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Product Support

Professionally Developing World-Class Product Support Managers

The Product Support Triad: A Critical Convergence

Affordable Logistics: Are We There Yet?

CONTENTS

ALSO

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The Product Support Manager

A Catalyst for Life Cycle Management and Product Support Success

Sue Dryden
Deputy Assistant Secretary of Defense for Materiel Readiness

The 2010 signing of Directive-Type Memorandum (DTM) 10-015, "Requirements for Life Cycle Management and Product Support," was a great achievement for both the DoD life cycle logistics and program management communities. It implemented the requirements of Section 805 of Public Law 111-84 in the Fiscal Year 2010 National Defense Authorization Act and established DoD policy mandating a product support manager (PSM) position be identified and assigned for each acquisition category (ACAT) I and II program office, and be filled by a properly qualified military Service member or full-time employee of the Department. The PSM reports directly to the program

manager and fills a key leadership position (KLP) for ACAT I or a critical acquisition position (CAP) for ACAT II programs. Now, for the first time, the logistician has a designated seat at the table as the program office catalyst for life cycle management and product support. The PSM, possessing greater responsibilies, capabilies and a broader, more enterprise-focused interdisciplinary skill set, represents a powerful new resource to assist the program manager (PM) in fulfilling their DoD Directive 5000.01 life cycle management responsibilities. PSMs will help deliver successful "inception through demilitarization" system life cycle product support outcomes.

Mahatma Gandhi said, "You must be the change you wish to see in the world." PSMs now have the authority to address logistics and product support early and throughout the program's life cycle, and thus effect the changes you wish to see in your programs. The PSM is vital to the development, implementation, and execution of an effective and affordable product support strategy. Specific areas to effect that change are inculcated into the product support manager's principal duties to:

- Provide weapon systems product support subject matter expertise to the PM for the execution of the PM's duties as the Total Life Cycle System Manager.
- Develop, implement, and periodically review a comprehensive, outcome-based, product support strategy.
- Promote opportunities to maximize competition while meeting the objectives of best-value, long-term outcomes to the warfighter.
- Leverage enterprise opportunities across programs and DoD components.
- Use appropriate analytical tools and conduct appropriate cost analyses, including cost-benefit analyses, as specified in Office of Management and Budget Circular A-94 to determine the preferred product support strategy.
- Develop and implement appropriate product support arrangements.
- Periodically assess and adjust resource allocations and performance requirements for product support, not less than annually, to meet warfighter needs and optimize implementation of the product support strategy.
- Document the product support strategy in the Life Cycle Sustainment Plan (LCSP).
- Conduct periodic product support strategy reviews and revalidate the supporting business case analysis prior to each change in the product support strategy or every 5 years, whichever occurs first.

The development and implementation of a product support strategy is an iterative process. The PSM duties and responsibilities are enablers to this process and key for program success.

Although this will be challenging job, the PSM does not stand alone. In addition to support from the respective Service and program office staff, the Office of the Deputy Assistant Secretary of Defense (Materiel Readiness) (ODASD(MR)), and the Defense Acquisition University (DAU) are available to assist as the PSM in the execution of these responsibilities. Both have been working diligently to develop and provide resources to assist prospective PSMs with their assigned duties and responsibilities. Immediately following distribution of DTM 10-015, DAU launched PSM Rapid Deployment Training to provide immediate training material on the new policy. Training is one of many essential elements to assist the PSM. As new policy is implemented, DAU develops and modifies training material to remain current with policy. The following training material is available now or under development:

- PSM Rapid Deployment Training (RDT) (http://www.dau.mil/images/Pages/RDT.aspx)
- New LOG 340 "Life Cycle Product Support" Course (http://icatalog.dau.mil)
- Enhanced LOG 350 "Enterprise Life Cycle Logistics Management" Course (http://icatalog.dau.mil)
- Continuous Learning Module, CLL 036 "The Product Support Manager" (http://icatalog.dau.mil)
- Post-Level III LOG 365 PSM Course (currently in early planning)

In addition, the ODASD(MR) in collaboration with components, agencies, industry, and academia wrote and disseminated several guidebooks to assist the PSM in execution of their duties. These guidebooks were written for the PSM as a reference tool for managing product support throughout the weapon system's life cycle. The following guidebooks are available now:

- *Product Support Manager's (PSM) Guidebook* (https://acc.dau.mil/psm-guidebook)
- *Business Case Analysis (BCA) Guidebook* (https://acc.dau.mil/bca-guidebook)
- *Logistics Assessment (LA) Guidebook* (https://acc.dau.mil/la-guidebook)

Other resources available to the PSM include:

- PSM Reference Repository on DAU Logistics Community of Practice (https://acc.dau.mil/psm)
- Product Support Policy, Guidance & Tools Repository (https://acc.dau.mil/productsupport)
- LCSP Outline/Template (https://acc.dau.mil/lcsp-outline)

Additionally, the following resources are in development and will be available soon at the DAU Logistics Community of Practice (LOG CoP) (https://acc.dau.mil/log) to assist the PSM:

- *Cost Assessment & Program Evaluation (CAPE) O&S Cost Estimating Guide*
- *Public-Private Partnering (PPP) Guidebook*
- *DoD O&S Cost Management Guidebook*
- *Integrated Product Support (IPS) Element Guidebook*
- Web-based PSM Toolkit

Upon issuance of DTM 10-015, the Services immediately began to comply with the requirement to identify and assign PSMs as well as publish additional Service-level implementation guidance. To date, each of the Services has assigned PSMs, aggressively participated in PSM training opportunities, and hosted a variety of PSM forums. On November 2–3, 2011, the OASD (L&MR) hosted the first PSM Conference at DAU to bring the Service PSMs together in an open forum to discuss the evolving challenges of the PSM in the current fiscal environment, including how to satisfy the goals outlined in the Better Buying Power Initiatives and fulfill the responsibilities outlined in DTM 10-015. The conference focused on policy, guidance, tools, and PSM expectations. In addition, the conference featured two critical workshops on the LCSP and the business case analysis (BCA), which also addressed operations and support (O&S) cost management. The next PSM Conference is scheduled June 5-7, 2012 at DAU and is open to government and industry personnel.

In addition, the Principal Deputy Under Secretary of Defense (AT&L) Sept. 14, 2011 "Document Streamlining—Life Cycle Sustainment Plan (LCSP)" memorandum provided the guidance and outline for development of the LCSP. The LCSP is a "living" document that articulates the product support strategy and evolves through the acquisition milestones and into sustainment. The LCSP is a key for documenting how the PSM will accomplish their myriad responsibilities. The recent LCSP workshop allowed the ODASD(MR) policy team to review the policy and LCSP outline in-depth and to address PSM and Service concerns, issues, and questions. For more information on the LCSP outline, please visit https://acc.dau.mil/lcsp-outline. ODASD(MR) will continue to provide guidance and assistance to the PM and PSM at future conferences, as well as in preparation for major milestone reviews.

As professional logisticians and product support managers know, reflecting on previous achievements can help guide one's future strategies and objectives. Policy, guidance, tools, and open communication forums are in place to assist the PSM in achieving product support and program success. As we move forward with PSM implementation, it is vital to maintain open communication with each other to capitalize on lessons learned and to share knowledge. These communication channels must include the Services, industry, academia and OSD stakeholders.

PSMs, you are the change we seek in the acquisition world. The responsibilities you have are vital to ensuring the DoD not only can deliver but also affordably sustain effective weapon systems. As President John F. Kennedy said, "There are risks and costs to a program of action. But they are far less than the long-range risks and costs of comfortable inaction."

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Professionally Developing World-Class Product Support Managers

Bill Kobren ■ *Doug Killey*

At the risk of sounding overly dramatic, it is not a stretch to say that we are at a pivotal moment when it comes to DoD weapon system product support and life cycle management. Congress and the president have weighed in with the passage of Section 805 of Public Law 111-84. DoD leadership has contriuted with issuance of Directive Type Memorandum 10-015.

The military components have provided their implementing guidance, identified positions, and designated and assigned a product support manager (PSM) to "every ACAT I and ACAT II program…and to former ACAT I/II programs that are post-IOC or no longer have PMs reporting to CAEs." So what's left to do? What's so pivotal?

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We have a once-in-a-generation chance to implement and execute something truly important. We also have a small window of opportunity to get it right. Policy only gets us so far; to achieve the desired outcomes, successful execution of the requirements is, in many respects, more important. And to successfully achieve the desired product support and life cycle outcomes articulated in statute and policy, we must have the right people, with the right skills, provided the right authorities, afforded the right resources, and with the right mix of experience, expertise, leadership, training, and education.

Thresholds and Objectives

Since we're talking about the acquisition realm, let's apply some acquisition terminology to this discussion, starting with the terms "thresholds" and "objectives." Section 805 of Public Law 111-84, along with DoD Directive Type Memorandum (DTM) 10-015 establishes the thresholds—the bare minimum qualifications a product support manager must meet in order to qualify for the position. These include:

- The position of PSM shall be performed by a properly qualified military Service member or full-time employee of the Department of Defense.
- This PSM will be designated as a key leadership position (KLP) for all major defense acquisition programs and major weapon systems and designated a critical acquisition position (CAP) for all other major weapon systems.
- The PSM will be an integral part of the program management team and will report directly to the program manager (PM).
- Incumbents are required to meet all requirements of the position within the prescribed timeframe for CAPs, as stated in DoDI 5000.66.
- In support of the PM's responsibilities enumerated in the DoD Directive 5000.01, the PSM shall be accountable to the PM for product support. This does not prevent the PSM from having a dual reporting relationship to a DoD component logistics, sustainment or materiel command.
- PSM positions for all major weapon systems must be certified at Defense Acquisition Workforce Improvement Act (DAWIA) Level III in the Life Cycle Logistics career field.

As life cycle logisticians with a total of nearly 5 decades in this business, we believe the lawmakers and the policymakers got this one right. They have established the requirement for a position (we have had similar—if less comprehensive—positions all along) with responsibilities (which we should have had in place all along) and authorities (which we needed all along). Is that the end of the story? Not a chance.

Success will come based on the qualities and capabilities of the people, the Services, and the Department assign to these positions, the value they place on the PSM role, as evidenced by not only the formal and informal authorities and resources they grant prospective new PSMs, but indeed on the strength of the imperative to assign only their "best and brightest" to PSM positions.

But what will it take to develop those future superstars? What investment must be made today? This is where the other half of the threshold-objective discussion comes into play. Objectives, as opposed to thresholds, are defined as those highly recommended, highly valued, indeed, highly desired, but not necessarily mandatory requirements. OSD policymakers, when crafting DTM 10-015, recognized the interdisciplinary nature of the PSM position—the fact that product support is broader than traditional logistics—and established vitally important desired objectives for future PSMs, namely that "cross-certification at DAWIA Level II or above in accordance with DoDI 5000.66 in the Program Management, Systems Planning Research Development and Evaluation, or Business-Financial Management career fields should be considered as valued criteria during the selection process." Cross-certification, although not mandatory, was deemed as important and was thus strongly encouraged.

Is that sufficient? Certainly a vitally important first step, but in reality, the answer is "Not by a long shot!" Assuming the former is a given, let's take a few moments to consider what else the Services might consider doing to groom these future superstars.

To successfully achieve the desired product support and life cycle outcomes articulated in statute and policy, we must have the right people, with the right skills, provided the right authorities, afforded the right resources, and with the right mix of experience, expertise, leadership, training, and education.

