Section 2432(a)).

Program Acquisition Quantity: total number of fully configured end items (including R&D units) a DoD Component intends to buy throughout the life cycle of the program, as approved by the MDA (reference DAU Glossary).

Program Manager (PM): The PM is the designated individual with responsibility for and authority to accomplish program objectives for development, production, and sustainment to meet the user's operational needs. The PM shall be accountable for credible cost, schedule, and performance reporting to the MDA. (Sources: DoDD 5000.01, Para 3.5 and DTM 10-015)

Public-Private Partnership (PPP): A PPP for depot-level maintenance under 10 U.S.C. §2474 is a cooperative arrangement between an organic depot-level maintenance activity and one or more private sector entities to perform DoD or Defense-related work and/or to utilize DoD depot facilities and equipment. Other government organizations, such as program offices, inventory control points, and materiel/systems/logistics commands, may be parties to such agreements. The terms public-private partnership and public-private partnering are frequently used interchangeably and are both often abbreviated as "PPP." (Source: DoD Instruction 4151.21)

Recurring cost: repetitive elements of development, investment or sustainment costs that may vary with the quantity being produced or maintained, irrespective of system life cycle phase and appropriation (reference DoD CSDR Manual DoD 5000.04-M-1).

Reliability: the ability of a system to perform as designed in an operational environment over time without failure. (Source: DAG 5.2)

Repairable: an item or material that is able to be repaired and put back into the Component. Contrast with consumable (reference dictionary.com).

Research, Development, Test and Evaluation (RDT&E) appropriation: Congressional funding to finance research, development, test and evaluation efforts performed by contractors and government installations to develop equipment, material, or computer application software. RDT&E appropriations follow the Department's Incremental Funding budget policy. RDT&E appropriations are available for obligation purposes for two years (reference DoD FMR 7000.14R).

Research and development cost: costs incurred from the beginning of the MSA Phase through the EMD Phase and potentially into low-rate initial production that explore and develop new capabilities. These costs may be expended in the development of modifications to the system after fielding, if the modification results in an increase in system performance (reference 2007 CAPE O&S Cost Estimating Guide).

Resource Sponsor: Responsible for mitigating the growth of total program life cycle cost by specifying technical performance capabilities whose design parameters, while meeting Warfighter requirements, are also technologically realistic and constrained in number throughout program development. Additionally provides an understanding of how requirements decisions impact life cycle costs.

Schedule Variance: An EVM term relating to schedule differences between planned and actual performance which require further review, analysis, or action.

Should cost: the DoD AT&L community has two key uses and sources for the definition of "Should Costs," as referenced below.

1. Should Cost Review (FAR 15.407-4) - A specialized form of cost analysis that does not assume the contractor's historical costs reflect efficient and economical operations. This cost analysis evaluates the economics and efficiency of the contractor's existing workforce, methods, materials, facilities, operating systems, and management.
2. Should Cost (Dr. Ashton Carter, USD (AT&L), April 22, 2011 Memo, "Implementation of Will Cost and Should Cost Management"). The should cost is one of three methods of cost estimating. First, a bottoms-up assessment of the program's cost based on reasonable efficiency and productivity enhancements. Second, identify reductions from Will Cost estimates. Third, utilize competitive contracting and contract negotiations to identify Should Cost savings. Regardless of methodology, the Should Cost position is used as the basis for contract negotiations and contract incentives, as well as program executive officer and program manager performance. It is normally produced by the Program Office, or some entity within the same chain of command as the Program office (references FAR 15.407-4; Dr. Ashton Carter, USD (AT&L), April 22, 2011 Memo, "Implementation of Will Cost and Should Cost Management").

Significant Cost Growth Threshold: a breach that occurs when the PAUC or the APUC increases by at least 15 percent over the current baseline estimate or at least 30 percent over the original BE (reference GAO-11-499T).

Software enhancements cost: cost to develop, test, and deploy software that enhances defense systems, as long as those enhancements do not change the fundamental mission of the system (reference 2007 CAPE O&S Cost Estimating Guide).

Software maintenance and modifications cost: cost of labor, material, and overhead incurred after deployment in supporting the update, maintenance and modification, integration, and configuration management of software. Depot-level maintenance activities, government software centers, laboratories, or contractors may incur these costs. The respective costs of operating and maintaining the associated computer and peripheral equipment in the software support activity and the cost to conduct all testing of the software should also be included (reference 2007 CAPE O&S Cost Estimating Guide).

Sunk Cost: cost incurred in the past that will not be affected by any present or future decision. Sunk costs should be ignored in determining whether a new investment is worthwhile (reference OMB Circular A-94).

Supply Support: (IPS Element) 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 (reference PSM Guidebook).

Supportability: A key component of availability. It includes design, technical support data, and maintenance procedures to facilitate detection, isolation, and timely repair and/or replacement

of system anomalies. This includes factors such as diagnostics, prognostics, real time maintenance data collection, and human system integration considerations (reference JCIDS Manual).

Support Component cost: unit-level costs for purchased support components (reference 2007 CAPE O&S Cost Estimating Guide).

Support Equipment: (IPS Element) 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, environmental control, generators, tools, metrology and calibration equipment, and manual and automatic test equipment. During the acquisition of systems, program managers are expected to decrease the proliferation of support equipment by minimizing the development of new support equipment and giving more attention to the use of existing government or commercial equipment (reference PSM Guidebook).

Support equipment replacement cost: costs incurred to replace equipment that is needed to operate or support a primary system, subsystems, training systems, and other support equipment. The support equipment being replaced (e.g., tools and test sets) may be unique to the system or may be common to a number of systems, in which case the costs must be allocated among the respective systems (reference 2007 CAPE O&S Cost Estimating Guide).

Sustaining Engineering: (IPS Element) those engineering, logistics, investigations, and analytical efforts that span technical tasks enabling continued operation and maintenance of a system with managed risk. Sustaining Engineering involves the identification, review, assessment, and resolution of deficiencies throughout a system's life cycle. Sustaining Engineering both returns a system to its baseline configuration and capability and identifies opportunities for performance and capability enhancement (reference PSM Guidebook).

Sustaining engineering and program management cost: labor, material, and overhead costs incurred in providing continued systems engineering and program management oversight to manage the program and to determine the integrity of a system, to maintain operational reliability, to approve design changes, and to ensure conformance with established specifications and standards (reference 2007 CAPE O&S Cost Estimating Guide).

Support features: include operational suitability features cutting across reliability and maintainability and the supply chain to facilitate detection, isolation, and timely repair/replacement of system anomalies. It also includes features for servicing and other activities necessary for operation and support including resources that contribute to the overall support. Traditional factors falling in this category include diagnostics, prognostics (see DoD CBM+ Guidebook), calibration requirements, many Human Systems Integration (HSI) issues (e.g. training, safety, Humans Factors Engineering (HFE), occupational health, etc.), skill levels, documentation, maintenance data collection, compatibility, interoperability, transportability, handling (e.g., lift/hard/tie down points, etc.), packing requirements, facility requirements, accessibility, and other factors that contribute to an optimum environment for sustaining an operational system. (Source: DAG 5.2)

Sustaining support cost: cost of support activities other than maintenance that can be attributed to a system and are provided by organizations other than operating units (reference 2007 CAPE O&S Cost Estimating Guide).

System-specific non-operator training cost: the cost of advanced system-specific training associated with maintenance and other support functions in units designated as primary training facilities (reference 2007 CAPE O&S Cost Estimating Guide).

System-specific operator training cost: costs for training conducted in units designated as primary training sites for individuals to become proficient in specific system knowledge (reference 2007 CAPE O&S Cost Estimating Guide).

System-specific training cost: cost of system-specific specialty training for individuals that need to be replaced due to attrition and normal rotation. Training costs should include the costs of instructors, training support personnel, training devices, course support costs, and course materials, as well as all trainee costs, per diem, and travel directly associated with the training (reference 2007 CAPE O&S Cost Estimating Guide).

Technical Data: (IPS Element) represents recorded information of scientific or technical nature, regardless of form or character (such as equipment technical manuals and engineering drawings), engineering data, specifications, data rights, standards and DIDs. Technical Manuals (TMs), including Interactive Electronic Technical Manuals (IETMs), provide the instructions for operation and maintenance of a system. IETMs also provide integrated training and diagnostic fault isolation procedures (reference PSM Guidebook).