They must understand how acquisition and sustainment intersect, why life cycle management is so critical, and how to design for supportability from the earliest stages of program development.

It's Better to Start at the Beginning

It starts with a culture of excellence, high expectations, clearly articulated requirements, and a rigorous commitment to human capital professional development. It continues with clearly understood competencies, a lifetime commitment to learning, and an excellent suite of training and tools that are viewed not as mandatory requirements or a "check in the block," but, rather, as opportunities to prepare the workforce and the individual for rigorous expectations yet to come. It includes early identification of future superstars, robust mentorship, preparation, and a detailed career roadmap for the individual, as well as an organizational focus on what it will take to ensure programmatic success potentially years into the future.

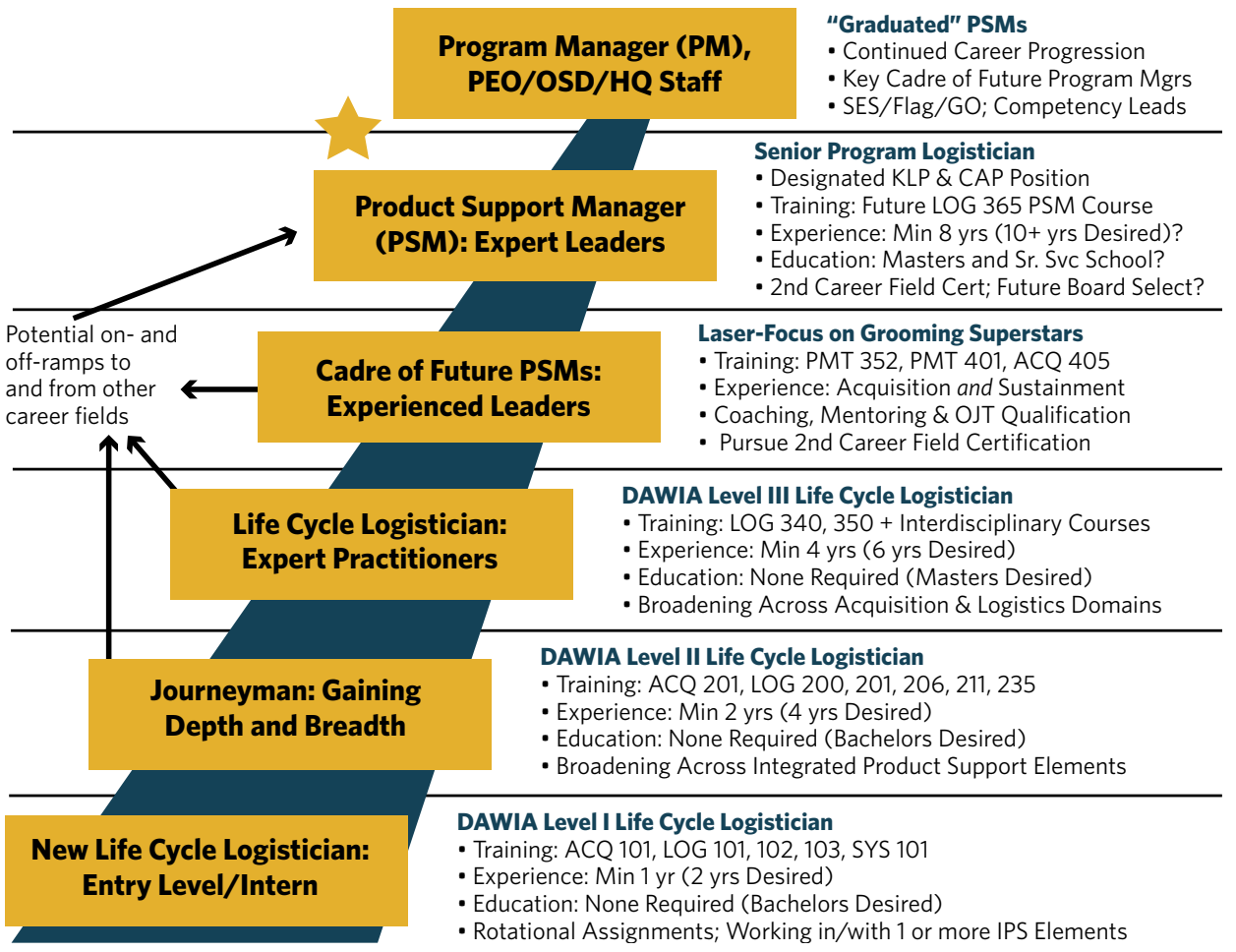
Although there is not yet DoD-wide consensus on specific requirements, we believe that over the longer term, it will also likely entail a formal selection process, such as prescreening, and possible board selection. We also believe the Services should continue to make a major effort to recruit into the life cycle logistics community and professionally develop greater numbers of uniformed military personnel in order to ensure sufficient numbers of highly qualified, well-experienced professionals to join their civilian counterparts in competing for these highly sought-after positions. As individuals, PSMs and future PSMs must methodically establish and cultivate professional and personal credibility as competent life cycle logisticians, acquisition professionals, and strategic thinkers with the interdisciplinary perspective, long-range life cycle management vision, personal integrity, intellect, and motivation to successfully execute this important task.

How would all this be achieved? We can start by building a diverse, innovative workforce that thoroughly understands the political, economic, and programmatic realities in which they are called to operate. They must understand both acquisition and sustainment processes, procedures, and requirements. They must understand how industry operates. They must understand how acquisition and sustainment intersect, why life cycle management is so critical, and how to design for supportability from the earliest stages of program development. Next, organizations at every level must cultivate innovation, initiative, creativity, agility, and responsiveness. Understand what it takes to satisfy key stakeholders and customers. Demand excellence. Establish clearly understood metrics, incentives, and expectations, then hold people accountable, and reward desired outcomes. These revolve around the foundational tenet of affordable readiness, and align rather nicely with the mandatory top-level DoD life cycle sustainment metrics of materiel and operational availability, materiel reliability, operations and support cost, and mean down time. Reduced logistics footprint and measures of supply chain efficiency and effectiveness are probably helpful here as well.

What else? First, seek to encourage young life cycle logisticians to strive to grab the PSM "brass ring." Reward competence when it comes to basic technical skills such as supportability analysis, configuration management, and reliability, availability, and maintainability. Does the PSM or PSM candidate understand the basic requirements and responsibilities of the position? Linking warfighter readiness requirements to key product support outcomes? Developing, validating, documenting, refining, and implementing a life-cycle focused product support strategy? Do they (and their parent organization) maintain a broadly-based integrated acquisition and sustainment perspective? Is there a firm commitment to a tight life cycle logistics, systems engineering, test and evaluation, financial management, and program management alignment? Do they seek to understand how these other functional disciplines operate and what their unique considerations and issues are? Do current and future PSMs "play well with others?" Do they communicate constantly and well—logically and compellingly articulating logistics and product support requirements, but also listening and understanding competing demands when design trades are being made?

If we're serious not only about current PSM success but also future PSM professional development, it is imperative that DoD commit to the following four principles: first, we must build "bench strength"—both in terms of breadth and depth. Second, we must commit to identification, mentoring, and coaching of our successors. Third, we must individually and corporately commit to and foster a culture of continuous lifetime learning, and fourth, we must commit to investing in professional development, no matter how few people we have available, how many pressing priorities there are, or how tight the budget is. We must continuously refine the required competency set for life cycle logisticians and product support managers, and indeed build more granular experience

Figure 1: Notional Product Support Manager Career Pathway



requirements, including perhaps a list of specific tasks and required experiences, rather than simply requiring "X" number of years of life cycle logistics experience in an acquisition and/or sustainment organization.

At the end of the day, human capital professional development is not something intended only for good budgetary times, but is particularly important in austere times. We must each resist the temptation to "eat our seed corn" by focusing only on today's mission without regard to investing in the future. This short-sighted perspective risks leaving our current workforce not only burned-out and frustrated, but ill-suited and unprepared to meet the challenges and demands of tomorrow. Just-in-time training has its place, but in the case of a PSM, anything less than a career's preparation risks being akin to an afterthought.

All well and good from a philosophical perspective, but let's put some "shoe leather" on this discussion. What will it take to prepare and groom these current and future superstars we expect to assume the demands of serving successfully as a world-class product support manager? What can I do?

Set your sights on the position early (or encourage your subordinates and colleagues to do so), and prepare yourself for ascent to that lofty goal. Obtain the necessary life cycle logistics certification requirements and credentials, but don't stop there. Go back and take new or modified classes established after you became certified. In fact, seek to be "fully qualified," rather than simply "fully certified." View 80-hour biennial recertification requirements as a bare-minimum threshold, rather than the ultimate end-state objective. Avail yourself of every continuous learning module and training course identified in the core plus guides of the DAU iCatalog. Begin working on that cross certification into another discipline. Take upper-level courses, such as PMT 352, ACQ 405, and ACQ 450-52. Get a professional certification. Hone your leadership and communications skills. Join Toastmasters. Seek opportunities to career broaden. Move around; look for other programs to develop breadth and depth. Cultivate a network

Resources, Tools, & References

DoD Product Support Policy, Guidance, Training & Tools — https://acc.dau.mil/productsupport

DoD DTM 10-015 — https://acc.dau.mil/CommunityBrowser.aspx?id=443634&lang=en-US

DAU iCatalog — http://icatalog.dau.mil/onlinecatalog/CareerLvl.aspx

PSM Guidebook — https://acc.dau.mil/psm-guidebook

Defense Acquisition Guidebook — https://dag.dau.mil/pages/default.aspx

DAU Continuous Learning Site — http://icatalog.dau.mil/onlinecatalog/tabnavcl.aspx?tab=CLL

Logistics Community of Practice — https://acc.dau.mil/log

PSM Resource Repository — https://acc.dau.mil/psm

PSM Toolkit — https://acc.dau.mil/psmtoolkit

Life Cycle Logistics career field initiatives , events , and policies— https://dap.dau.mil/career/log/blogs/default.aspx

of top-notch professionals and seek feedback, mentorship, and career guidance from them. Lead by example. Support those around you by helping them succeed, and learn in the process. Take calculated risks. Cultivate personal resiliency and a positive mental attitude. View professional setbacks and perceived career stumbles as learning opportunities, grow from them, and resolve never to repeat the same mistakes. If you are working on a program in early acquisition, seek to broaden into a fielded program already in sustainment. Ask yourself what options you might choose to address key programmatic and budgetary issues facing your program's leadership. Recognize that PSMs are, in many respects, program managers—a program manager of product support. And, like a top-notch program manager, the exceptional PSM will be part accountant, part cheerleader and coach, part negotiator who can both empathize and "play hardball," all at the same time, and of course, be a strong leader with both a strategic and tactical perspective. Sufficiency of PSM experience is less a matter of years than of "scar tissue"—that largely indefinable professional maturity that teaches one how to compromise gracefully and how—from a leadership perspective—to be a persuasively assertive team player, having the wisdom to prioritize for the long term, no matter how the short-term crises mount.

As in the education arena where the difference between accumulation of facts, and the ability to synthesize data and turn it into useable information is a critical distinguishing difference between success and failure, so too must a PSM have more than a mere mechanical understanding of the acquisition system. Indeed, the PSM must grasp both the tactical details of the life cycle sustainment plan, in addition to the overarching strategy of the acquisition plan, as well as the minute-by-minute conglomeration of criticalities and trivia in between. Recognize too, that a successful PSM would likely be well suited to serve as a future program manager or even a program executive officer.