Technical Performance Measurement (TPM): A graphical depiction of a product design assessment. It displays values derived from tests and future estimates of essential performance parameters of the current design. It forecasts the values to be achieved through the planned technical program effort, measures differences between achieved values and those allocated to the product element by SE Processes and determines the impact of those differences on system effectiveness. TPMs are typically related to KPPs and MOEs. (Source: DAU Glossary, 15th Edition)

Temporary additional duty, or temporary duty (TAD/TDY) pay and allowances costs: costs that include unit personnel travel for training, administrative, or regularly scheduled training away from the unit's permanent operating location that are associated with a unit's concept of operating and support. TAD/TDY costs include military and commercial transportation charges, rental costs for passenger vehicles, mileage allowances, and subsistence expenses (e.g., per diem allowances and incidental travel expenses) but excludes temporary duty associated with contingencies or wartime operations (reference 2007 CAPE O&S Cost Estimating Guide).

Total ownership cost/Life cycle cost (TOC/LCC): complete and exhaustive cost for the acquisition and ownership of an item or program over its lifetime. These costs are not constrained by appropriation category, funding source, or management control. These costs are made up of direct and allocable indirect costs, including costs associated with concept,

research, development, procurement, operations, support and disposal (see Life Cycle Cost; references span numerous sources).

Training and Training Support: (IPS Element) 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 comprises 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, shall be validated during system test and evaluation at the individual, crew, and unit level (reference PSM Guidebook).

Training, Munitions, and Expendable Stores Costs: costs that include the unit-level consumption of training munitions, rockets, missiles, and expendable stores in the course of normal peacetime training missions (reference 2007 CAPE O&S Cost Estimating Guide).

Unit Cost Report (UCR): a quarterly written report that is submitted by the PM to the Component Acquisition Executive on the unit costs of an MDAP, i.e., the PAUC and APUC. UCR information is submitted in the DAES report. Breaches of UCR baselines are also reported in the DAES and, depending upon the extent of the breach, require reports and/or certifications to Congress. UCR breaches are commonly referred to as Nunn-McCurdy breaches (see Significant Cost Growth Threshold and Critical Cost Growth Threshold; reference DAU Glossary).

Unit operations cost: cost of unit operating material (e.g., fuel and training material), unit support components, and unit travel, excluding all maintenance and repair material (reference 2007 CAPE O&S Cost Estimating Guide).

Unit-level manpower cost: cost of operators, maintainers, and other support manpower assigned to operating units (or at maintenance and support units that are organizationally related and adjacent to the operating unit). These include military, civilian, and/or contractor personnel. For cases such as intermediate maintenance activities and manpower where individuals perform duties across more than one system, manpower costs should be allocated on a relative workload basis (reference 2007 CAPE O&S Cost Estimating Guide).

Variable Cost: a cost that changes with the production quantity or the performance of components. This contrasts with fixed costs that do not change with production quantity or components performed (reference investopedia.com).

Value Engineering (VE): VE is a functional analysis methodology that identifies and selects the best value alternative for designs, materials, processes, systems, and program documentation. VE applies to hardware and software; development, production, and manufacturing; specifications, standards, contract requirements, and other acquisition program documentation; facilities design and construction; and management or organizational systems and processes to improve the resulting product. (Source: DAU Glossary, 15th Edition)

Value Engineering Change Proposal (VECP): Submitted by the contractor for review as to its VE applicability. If accepted by the government, normally the contractor is compensated for saving the government money. (Source: DAU Glossary, 15th Edition)

Will Cost: cost analysis of a program's costs as conducted and presented by an independent cost analysis team. For ACAT ID MDAP, this cost analysis estimate is produced by CAPE through its ICE process or by the Components through their CCE process. The Will Cost estimate of a program is the estimate to be used for budgetary purposes, as defined in the WSARA of 2009 (USD(AT&L) November 3, 2010 Memo, "Implementation Directive for Better Buying Power," page 2).

Working Capital Fund (WCF): revolving funds within DoD that finance organizations which are intended to operate like commercial businesses. WCF business units finance their operations with cash from the revolving fund; the revolving fund is then replenished by payments from the business units' customers (reference DAU Glossary).