Additionally, go above and beyond the career field requirements for education. Consider obtaining a baccalaureate degree—or a master's degree—in a logistics, business, management, or technical field. Pursue completion of a certificate program in systems design and operational effectiveness or similar systems engineering/technical education, business administration, and/or supply chain management—but don't stop there. Consider pursuing joint professional military education (JPME) at institutions such as Industrial College of the Armed Forces (ICAF) or the Service war colleges. Future PSMs must possess a broad strategic perspective. Such rigorous educational pursuits will facilitate such perspective, as well as hone the critical thinking skills necessary to be successful in these important endeavors.

Actually, You CAN Get There From Here

There will likely be as many unique pathways to the PSM pinnacle as there are PSMs, and virtually any variety of leadership and life cycle logistics experience is valid if it accumulates and combines the foundational education and training with successful application in the real world. But given the all-encompassing responsibilities of the product support manager, that extent of capability is derived largely from a steady, conscientious plan developed and executed over time!

Although not officially adopted by DoD, the notional career development roadmap ladder at Figure 1 outlines one possible step-by-step professional development strategy the Services, as well current and future PSMs might want to consider tailoring and adopting as their own. The sidebar offers a list of resources, tools and references useful along the way. While we are not advocating mandatory implementation of this approach, if we are serious about ensuring our future PSMs have the requisite skills required for successful execution of the rigorous requirements of the position, we must ensure we have committed to their professional development well in advance.

That time is now. To achieve the successful acquisition and sustainment outcomes the warfighter, the taxpayer, Congress, DoD, and indeed, our own organizational leadership expects, will take all of us—OSD, Services, individual life cycle logisticians, DAU, our industry counterparts—all working together to ensure we have made the appropriate and requisite investments in the professional development of our current and future product support managers.

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Implementing the Next-Generation Product Support Strategy

Mark Gajda ■ *Basil Gray*

Accumulating budget pressures and ongoing DoD leadership attention has accelerated the need to reduce weapons system life cycle costs and maximize efficiencies across the entire Department. This focus on total life cycle management has created renewed attention to the weapon system support area (now referred to as product support), an area in which DoD spends over $132 billion annually. As a result, the DoD established a cross-functional team of stakeholders from the Services, agencies, industry, and academia, known as the Product Support Assessment Team (PSAT), to drive critical process changes needed to reduce costs and facilitate next generation product support across the entire enterprise. The PSAT reports to a Product Support Executive Council (PSEC), a select group of flag officers and Senior Executive Service (SES) staff, who provide strategic oversight and a resource commitment needed to implement product support changes.

The first phase of the PSAT's efforts culminated with the DoD Weapon Systems Acquisition Reform Product Support Assessment report, signed by the USD(AT&L) in 2009. The report provided an assessment of product support strategies and processes, and provided key recommendations for the next generation product support strategies. The report continues to serve as the foundational guidance for making real changes in the procedures associated with life cycle product support. The PSAT has developed and delivered a majority of the products identified in the 2009 report, with more scheduled to be fielded in 2012. This effort doesn't end there however; the PSAT is also developing a strategic implementation plan to assess product support progress against a set of long term success indicators, to facilitate a continuous improvement process. This article focuses on the PSAT life cycle product support management efforts to drive down costs and provide desired warfighter outcomes through business, governance and human capital improvements.

Product Support: A Life Cycle Management Enabler

A fundamental premise of the total life cycle management approach is the recognition that decisions made in the early program phases have long-term affordability, availability, and supportability ramifications and must be managed accordingly. This total life cycle management view has driven the DoD to see the acquisition and sustainment phases of a weapon system program as dependent on each other, and it has highlighted the importance of product support considerations throughout the entire life cycle. The importance of product support as a life cycle management enabler was reinforced by the 2009 Weapons System Acquisition Reform Act, and more recently, the USD(AT&L) Better Buying Power Initiatives. It

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is widely acknowledged that approximately 70 percent of a weapon system's life cycle costs occur after fielding and during operational use (the life cycle phase known as operations and support [O&S]). However, under a total life cycle management approach, addressing product support requirements up front and concurrent with the design, testing and manufacturing phases allows a greater influence on O&S costs and reduction opportunities.

This transition to the next generation product support framework is facilitated by a systems approach that includes a life cycle sustainment plan (LCSP) that documents how the program manager will use the product support business model to manage the twelve integrated product support (IPS) elements. These elements contain all the support functions required to develop, field, and maintain the readiness and operational capability of a weapon system. The product support manager (PSM) position, formerly the program's lead logistician, has been established and elevated to a key leadership position. The PSM is responsible to the program manager for creating and operating an effective and affordable product support strategy over the entire weapon system's life cycle.

Product Support Assessment: Genesis

Responding to the 2009 *Weapon System Acquisition Reform Product Support Assessment*, DoD initiated a PSA effort with the overarching goals of assessing the health of logistics product support and developing recommendations to enhance efficiencies, remove obstacles, and take an enterprise approach to product support improvement. The WSARA PSAT represented all stakeholders, not just logisticians. The components were represented by functional experts from the requirements, acquisition, and sustainment communities. The team also included members from the OSD comptroller, the Office of Cost Analysis and Program Evaluation (CAPE), industry, and academic institutions.

The assessment highlighted obstacles as well as opportunities to improve product support processes, reduce weapon system total ownership cost and improve overall readiness. The analysis went beyond merely identifying problems and provided an operational strategy to correct the root causes. Specifically, some of the root causes included:

- Requirements generation, acquisition process, and governance structure did not support overarching product support, in terms of overall life cycle.
- Inconsistent, inaccurate, and unavailable data for proper life cycle decision making and contract development (especially in the area of costs).
- Poor integration of various stakeholders creating considerable inefficiencies (to include the defense industrial base).
- Ineffective, or at least inconsistent, business case analysis process.
- No standard business model for product life cycle support.
- No common lexicon, metrics, or methodology for assessing and improving the DoD end-to-end supply chain.
- Inconsistent interpretation and compliance with laws, regulations, and strategic intent.
- Skills, talents, tools, and processes not always aligned for transformational thinking and cultural change.

Product Support Assessment: Implementation

Results and recommendations were documented in the 2009 *Weapon System Acquisition Reform Product Support Assessment*, published by USD(AT&L). The report contained a product support strategic vision and objectives (as shown in Figure 1) and is the foundation for the next generation of product support strategies. The Office of Deputy under Secretary of Defense for Logistics and Materiel Readiness created charters and the PSEC provided members for three integrated product teams (IPTs) to develop the recommended policies, leverage best business practices, and create improvements to existing product support processes.

IPT-1 was focused on the product support business model (PSBM) that defines and improves the business aspects of product support. This team had the following sub-IPTs and primary deliverables:

- Product support business model
- Industrial integration strategy
- Supply chain operational strategy
- Analytical tools

The PSBM is designed to optimize product support by balancing maximum system availability with affordability throughout the weapon system life cycle. It achieves optimization by defining product support roles, relationships, responsibilities, authorities, and accountabilities among the managers, integrators, and providers of product support.

Figure 1. PSAT Strategic Vision/Objectives

Figure 2.
Integrated Product Support Elements

The PSBM is the central nervous system for product support execution as defined by the weapon systems logistics life cycle sustainment plan (LCSP). Integral to the LCSP is the *Product Support Managers Guidebook*, a guide for developing and implementing product support across the system's entire life cycle. Accompanying the *PSM Guidebook* is the *Integrated Product Support (IPS) Element Guidebook*. It describes the IPS elements, which replaced the traditional integrated logistic support elements, and added two additional: sustaining engineering and product support management (Figure 2). Supporting all business decisions associated with product support alternatives is the accompanying *Business Case Analysis (BCA) Guidebook*, which has been developed to assist the PSM in a data-driven, objective BCA process.

The analytical tools effort is focused on identification and consolidation of PSM processes and tools. A survey across the various stakeholders allowed creation of a preferred list of tools for a notional PSM toolbox application. It is scheduled to be available in 2012.

Key to successful product support implementation is consideration and integration of the industrial base and maximizing the efficiency and effectiveness of the supply chain operations. Accelerated industrial integration efforts began with validating the number and types of public-private partnerships in existence and providing product support functions. The next step will identify how to make improvements in these partnering agreements, the development of a depot partnering handbook for depot maintenance, and multiple efforts associated with Title 10 legislative changes and proposals.

A majority of a weapon system's life cycle cost is accounted for in operations and support cost; identifying and optimizing O&S costs needs to be strongly considered—not only in developing the product support strategy, but also in execution. For example, optimizing supply chain operations can have considerable impact on reducing cost and improving weapon system availability. In order to better manage the supply chain, the Deputy Assistant Secretary of Defense–Supply Chain Integration Office has established a joint supply chain architecture (JSCA) that creates a common lexicon and metrics for managing the end-to-end supply chain elements (plan, source, make/maintain, deliver, and return). JSCA enables the assessment of a supply chain's reliability, speed, and efficiency in order to target the best opportunities for improvement. The concept has been used in private industry for decades but was recently proven extremely effective with managing weapon systems in the development or sustainment phases. To supplement the JSCA model, OSD is planning to deliver a supply chain performance assessment capability and other planning guidance in 2012.

IPT-2 was designed to address the governance and decision making process throughout the product life cycle. This team focused on the following:

- Sustainment metrics
- Logistics assessment
- Post initial operations review
- Operations and support costs

One of the first deliverables for this team was a sustainment quad chart to provide product support visibility during the various weapon system acquisition reviews. This sustainment quad chart includes a product support overview, product support schedule, sustainment key performance parameter (KPP)/key system attribute (KSA) information as well as financial resource information (including O&S information). Mandated for use in program integrated process teams, defense acquisition boards, defense acquisition executive summary reviews, etc., since April 2010, the sustainment quad chart has allowed decision makers to gain an understanding of the health of the product support strategy as well as facilitating comparison with any antecedent systems. Currently, refinement of the sustainment metric definitions for different weapon system types and linking the sustainment quad chart to affordability targets/requirements and portfolio reviews has been initiated.

To govern product support effectiveness across the life cycle, two additional processes are under development: the logistic assessment and post–initial operational capability (IOC) review. The *Logistic Assessment Guidebook* provides criteria for evaluating the product support strategy throughout the weapon's life. For those programs that are post–full rate production, the acquisition continuum has no equivalent formal milestone review. However, the PSAT identified this as a shortfall and developed procedures modeled after the post-deployment Navy six-gate review processes. This includes post-IOC triggers (changes in product support strategy, KPP not being met, resource changes, etc.) to initiate a formal review. This post-IOC review really introduces a new type

Addressing product support requirements up front and concurrent with the design, testing and manufacturing phases allows a greater influence on O&S costs and reduction opportunities.

of milestone review. Governance procedures for this review are scheduled to be fully developed in 2012.

O&S costs have been a major emphasis area in 2011. The initial focus is on understanding and standardizing common O&S element nomenclature and definitions, which resulted in the *O&S Cost Glossary*. This is the foundation for an upcoming *O&S Cost Management Guidebook*, to be released in 2012, along with an *O&S Cost Analysis Guide* being developed by the cost analysis program evaluation (CAPE).

IPT-3 addressed the human capital, skills, and tools needed to create and sustain a new product support mentality:

- Establish required product support competencies
- Revise and create new training courses
- Integrate product support considerations into other competency classes

The human capital IPT is critical to the product support transformation because it isn't possible without the right people in the right places. This includes training specific to product support areas, and integrating product support into other competency areas such as program management, systems engineering, and test and evaluation. A lot of advances have resulted from collaborative efforts of the DAU Logistics Center. All PSAT-related human capital efforts have been developed and deployed in an integrated fashion with the product support business model and governance efforts. Efforts have focused on continuous learning module development on a wide variety of product support related topics, rapid deployment training that has emphasized life cycle management and PSM responsibilities, and cross functional training, including life cycle product support and supportability courseware.

In carrying out PSAT tasks, the IPTs and sub-IPTs met individually as required. Each quarter, IPT meetings were conducted to provide development status, integrate related efforts and identify issues. Additionally, IPT progress was reported periodically to the PSEC via quarterly newsletters.

The PSAT spent 2010 developing several product support products and processes. In 2011 the team began fielding and evaluating these products and processes for Service and industry use. Currently, the remaining tasks are being initiated, and ongoing feedback on implementation will be used to adjust direction and inform updates as required. Change and transition will take time, but since many of the ideas and solutions were developed by team representatives, there is less resistance to change and better organizational acceptance across DoD and industry. The success of PSAT will be judged on how the Services, agencies and industry adopt solutions to make a lasting change, manifested as efficiencies gained and achievement of the next generation product support vision.

The DAU Acquisition Community Connection (https://acc.dau.mil/product support) provides a centralized repository for information about product support policy, PSAT generated guidebooks, associated manuals, tools, and training material for further reference.

What's Next

Under the Office of the Deputy Assistant Secretary of Defense-Logistics and Materiel Readiness leadership, DoD has been making changes and enhancing the business of product support. This is in alignment with ongoing changes internal to the acquisition community. In a relatively short time, the PSAT's Service, component, industry, and academia representatives have responded to WSARA-PSA report recommendations and begun implementing the next generation product support strategy in the business model, governance, and human capital areas.

DoD weapon system product support implementation is now at a critical juncture. The first wave of products has been delivered and socialized among the product support community, but this is not the most key measure of success. Rather, these processes must be institutionalized, evaluated and refined over time, to realize the desired outcomes.

More recently, the PSAT's focus has been on designing a capable, enduring approach that lends itself to ongoing continuous improvement. The strategic implementation plan focuses on measurable outcomes and identifies opportunities for the way ahead. It also serves as a framework to measure transition progress from a program centric management approach to a focus on enterprise-wide management. This effort will ensure that DoD reaches its vision to "align and synchronize the operational, acquisition, and sustainment communities to provide affordable warfighter outcomes."

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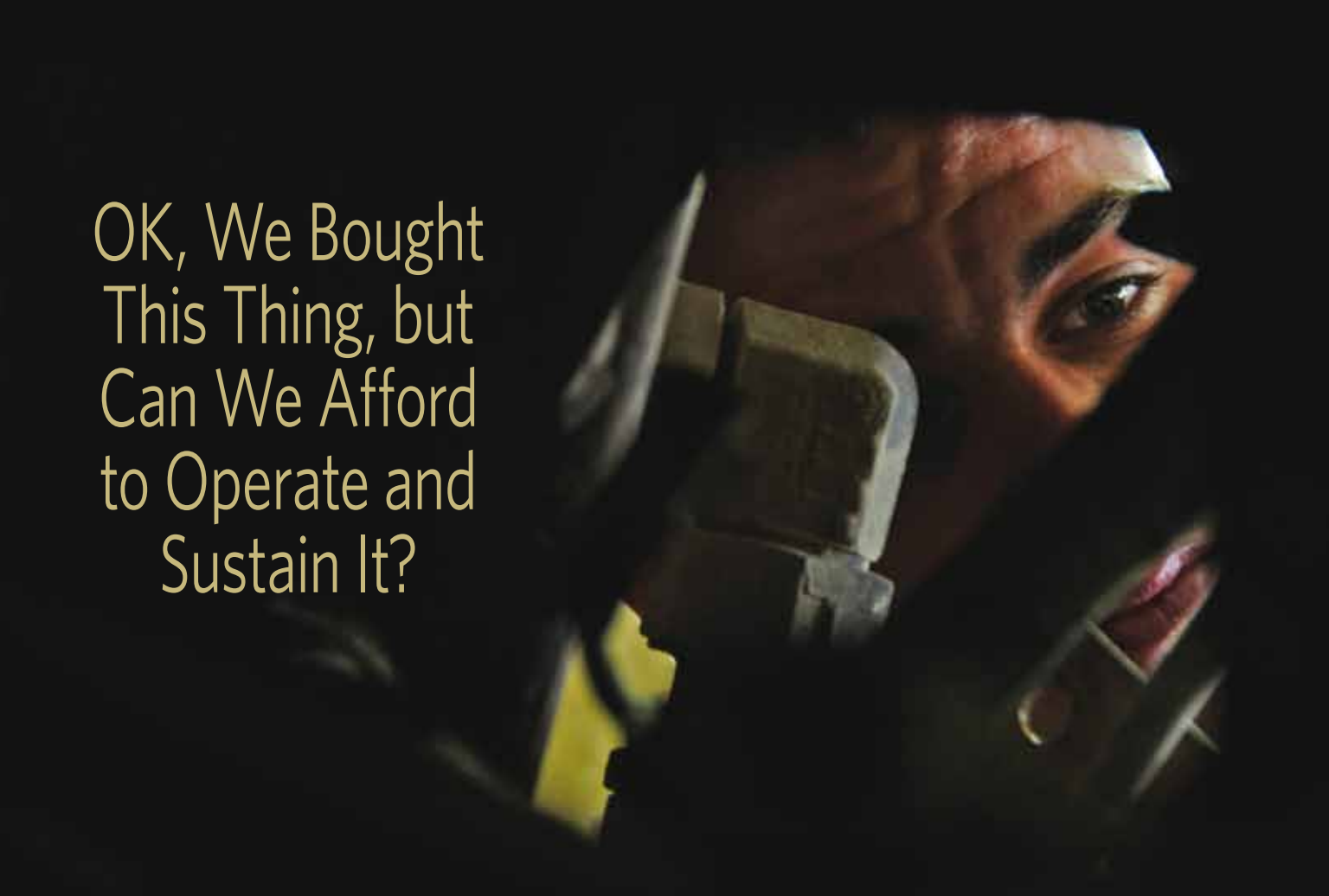
OK, We Bought This Thing, but Can We Afford to Operate and Sustain It?



Mike Taylor ■ *Joseph "Colt" Murphy*

U.S. Air Force photo by Airman 1st Class Tony Ritter

Can affordability of weapon systems acquisitions be achieved without considering operations and support (O&S) costs? The answer is a resounding "No!" With pressures to reduce costs driving DoD's continuous review of programs, business practices, modernization programs, civilian and military personnel levels, overhead costs, and more, leaders at DoD will not only focus on new weapon system procurements, but also the modernization and sustainment of current weapon systems. All DoD programs must strike a balance between requirements and total life cycle costs.

So what do we need to consider regarding the total life cycle costs of a program? And why is it so important?

When you buy a new car, you not only have to worry about the purchase price, but also the costs of any additional warranties, fuel, maintenance (parts and labor), insurance, taxes, cleaning, etc. You have to ask yourself, "Can I

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afford to not only buy a new car, but can I afford to own a new car?" That is, you need to consider the total life cycle costs involved in buying and operating the car.

The Beginning and End of O&S Costs

What are O&S costs? When do they begin, and when do they end? According to the 2007 *Operating and Support Cost Estimating Guide*, published by the Cost Analysis Improvement Group (CAIG), now part of the Cost Assessment and Program Evaluation (CAPE), O&S costs consist of sustainment costs incurred from the initial system deployment through the end of the system operations (operating, maintaining, and supporting). This includes the costs of personnel, equipment supplies, software, and services associated with operating, modifying, maintaining, supplying training and supporting the system in the DoD inventory. This may include interim contractor support when it is outside the scope of the production program and the acquisition baseline. O&S costs include costs directly and indirectly attributable to specific programs—i.e., costs that would not occur if the program did not exist, regardless of funding source or management control.

Although there can be different interpretations of this definition based on the acquisition strategy, O&S costs typically start when the first end-item is delivered to DoD or when the first "operational unit" is delivered. On the other hand, the end of the O&S phase may also be defined as the decommissioning or striking from official inventory records of one end item or an operational unit. Each program should address what defines the beginning and the end of the O&S phase in order to address the many costs that should be budgeted throughout the operational life of the weapon system's program.

Looking for All Costs in All the Wrong Phases

A weapon system's full life cycle is often described by either four major life cycle cost categories or in five phases. The four major cost categories are development, production and deployment, operation and support, and disposal. These terms may be confused with the five phases of the acquisition life cycle. The DODI 5000.02 describes the acquisition cycle phases to include materiel solution analysis, technology development, engineering and manufacturing development (EMD), production and deployment phase, and finally operations and support phase, to include demilitarization and disposal.

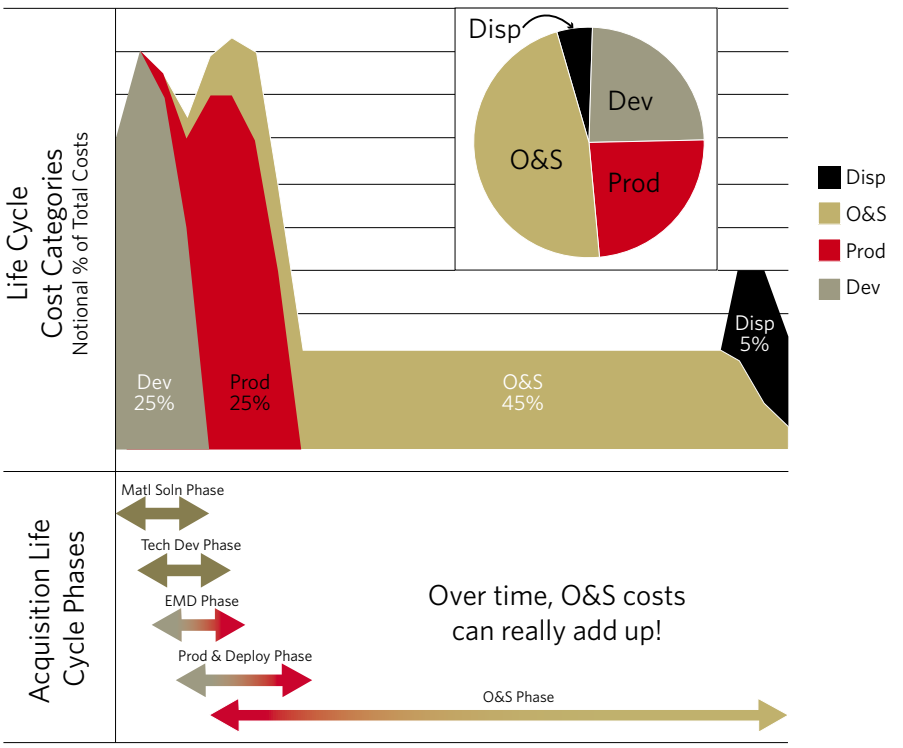
Figure 1 shows the life cycle cost categories and the five phases as modified to reflect the changes as put forth in the DODI 5000.02. Of note, this graphic illustrates that O&S costs tend to be a large part of the life cycle cost. Depending on the type program and how long a program may be in service as well as other factors, O&S costs can reach as high as 60 percent–80 percent of the life cycle costs of a weapon system. With this in mind, we can see that since O&S costs can be a large part of DoD programs, especially if the O&S phase is extended, these costs cannot be ignored in considering a total systems approach to understanding total life cycle costs.