Appendix J - Acronyms

\$ - dollars
 ABC – Activity Based Costing
 ABS – Availability Based Sparing
 A/C - Aircraft
 ACAT – Acquisition Category
 ACWP – Actual Cost of Work Performed
 ADM – Acquisition Decision Memorandum
 AFTOC – Air Force Total Ownership Cost
 AIS – Automated Information System
 A_M – Materiel Availability
 A_O – Operational Availability
 AoA – Analysis of Alternatives
 APB – Acquisition Program Baseline
 APUC – Average Procurement Unit Cost
 ARA – Acquisition Resources and Analysis
 ASOE – Affordable System Operational Effectiveness
 AT&L – Acquisition, Technology, and Logistics
 AVDLR – Aviation Depot Level Repairable
 BA – Budget Authority
 BBP – Better Buying Power
 BCA – Business Case Analysis
 BCM – Beyond Capability of Maintenance
 BCWP – Budgeted Cost of Work Performed
 BE – Baseline Estimate
 BFM – Business Financial Manager
 BY – Base Year
 CAIV – Cost as an Independent Variable
 CAPE – Cost Assessment Program Evaluation
 CARD – Cost Analysis Requirements Description
 CBA – Cost Benefit Analysis
 CBM+ – Condition-Based Maintenance Plus
 CCA – Component Cost Agency
 CCE – Component Cost Estimate
 CDD – Capability Development Document
 CDRL – Contract Data Requirements List
 CER – Cost Estimating Relationship
 CI – Configuration Item
 CJCSI – Chairman of the Joint Chiefs of Staff Instruction
 CLA – Core Logistics Analysis
 CLIN – Contract Line Item Numbers
 CLS – Contractor Logistics Support
 CONOPS – Concept of Operations
 COTS – Commercial Off the Shelf
 CPD – Capability Production Document
 CPAF – Cost Plus Award Fee
 CPFF – Cost Plus Fixed Fee
 CPIF – Cost Plus Incentive Fee
 CPIPT – Cost Performance Integrated Product Team
 CSDR – Cost and Software Data Reporting

CV – Cost Variance
CY – Constant Year
DAB – Defense Acquisition Board
DAE – Decision Acquisition Executive
DAES – Defense Acquisition Executive Summary
DAG – Defense Acquisition Guidebook
DAMIR – Defense Acquisition Management Information Retrieval
DAMS – Defense Acquisition Management System
DAU – Defense Acquisition University
DCARC – Defense Cost and Resource Center
DET – Displaced Equipment Training
DID – Data Item Description
DLA – Defense Logistics Agency
DLIS – DLA Logistics Information Service
DLR – Depot-Level Repairable
DMSMS – Diminishing Manufacturing Sources and Material Shortages
DoD – Department of Defense
DoDD – Department of Defense Directive
DoDI – Department of Defense Instruction
DT – Developmental Test
DTM – Directive Type Memorandum
DT&E – Development Test and Evaluation
DWCF – Defense Working Capital Fund
EA – Economic Analysis
ECD – Estimated Completion Date
EEIC – Element of Expense Investment Code
EMD – Engineering and Manufacturing Development
EOQ – Economic Order Quantity
EVM – Earned Value Management
EVMS – Earned Value Management System
FAR – Federal Acquisition Regulation
FBCE – Fully Burdened Cost of Energy
FOC – Full Operational Capability
FUE – First Unit Equipped
FY – Fiscal Year
FYDP – Future Years Defense Program
G&A – General and Administrative
GFE – Government Furnished Equipment
GOTS – Government Off the Shelf
HFE – Human Factors Engineering
HSI – Human Systems Integration
HW - Hardware
ICD – Initial Capabilities Document
ICE – Independent Cost Estimate
ICS-CLS – Interim Contractor Support – Contractor Logistics Support
IETM – Interactive Electronic Technical Manual
ILA – Independent Logistics Assessment
IMS – Integrated Master Schedule
IOC – Initial Operating Capability
IOT&E – Initial Operational Test and Evaluation