O&S: Not My Job!

DoDI 5000.02 states: "The purpose of the Operations and Support Phase is to execute a support program that meets materiel readiness and operational support performance requirements, and sustains the system in the most cost-effective manner over its total life cycle. Planning for this phase shall begin prior to program initiation and shall be documented in the [life cycle sustainment plan]."

The current Better Buying Power Initiatives' focus is on "should cost" and "affordability as a requirement" early in a program's life cycle before EMD and production. In doing so, these initiatives address affordability by driving design trades and choices based on projected budgets for the product over its life cycle, which, by the way... includes sustainment. This total systems approach is also dictated in the DoD Directive 5000.01 which states that planning for O&S and the estimation of total ownership costs shall begin as early as possible. It is during the design phase that the pressures of weapon systems management prevail to accelerate initial systems procurement, sometimes

Figure 1. Weapon System Life Cycle Cost Categories and Phases



at the expense of product support planning. These pressures to deliver the best performance possible at the optimum schedule and lowest costs are real in any program.

Historically, program offices and by extension, their contractors, are much more focused and incentivized toward design and procurement of weapon systems. Given this focus earlier in the life cycle, funding efforts are often centered on two appropriation categories: research, development, test and evaluation (RDT&E) and procurement (PROC) appropriations. Single-minded focus on these earlier phases and impacts to program appropriation budgets may increase the sustainment costs of the weapon system over its lifetime. Indeed, the force of statute is felt more in procurement costs and the larger category of program acquisition costs with program cost or schedule parameters for not only major defense acquisition programs (MDAPs) but also for acquisition category (ACAT) II and III programs. If specific parameters are not met, then a program breach may require documentation and reporting in selected acquisition reports (SARs), unit cost reports (UCRs), or acquisition program baselines (APBs). So what requirements, if any, should program offices focus on in order to achieve a balanced approach to reduce total ownership costs, and not just development and production costs?

To address a more balanced systems approach to acquisitions, the key system attribute (KSA) of ownership costs is now required for all acquisitions, in accordance with the Joint Capability Integration and Development System, or JCIDS (CJCSM 3170.01). The ownership cost KSA provides balance to the sustainment solution by ensuring that O&S costs are considered in making decisions. Unfortunately, visibility of sustainment costs is often delayed until the O&S phase where sustainment costs add significantly to the weapon system's total ownership costs.

Furthermore, these out-year costs reflect a myriad of decisions from different organizations at different levels, making modeling and predictability a challenge, especially considering increasing complexity of the weapon systems of the future. Additionally, these costs are borne and managed by operational commands and typically funded mainly through non-program office O&M appropriations, bringing to mind the old adage about "other people's money"! Clearly, it is not only a PSM's concern, nor should it be compartmented as an operational commander's or operational logistician's problem. At the risk of overemphasizing the team effort, it remains the PM's responsibility to balance requirements, schedule and costs to reduce total ownership costs throughout the acquisition process.

How Do I Account for O&S Costs?

The cost element structure (CES) on the operation and sustainment of a weapon system is focused into six major categories. The 2007 *Operating and Support Cost Estimating Guide* (*O&S Guidebook*) provides the CES cost elements and the structure required when performing an O&S cost estimate. The CES elements and costs included in each element are as follows:

- **Unit-Level Manpower:** Costs of operators, maintenance and other support manpower assigned to operating units. May include military, civilian or contractor support.
- **Unit Operations:** Costs of unit material (e.g., fuel and training material, unit support services and unit travel. This excludes all maintenance and repair material.
- **Maintenance:** Cost of all maintenance other than maintenance manpower assigned to operating units. May include contractor maintenance.
- **Sustaining Support:** Cost of support activities other than maintenance that can be attributed to a system and are provided by organizations other than operating units.
- **Continuing system improvements:** Cost of hardware and software modifications to keep the system operating and operationally current.
- **Indirect Support:** Costs of support activities that provide general services that cannot be directly attributed to a system. Indirect support is generally provided by centrally managed activities that provide a wide range of activities.

A simple way of thinking of the CES structure is to ask, "What are the costs associated with operating and sustaining a weapon system?" Often these costs are more difficult to define, scope, and project than most program offices first realize. To help, the *O&S Guidebook* also details other considerations in life cycle costs, O&S cost information, and more information on the O&S cost estimating process, procedures, and sample formats.

We now need to account for O&S costs. This is where many people get confused on categorizing O&S costs—especially with respect to appropriation categories or in more detailed terms, program elements (PEs). It is a common mistake to say that only the O&M appropriation is used in O&S cost estimates. It is impractical to list all the possibilities that may arise in determining what appropriation categories should be included in O&S costs; however, there may be several different appropriations involved.

How Can I Ensure I Have Accounted For All Costs?

Many PSMs speak sustainment support in terms of the IPS Elements for supporting programs. These elements can all factor into O&S costs. The 12 IPS elements as outlined in the DoD *Product Support Manager (PSM) Guidebook* are:

- Product Support Management
- Design Interface
- Sustaining Engineering
- Supply Support
- Maintenance Planning and Management
- Package, Handling, Storage and Transportation (PHS&T)
- Technical Data
- Support Equipment
- Training and Training Support

- Manpower and Personnel
- Facilities and Infrastructure
- Computer Resources

On the other hand, many programmers and budgeters speak in terms of appropriations and/or program elements (PEs). They are concerned about ensuring that program offices properly translated the IPS elements or CES elements into the proper budget submission, or PE elements. So the question arises: "How do I ensure I have translated all my requirements into a proper budget to pay for the O&S costs?"

To help logisticians and cost and budget personnel avoid confusion in categorizing IPS elements, cost elements, and budgeting PEs, a new tool called the "Rosetta stone" is being developed by the Office of the Deputy Assistant Secretary for Defense Materiel Readiness (ODASD [MR]) in conjunction with the CAPE and the Office of the Under Secretary of Defense, Comptroller (OUSD[C]). This tool will help PMs, PSMs, cost estimators, budgeters, and programmers, etc., to ensure that O&S costs are captured, properly categorized, and accounted for in their budget submissions. It will provide a cross-walk to help avoid double counting or omissions of costs to a program across IPS elements, cost elements and PEs.

How Are O&S Cost Estimates Reported in Major Defense Acquisition Programs?

Senior DoD leadership uses meetings such as the Defense Acquisition Board (DAB), defense acquisition executive summaries (DAEs) reviews and overarching integrated product teams (OIPTs) to address life cycle sustainment and management decisions. Currently, there are several different charts used to convey O&S costs. First, the Program Funding and Quantities Chart illuminates the resourcing levels of a program within the context of the full program review. Second, the "Sand Charts" show Operation and Maintenance funding requirements in specific Then Year dollars (TY$) for similar portfolio programs. This paints an easy to interpret picture of affordability projections within a mission type or Service portfolio.

Finally, the new "sustainment quad chart," required for ACAT 1D programs, summarizes four areas of a program. (See Figure 2.) As stated by the former under secretary of Defense for acquisition, technology and logistics, "Increasing visibility of sustainment factors is vital to ensuring we deliver a program that meets warfighters' materiel readiness objectives with long-term affordability consideration." With this in mind, the sustainment quad chart addresses these issues. The first quadrant is a narrative of the product support strategy approach, list of challenges, and discussion of solutions to those challenges. The second quadrant contains a collection of sustainment KPPs and KSA metrics: materiel availability; materiel reliability, O&S costs (previously ownership costs), and mean down time. The third quadrant of the chart describes an abbreviated sustainment schedule. Finally, the fourth quadrant reviews the total O&S cost data, baselines, and antecedent system data (when available) using the CAPE's CES structure.

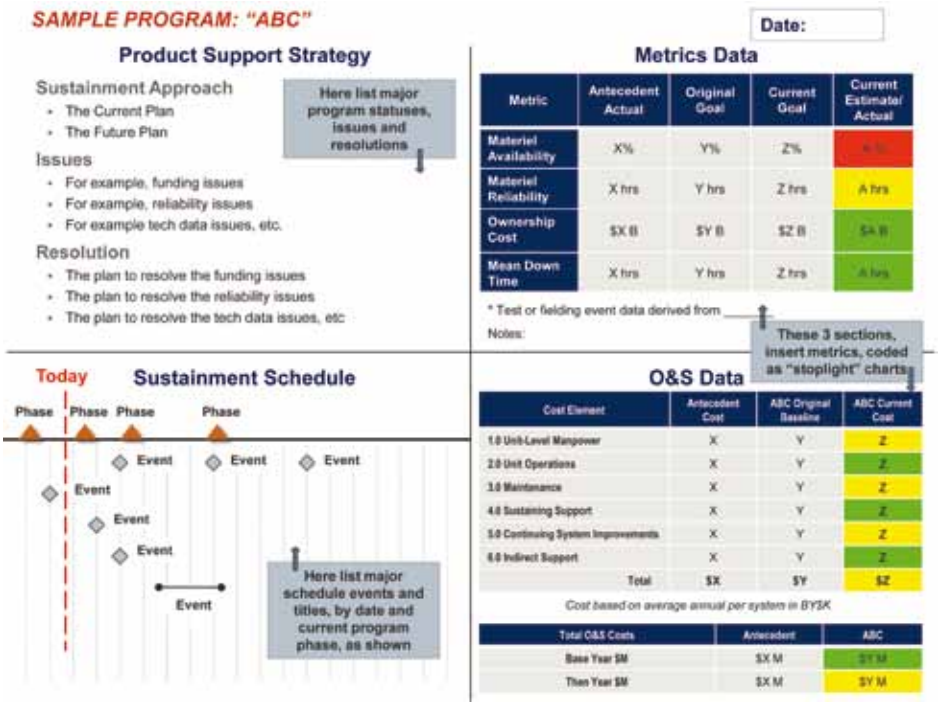
These briefing formats are required for all MDAP presentations to the DAB. These tools are being used and are undergoing further refinement to present O&S cost information to senior managers with the goal of making better decisions in acquisition programs.

Where Can I Go for Help in Performing an O&S Cost Estimate?

First of all, the CAIG (now CAPE) has published the *Operating and Support Cost-Estimating Guide* and is working to publish a new *O&S Guide* in the near future to assist program offices in developing an O&S cost estimate. Additionally, ODASD (M&R) is also developing a new *Operating and Support Cost Management Guidebook* intended to supplement the CAPE's guidebook and to assist program office staff in understanding O&S cost estimating and reporting requirements.

Furthermore, Service cost agencies, program offices, and major command cost departments have personnel experienced in producing O&S cost estimates. Never underesti-

Figure 2. Sample Sustainment Quad Chart



mate the value of asking people with this expertise to assist you. Remember, no one works an issue of this importance or complexity in isolation.