IPMR – Integrated Program Management Report
IPS – Integrated Product Support
IPT – Integrated Product Team
JCIDS – Joint Capabilities Integration and Development System
JLTV – Joint Light Tactical Vehicle
JUONS – Joint Urgent Operational Needs Statement
JROC – Joint Requirements Oversight Council
KPP – Key Performance Parameter
KSA – Key System Attribute
LCC – Life Cycle Cost
LCCE – Life Cycle Cost Estimate
LCM – Life Cycle Management
LCSP – Life Cycle Sustainment Plan
LFT&E – Live Fire Test and Evaluation
LRIP – Low Rate Initial Production
LUT – Limited User Test
MAIS – Major Automated Information System
MDA – Milestone Decision Authority
MDAP – Major Defense Acquisition Program
MDD – Material Development Decision
MER – Manpower Estimate Report
MILCON – Military Construction
MILPERS – Military Personnel
MMH – Maintenance Manhours
MOEs – Measures of Effectiveness
MOSA – Modular Open Systems Architecture
MS – Milestone
MSA – Materiel Solution Analysis
MTBF – Mean Time Between Failure
Mx – Maintenance
NDAA – National Defense Authorization Act
NET – New Equipment Training
NPV – Net Present Value
O&M – Operations and Maintenance
O&S – Operating & Support (Cost)
ODASD(MR) – Office of the Deputy Assistant Secretary of Defense for Materiel Readiness
ODir – Office of the Director
OE – Operational Effectiveness
OEM – Original Equipment Manufacturer
OH - Overhaul
OIPT – Overarching Integrated Product Team
OJT – On the Job Training
OMB – Office of Management and Budget
OPEVAL – Operational Evaluation
OPTEMPO – Operational Tempo
OSA – Open Systems Architecture
OSD – Office of the Secretary of Defense
OSJTF – Open Systems' Joint Task Force
OSMIS – Operating and Support Management Information System
OT&E – Operational Test and Evaluation

OUSD – Office of the Under Secretary of Defense
 PARCA – Performance Assessment and Root Cause Analysis
 PAUC – Program Acquisition Unit Cost
 PB – President’s Budget
 PBA – Performance Based Arrangement
 PBL – Performance-Based Logistics
 PCS – Permanent Change of Station
 PEO – Program Executive Officer
 PHS&T – Packaging, Handling, Storage and Transportation
 PLCCE – Program Life Cycle Cost Estimate
 PM – Program Manager
 PMB – Performance Measurement Baseline
 POE – Program Office Estimate
 POL – Petroleum, Oil, and Lubricants
 POM – Program Objective Memorandum
 PPP – Public-Private Partnership
 PSA – Product Support Arrangement
 PSBM – Product Support Business Model
 PSEC – Product Support Executive Council
 PSI – Product Support Integrators
 PSM – Product Support Manager
 PSP – Product Support Provider
 PSS – Product Support Strategy
 R&D – Research and Development
 RAM – Reliability, Availability, Maintainability
 RAM-C – Reliability, Availability, Maintainability and Cost
 RBS – Readiness-Based Sparing
 RDT&E – Research, Development, Test and Evaluation
 RFP – Request for Proposal
 ROI – Return on Investment
 SAR – Selected Acquisition Report
 SCN – Shipbuilding and Conversion, Navy
 SCP – Service Cost Position
 SE – Systems Engineering
 SEP – Systems Engineering Plan
 SoRA – Source of Repair Analysis
 SW - Software
 SWaP-C – Size, Weight, Power and Cooling
 T&E – Test and Evaluation
 TADSS – Training and Training Aids, Devices, Simulators and Simulations
 TAD/TDY – Temporary Additional Duty/Temporary Duty
 TD – Technical Data
 TEMP – Test & Evaluation Management Plan
 TM – Technical Manuals
 TOC – Total Ownership Cost
 TPM – Technical Performance Measure
 TY – Then Year
 UCR – Unit Cost Report
 U.S. – United States
 USD – Under Secretary of Defense

VAMOSC – Visibility and Management of Operating and Support Costs

VE – Value Engineering

VECP – Value Engineering Change Proposal

WBS – Work Breakdown Structure

WCF – Working Capital Fund

WSARA – Weapon Systems Acquisition Reform Act

WSAR-PSA – Weapon System Acquisition Reform - Product Support Assessment