Additionally, there are O&S cost data repositories that collect actual cost and non cost data from the services in vast informational databases that can assist PSMs, cost estimators, etc. in developing a O&S cost estimate. The organizations responsible for this data not only collect data from a many sources, they review and scrub the information for accuracy and provide standard and user-defined formats and reports. O&S data can be obtained from the following three major agencies:

- **U.S. Navy and U.S. Marine Corps:** Visibility and Management of Operating and Support Costs (VAMOSC): http://www.vamosc.navy.mil. VAMOSC help desk e-mail: support@vamosc.navy.mil
- **U.S. Army:** Operating and Support Management Information System (OSMIS): https://www.osmisweb.army.mil. OSMIS help desk e-mail: osmisweb@calibresys.com
- **U.S. Air Force:** Air Force Total Ownership Cost (AFTOC):https://aftoc.hill.af.mil/. AFTOC help desk e-mail: SMXG.AFTOC.helpdesk@hill.af.mil

Another excellent resource is provided by DAU: a 1-week training course on O&S costing analysis (course BCF 215), where students learn the basics of conducting an O&S cost estimate.

O&S Costs are Everybody's Business

Back to our initial question: "Why should I care about O&S costs?" With the promise of budget cuts and accelerating efficiencies to defense programs, DoD will face continuous pressure to reduce development and procurement budget accounts. Additionally, modernization programs as well as sustainment budget accounts will also be impacted. This will present many problems not only for PMs responsible for new programs, but also for operational commanders responsible for sustaining our deployed forces. Numerous Service and materiel support agencies will also be responsible for reducing costs for supporting program offices and operational commanders.

But this is nothing many of us have not seen before. What is new to many of us is that expanding O&S costs garner ever more attention from senior DoD decision makers with regard to the total ownership costs of programs. If weapon systems are not sustainable within DoD budgets, the risks of major delays or cancellations will increase. It is up to the acquisition professionals who develop, procure, and field weapon systems to adopt a total life cycle approach to get the best value for our warfighters on or ahead of schedule and below costs. This urgency will be shared by the many organizations that service and support our weapon systems once they are in the hands of our warfighters. Understanding the requirements is a difficult task, but it is incumbent on all of us to understand the impacts of our decisions on O&S costs.

After all, we bought the thing; it would be nice to drive it a while.

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The Life Cycle Sustainment Plan

A Review of the Annotated Outline

Terry Emmert

In late 2011, the principal deputy under secretary of Defense for acquisition technology and logistics furnished direction on the information content and format for the life cycle sustainment plan (LCSP). Although LCSPs have been in use for some time under a variety of names, this direction was intended to improve the document's utility for all stakeholders in life cycle product support. Several major defense acquisition programs have now been through a variety of milestone decisions using the new LCSP outline. So this is a good time take stock of where we've been and where we're going with the refinement of the LCSP as a stand-alone decision support document and useful tool for programs in product support planning.

Emmert, *branch chief for policy at the Office of the Deputy Assistant Secretary of Defense for Materiel Readiness, has 23 years of experience in logistics and product support in commercial and DoD organizations.*


STREAMLINING

The word 'streamlining' may connote shorter or easier, but in the context of the Task Force's goal it has more to do with improving the relevance of acquisition documents.

The PDUSD(AT&L) chartered an Acquisition Document Streamlining Task Force in 2010, with the following goal:

> "Eliminating non-value added content [from acquisition documents] while simultaneously increasing their value to the preparing organizations and senior decision makers... all of our required documents should be of utility to those directly responsible for planning, managing, and conducting our programs...If the various plans and reports we require adequately serve this purpose, then they should be sufficient for [milestone] reviews."

It is worth clearing up any misconceptions about the term "streamlining." The word may connote shorter or easier, but in the context of the task force's goal, it has more to do with improving the relevance of documentary information. For acquisition documents, information must be relevant in servicing at least two critical needs: those of program manager and those of the milestone decision authority in making the right business decision. Although these needs evolve throughout the acquisition process, they must complement one another for the acquisition process to work. The impetus behind the Streamlining Task Force was to reverse a trend in which programs expended significant effort preparing acquisition documents solely for the purpose of a milestone decision review, only to have those documents fail to support the information needs of the decision maker. So if there are instances in which neither the program nor the decision maker derives value from the production of acquisition documents, that would seem to be an opportunity for improvement.

The task force's approach was to build an initial set of outlines for four critical acquisition documents (the technology development strategy/acquisition strategy, the systems engineering plan, the program protection plan, and the life cycle sustainment plan), that provide specificity in the minimum information required to serve both the needs of program and the decision maker. Additionally, the outlines provide guidance on a format for presenting the information so that it is easily captured and easily consumed. Format is important, because one of the key dynamics with the non-value-added documents was the extensive use of narrative and descriptions, which increased page counts but not necessarily clarity. This is why you'll see in the outlines extensive use of tables, graphs, and lists, with the intent of making the information more easily produced, maintained, and consumed, at the program and decision-maker levels.

The LCSP was among this first group of outlines the Streamlining Task Force produced. While the streamlining effort was focused on efficiency in the acquisition process, a theme emphasized in the USD(AT&L) Better Buying Power initiatives, the LCSP has assumed a much larger purpose in the past 2 years, as the emphasis on affordability has grown. In the current and projected budget environment, an acquisition program's survival depends on its demonstrating, unambiguously, that its plan for sustainment satisfies the warfighter requirements and is affordable for the taxpayer. The LCSP therefore focuses on aligning three dynamics: 1) the needs of the warfighter, 2) what the Service(s) can afford in the context of the portfolio of capability, and 3) the program's strategy and plan for satisfying (1) and (2).

The first area addressed in the outline is the warfighter's requirements, with specific emphasis on sustainment metrics and elaboration on these metrics. This helps the program factor supportability into the system design and the design of the product support package. Product support strategy comes next. This is where the program delineates, at a high level, how it will allocate sustainment functions among organic and commercial providers. Strategy is then refined into plans through the definition of product support arrangements among commercial contracts.

The LCSP outline then addresses the individual product support elements, but only at a review and assessment summary level. What about the detailed implementation plans, you might ask? The task force deliberately constrained this sec-

tion for a couple of reasons. First, implementation plans could be voluminous, introducing a level of detail that at this point in the document would detract from the goal of the aligning the three dynamics discussed above. Second, detailed implementation plans entail a degree of Service specificity, and the task force did not believe that driving a standardized approach supported the two main objectives: providing a program tool first and milestone decision support second. This is not to say that implementation plans don't have a place in the LCSP. The annex section at the end of the outline was included to provide a place for greater detail needed by the specific program or Service.

The outline provides a place to document the statutory and regulatory requirements that impact sustainment planning, but the key here is the alignment among these requirements and the performance requirements of the program. Next in the LCSP is the integrated schedule, which is specifically focused on product support activities and deliverables, and must align with the program's integrated master schedule.

Funding is covered next in the outline. This section is critical in addressing the affordability dimension of the three dynamics. Here is where the program details its sustainment specific funding requirements and assesses any gaps. It goes without saying that the current economic situation will likely turn any discussions of closing gaps with *more* funding into spirited dialogs, to say the least.

The LCSP outline then shifts to the program's management approach, drilling down to the structure, roles and responsibilities of the program's product support organization. This section describes the membership and objectives of the Sustainment IPT. Ideally, the LCSP is not just a product of the Sustainment IPT, but the central management tool used by this team and its leader, the product support manager. Key to the management approach is the program's method for managing sustainment risks, in the context of the overall program risk management process. The final section of the outline addresses supportability analysis from three aspects: design interface, product support package determination, and sustaining engineering.

As mentioned earlier, the content of the LCSP outline was intended to furnish the minimum essential information. Accordingly, the outline provides a section at the end for planning factors and annexes which the PM may need to ensure the tactical utility of the document.

In many cases the task force provided notional information to stimulate the writer's thinking as pen meets paper on a program's initial LCSP. More to the point, the actual data in the document must be relevant and specific to the unique program, if it is to be useful to the program; the notional charts and data in the outline are thus representational, illustrative only.

The LCSP is intended to serve as the nexus of critical thinking among stakeholders, united in the goal of delivering affordable product support. Those stakeholders exist within the program: think in terms of systems engineering, contracting, and financial management. External stakeholders might include such product support providers as depots, DLA, the Service's retail supply system, or industry partners.

Commercial providers may be internal or external depending on where the program is in the contracting process. When a program begins to formulate the RFP for commercial product support services, the LCSP becomes an even more critical tool. The type of contract is guided by the stability of the product design and the maturity of the product support package, which is documented in the LCSP. The performance work statement is guided by the product support strategy, and incentives must support the performance metrics. Again, all captured in the LCSP. A robust LCSP is, in other words, the key tool in documenting and translating product support and sustainment requirements into effective contracts.

Beyond being a good reference that informs RFP development, there are sections from the LCSP that might be good background to include directly in the solicitation, such as the sustainment requirements, the product support strategy or portions of the schedule, although other sections, such as funding data, might not be appropriate. Some portions of the LCSP might be developed by the prime, such as the detailed plan for supportability analysis, or specific product support implementation plans, but always in the context of the overall Life Cycle Sustainment Plan, the development of which is unequivocally a governmental function.

The LCSP Outline can be found at https://acc.dau.mil/lcsp-outline. The Acquisition Community Connection product support website is https://acc.dau.mil/productsupport.

The real measure of success for the deployment of the LCSP is its comprehensive use as a management tool within the program and among the program and its key stakeholders. To be useful in this context, the plan must align requirements, strategy, costs, and affordability. The "win-win" is that this same information is needed for sound acquisition decisions and ultimately the delivery of optimized sustainment outcomes.

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Performance Based Logistics and Project Proof Point

A Study of PBL Effectiveness

John Boyce ■ *Allan Banghart*

There has been much debate recently about performance based logistics (PBL) as a sustainment strategy. Claims about the strengths and weaknesses of PBL have usually been based on emotionally charged anecdotal evidence and opinions, rather than facts.

To address this, the principal deputy assistant secretary of Defense for logistics and materiel readiness chartered a study to perform an independent, fact-based assessment of PBL product support strategies. Called Project Proof Point, the analysis is intended to provide conclusive evidence of the effectiveness and affordability of DoD PBL strategies. A team of subject matter experts

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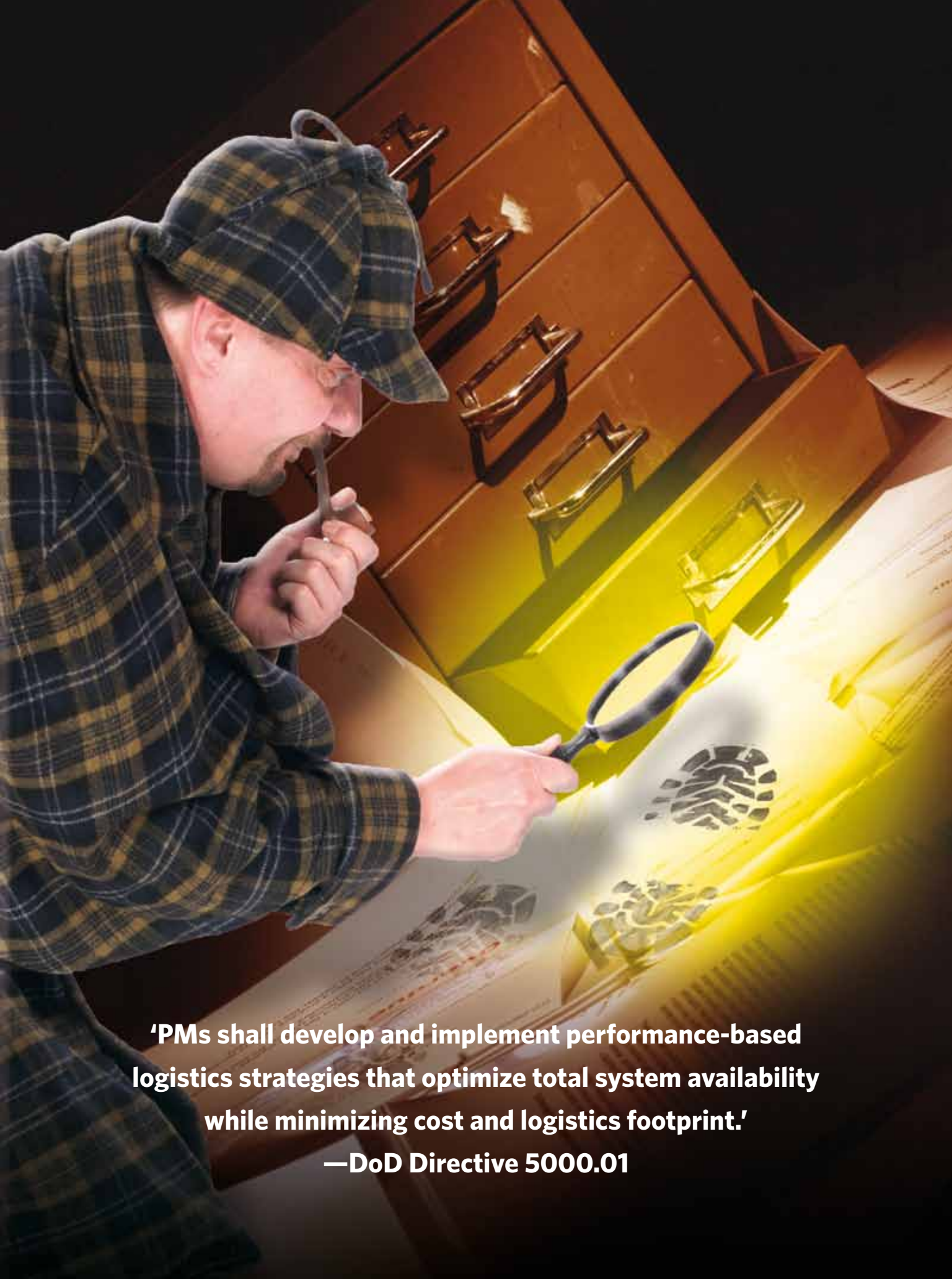


‘PMs shall develop and implement performance-based logistics strategies that optimize total system availability while minimizing cost and logistics footprint.’
—DoD Directive 5000.01

from Deloitte Consulting, Supply Chain Visions, and Auburn University, in conjunction with the Office of the Deputy Assistant Secretary of Defense–Materiel Readiness, began the project in September 2010.

Performance based logistics (PBL), also known as performance based life cycle product support, is an outcome-based support strategy that plans and delivers an integrated, affordable performance solution designed to optimize system readiness. Its original intent was to improve weapon system readiness that had been severely degraded. The 2001 DAU publication *Product Support for the 21st Century* noted, "The emphasis is shifting from the performance of individual stovepipe functions (e.g., procurement; supply; transportation) to harmonizing the functions to improve weapon system readiness." More recently, attention has been on achieving the optimal balance between warfighter readiness and affordability.

It is important to stress that PBL strategies are not synonymous with contractor logistics support (CLS). PBL is about *how* a system is supported and success is measured. The success of the product support strategy is ultimately determined by its ability to meet the key performance parameter (KPP)threshold value for materiel availability and the key system attributes threshold values for materiel reliability, operations and support costs, and other program-specific supportability requirements. CLS is about *who* provides the support (whether it is performance-based or not).

The transition from traditional transactional support to performance based support started with the DoD report to Congress on product support reengineering. The first official use of the term was in the 2001 Quadrennial Defense Review (QDR) followed by the DODD 5000.01 and DODI 5000.02, which require that performance based life cycle product support (PBL) strategies be used. PBL was recognized as the best way to ensure every part of the product support package is connected and contributing to the warfighter's mission capability.

Today there is general agreement that PBL has performed as intended and improved readiness in virtually every application. However, there is a sentiment among some that PBLs are more expensive than transactional alternatives. The Deloitte team's approach to the analysis was to evaluate the following hypothesis: *Sustaining materiel via Performance Based Logistics arrangements delivers improved readiness at reduced life cycle costs.* That is, the cost per unit of performance to DoD is lower when a system, sub-system, or component is maintained via a PBL agreement rather than through traditional, transactional maintenance arrangements. The analysis of the sample data supports this hypothesis.

Methodology

The Proof Point team used a two-tiered, fact-based method to test its hypothesis: Sustaining weapon systems, sub-systems and major components via performance based logistics arrangements delivers improved readiness at reduced life cycle costs when compared to traditional, transactional sustainment arrangements.

Assembly of the F-35 Joint Strike Fighter

First tier: A "middle dive" analysis was conducted on 21 weapon systems, sub-systems, and components representing all military Services and varied contract structures to determine what the preponderance of data and facts revealed regarding the impact of PBLs on performance and the cost to sustain equipment. These analyses employed inductive reasoning to draw generalized conclusions from a finite collection of specific observations. Analyzing 21 of the 89 current PBL programs identified by the Services is a sufficient sample size to support generalizations. The premise of the inductive logical approach is that it indicates probability for the conclusion; that is, it suggests truth but does not ensure it. Specifically it will tell you that cost per unit of performance went up or down but does not prove PBLs caused this outcome.

Second tier, Step I: A "financial deep dive" analysis was conducted on six of the twenty-one weapon systems, sub-systems and components, also representing all military Services and varied contract structures, to tighten the proof gap regarding the impact of PBLs on the cost to sustain equipment. Both a financial accounting approach utilizing the OEM's cost structure and the Service's price structure, and an in-depth analysis of the negotiation process and OEM's investment strategies were used to support a suggested linkage between the Performance Based Logistics Strategy and a change in cost.

Second tier, Step II: A "statistical deep dive" analyses was conducted on 5 of the 21 weapon systems, sub-systems and components, also representing all military Services and varied contract structures, to provide definitive point of proof of the impact of PBLs on the cost to sustain specific equipments. Both an inductive approach and a rigorous statistical approach were used. Materiel demand and availability and cost prediction models with generalized linear modeling approaches were used to support investigations of suggested links between the PBL strategy and changes in cost. Using generalized Poisson regression techniques, the team developed a full model of expected demand and availability as a function of materiel, time, and their interaction. From these models, tests for trends and corresponding estimated effects were produced. The overall cost, based on the average cost, was computed as a function of materiel demand and availability. Statistically significant, conservative estimates for the effect of PBLs on cost and associated confidence intervals were computed and are provided.

Results

PBL tenet adherence among sustainment arrangements selected for Proof Point analyses spanned the spectrum from strong (but none with 100% adherence) to essentially nonexistent. Of the 21 arrangements reviewed, 18 adhered to strategy tenets in some meaningful ways and are considered PBLs. Three of the arrangements did not embrace PBL tenets in any substantive manner. The weaker results uncovered during the analyses of the three (essentially) non-PBL sustainment arrangements tended to bolster the initiative's overarching conclusion noted above. Key findings stratified by level of evidence supporting the conclusions:

Statistical results with a defined level of confidence:

- PBLs can work.
- PBLs have successfully incentivized PBL provider behavior that delivered superior sustainment pricing and performance for systems, sub-systems and components.

Compelling evidence, absent the ability to meet the strictest statistical criteria:

- PBLs do work (when there is substantive program adherence to PBL tenets).
- Well crafted PBL arrangements "manufacture competition" by incentivizing companies to compete against internal waste and quality challenges in order to drive up quality (thereby reducing demand) while simultaneously driving down process, labor and material costs.
- PBL provider behavior is directly linked to the incentives embedded in the arrangement; the military Services set the contractual arrangement.
- Services get the outcomes for which they contract/incentivize.

Preponderance of the evidence:

- Longer-term contracts that provide assured revenue streams and contain well-crafted cost and performance incentives drive predictably positive outcomes for the Services.

The PBL arrangements that were analyzed clearly reduced DoD's costs per unit of performance while simultaneously driving up the absolute levels of system, sub-system and component readiness/availability. (See Figures 1 and 2.)

Due to the proprietary, competition-sensitive nature of the data analyzed, the specifics of the analysis cannot be shared in a public forum. However, an aggregated table of the analysis results is provided in Figure 3. The programs are listed based on an assessment of the programs' PBL maturity.

Of the 21 programs evaluated, 13 began under a non-PBL support strategy, and 12 realized improved operational readiness at a reduced cost, compared with their pre-PBL support. The remaining 8 programs were supported from inception by a PBL

Figure 1. Contract Type

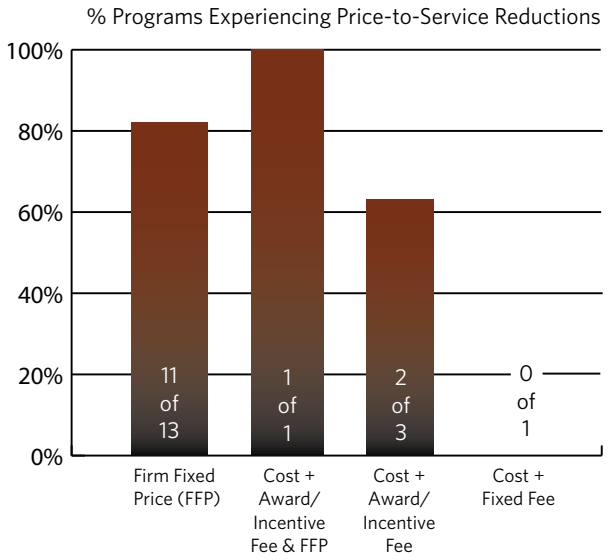
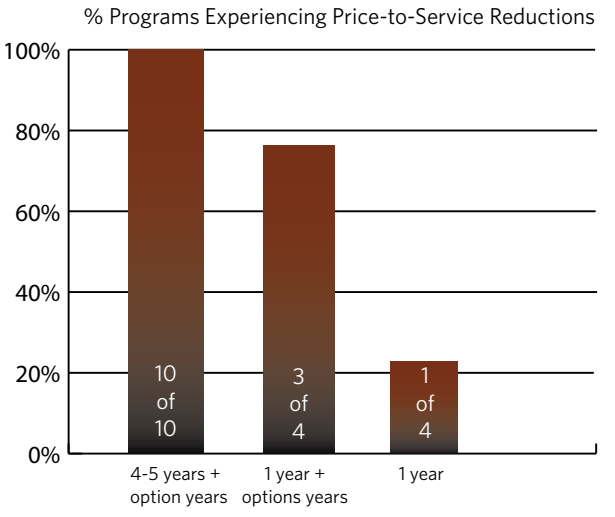


Figure 2. Contract Length



strategy and had no pre-PBL data to evaluate. Even so, 17 programs had improved performance and lowered cost over time.

Conclusions

The study concluded that "PBL arrangements which substantially adhere to generally recognized PBL tenets reduce DoD cost per unit of performance while simultaneously driving up the absolute levels of system, sub-system, and major component readiness/availability when compared to non-PBL arrangements."

It should be stressed that this conclusion holds true independent of individual PBLs' rigid adherence to all the tenets of an ideal PBL arrangement, exhaustive contract oversight, or contract renegotiation. The consistent ability of PBL arrangements to deliver positive cost and performance results with less-than-strict adherence to all tenets suggests the strategy is robust. Any business strategy whose success requires flawless execution is destined for failure in the long run.

Although tasked to perform a quantitative analysis, the Deloitte team was able to capture a number of additional qualitative observations as well:

- PBLs can deliver significant value even with less than perfect implementation.
- PBLs do not necessarily outsource or degrade DoD's organic capability. Many PBLs include public/private partnering and have improved organic capability and increased workload.
- PBLs can work with government providers, but the incentives are more difficult to establish and track.

A few key takeaways for program managers and product support managers alike:

- PBL product support strategies work. In fact, PBL product support strategies deliver both reduced cost of ownership and increased readiness.
- PBL strategies are flexible. They are equally effective regardless of whether applied to system, subsystem, or component level product support.
- PBL strategies are policy. DoD Directive 5000.01, paragraph E1.1.17. directs that "PMs shall develop and implement performance-based logistics strategies that optimize total system availability while minimizing cost and logistics footprint."
- PBL strategies are not synonymous with, nor should they be confused with Contractor Logistics Support (CLS). Successful PBL strategies leverage a best value mix of both public and private sector capabilities.

The Department spends more than $90 billion on sustainment every year. A conservative estimate of savings that could result from broadly transitioning to PBL sustainment across the DoD ranges from 10 percent to 20 percent—*every year.*

Proof Point addressed the cost and performance information gap associated with PBLs. PBL strategy accommodates a wide range of contractual options to address financial flexibility and other concerns. Since military program offices establish and manage the contractual arrangements associated with PBLs, the unanswered question is: "Is the Department willing to forgo 10- to 20-percent savings *every year* in lieu of deploying a robust, performance based life cycle sustainment program across the DoD?" The answer must be a clear and unequivocal no!

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Figure 3. Aggregated Analysis Results

Program	Type	Maturity	Contract Length	Contract Type	Cost	Performance
	Sub-System		5 years	Firm Fixed Price w/ performance incentives		
	Sub-System		5 year, one 3 year & one 2 year options	Firm Fixed Price w/ performance incentives		
	Component		5 year base, two 5 year options	Firm Fixed Price w/ performance incentives		
	Sub-System		5 year base, one 5 year option	Firm Fixed Price w/ performance incentives	▪	▪
	Sub-System		4 years	Firm Fixed Price w/ performance incentives		
	System		5 years	Firm Fixed Price w/ performance incentives		*
	Sub-System		1 year, 9 option years	Firm Fixed Price w/ performance incentives		*
	Component		5 month base, 7 option years	Firm Fixed Price w/ performance incentives		
	System		5 years	Firm Fixed Price Award Fee		
	Sub-System		5 years, one 5 year option	Firm Fixed Price w/ performance incentives		
	System		5 years	Firm Fixed Price w/ performance incentives	Indeterminate	
	System		— yearly	Cost Plus Incentive Fees		
	Sub-System		5 years	Firm Fixed Price		*
	System		6 year base, 6 option years	Cost Plus Award Fee		
	System		1 base year, 7 option years	Fixed Price Award Fee, Cost Plus Incentive Fee		*
	System		5 years, with option years	Firm Fixed Price w/ performance incentives		
	System		1 year base, 7 option years	Fixed Price Incentive Fee		
	System		1 year	Firm Fixed Price w/ performance incentives		
	System		1 year	Cost Plus Incentive Fee/ Cost Plus Award Fee		*
	System		1 year	Not Applicable	Indeterminate	*
	System		1 year	Cost Plus Fixed Fee		*

* No Pre-PBL Support/Performance Exceeding Expectations
▪ Not Validated

Leveraging Better Buying Power to Deliver Better Product Support Outcomes

John Medlin ■ *Jeff Frankston*

How often have you heard the expression that systems are "thrown over the fence" from acquisition to sustainment? Or that systems which transition from acquisition to sustainment often didn't adequately plan for and fund sustainment? As a result of this real or perceived scenario, the under secretary of Defense for acquisition, technology and logistics (USD(AT&L)) has been elevating the prominence of sustainment planning in requirements and acquisition, and instantiating it in policy documentation.

The import of sustainment planning and implementation is also reflected in the Sept. 14, 2010 USD(AT&L) memorandum, *Better Buying Power: Guidance for Obtaining Greater Efficiency and Productivity in Defense Spending*, which requires programs to establish an affordability target for a system's life cycle cost at Milestone A. It specifically states that in addition to a program's acquisition cost, the affordability calculation must include the system's operations and support (O&S) costs.

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The Nov. 3, 2010 USD(AT&L) memo, *Implementation Directive for Better Buying Power—Obtaining Greater Efficiency and Productivity in Defense Spending*, provides implementation detail that is more tactical and establishes the O&S cost baseline to be the "…average annual operating and support cost per unit." This requires a disciplined process to assess the new system's O&S cost for use in the "…quantitative analysis of the program's portfolio or mission area across the life cycle of all products in the portfolio or mission area."

The memo goes on to mandate that for new programs, specific adjustments to portfolio or mission areas will be identified to absorb the new program. This requires strong and detailed communication between the three communities of the DoD Decision Support System—the Joint Capabilities Integration and Requirements System (requirements), the Defense Acquisition System, and the Planning, Programming, Budgeting and Execution System.

For Milestone B, the memo changes the affordability target to an affordability requirement and further illuminates the O&S element; it also requires programs to document the affordability requirement in the Acquisition Decision Memorandum (ADM) and ensures linkage to the O&S cost element of the Acquisition Program Baseline (APB). While some may perceive this as a new requirement, it is not; rather, it builds on existing statutory language in Title X, Section 2435, baseline description, which specifically cites supportability as a parameter to be included in the baseline (e.g., acquisition program baseline). This has also long been reflected in the selected acquisition reports (SAR) within the report's O&S cost section.

Another cited element in the Better Buying Power memos that specifically affects sustainment is open systems architecture and the related acquisition of technical data rights. This is an integral element of the engineering tradeoff analysis that will be completed and presented at a program's Milestone B. A major purpose for the two elements is to ensure the government has the right information to compete future contracts (i.e., design documentation, interfaces, tools and information that can be shared with others). The data rights included in this element are not new, though arguably they may represent a poorly understood area, especially with respect to the sustainment aspects of technical data. Title X, Section 2320, Rights in Technical Data, has been in force for many years and instantiated in various Defense Federal Acquisition Regulation Supplement sections, and is dependent on multiple factors:

- Rights granted to the government depend on the nature of the data (form, fit, function, operations, maintenance, installation, and training)
- The source of funding for the item, process, or computer software (100 percent government, 100 percent private, mixed)
- Whether the government secured data rights through other agreements (cooperative research and development agreements)

Although planning and implementation of technical data rights is not the primary purpose of this article, data rights decisions made during acquisition do have far-reaching implications over the system's life cycle including sustainment activities. Specifically, the Better Buying Power memos require a business case analysis (BCA) that includes "…acquiring technical data rights to ensure sustained consideration of competition in the acquisition of weapon systems." By extension, the information in the initial BCA for technical data rights should inform the sustainment BCA completed to support Milestone B; the sustainment BCA was mandated in the same legislation and subsequent directive type memo that established the product support manager. As programs progress through the acquisition cycle, there exists a deliberate and effective review process that in the year since the BBP memos release, has now grown to include most or all of the major tenets of BBP. This includes the sustainment aspects of BBP which linked directly with ongoing sustainment governance and visibility improvements in the acquisition process.

The integrated process team (IPT) system has been one of the primary beneficiaries of BBP changes. From the lowest-level working IPT (WIPT), through the more senior Integrating IPT (IIPT) and overarching IPT (OIPT), up to the Defense Acquisition Board (DAB), BBP initiatives are now mandatory reporting elements for each program. All programs report on will cost/should cost implementation initiatives. Will cost/should cost is an analytical process that seeks to preclude cost overruns from exceeding the independent cost estimate (will cost) at which the program is funded, by conducting disciplined analysis of all government and contractor cost elements to arrive at a should-cost figure. Portfolio reviews for all systems within a given commodity group are mandatory briefing elements. Presentations on the development and status of affordability targets are now required.

While the primary focus of these particular BBP directives has been in the acquisition realm, there are a number of examples of programs applying them to sustainment, which is becoming the norm for programs coming before IPT or DAB meetings. The OHIO Class ballistic missile submarine replacement program is a prime example. The OHIO Replacement (OR) went through its Milestone A decision in late 2010, following a lengthy analysis of alternatives review. In the procession of meetings leading up to the DAB, it was evident that both the acquisition and sustainment cost projections were becoming unaffordable. The OR program became the first major program to have the BBP initiatives applied to it.

At the OR DAB, the USD(AT&L) cited the Navy's unit costs and O&S costs as too high and unaffordable. Using the new affordability target mandate for Milestone A, USD(AT&L) and the Navy worked to shed additive capabilities beyond the mini-

mum requirements for national security to lower the unit cost. Additionally, the Navy's assumptions on their average annual O&S cost per boat were declared unaffordable, and the Navy committed itself to a target that will match or improve upon current OHIO class O&S costs. Similarly, the littoral combat ship (LCS) program had a hard requirement for annual support costs set at their Milestone B decision in early 2011. These actions were merely the first examples of the enhanced amount of attention that sustainment and sustainment affordability now receive at programmatic reviews.

Another review forum that has seen increased sustainment focus and attention is the Defense Acquisition Executive Summary (DAES) meeting. All major defense acquisition programs (MDAPs) submit quarterly DAES reports, which are also assessed by OSD, and then a review is held monthly on select programs. The DAES process is used by DoD to monitor and assess the health of programs and identify and resolve risks before they become issues. Use of the DAES meeting as a forum for programmatic decision-making has been growing over the last 2 years to the point where DAES meetings have become equal to OIPTs in the amount of detail covered. Sustainment is not lacking for emphasis in this expansion.

Sustainment issues are primarily addressed on the Sustainment Quad Chart (Figure 1). The quad chart, which covers sustainment strategy, schedule, sustainment metrics performance and O&S costs, was mandated for all programmatic reviews in April 2010 by the USD(AT&L). It proved extremely popular in OSD management of sustainment issues, and its use was mandated for all DAES reviews. At the DAES meetings, sustainment performance and overall affordability are considered on par with all other programmatic decision making. Affordability targets/requirements are tracked directly in the O&S cost portion of the quad chart, tying directly into the other mandatory BBP slides in the DAES brief. The product support manager (PSM) needs to be an activist in ensuring the chart reflects the current sustainment picture. It is an opportunity to highlight issues that require resolution or show off where a program has excelled in sustainment.

The acquisition phase has been the primary focus of the other initiatives of BBP. From mandatory reviews of should cost/will cost to portfolio views of similar systems, acquisition costs currently receive most of the attention. This should not be the case. The PSM should be actively seeking to find sustainment savings in a should-cost environment. When the CAPE gives their O&S cost projection in the independent cost estimate (ICE), the PSM should treat this as a challenge to provide the required sustainability at a better cost relative to the ICE. The majority of expenditure for a program will be O&S dollars, so a true affordability focus cannot overlook sustainment costs.

Similarly, a true portfolio view of costs would look at O&S expenditures, not just the acquisition budget. In a period of flat or declining budgets, fielding a new system that costs more than what it replaces is probably not affordable. An excellent example of this type of concern is the Army's cost control efforts on the Ground Combat Vehicle ahead of the Milestone A decision in mid-2011. Emphasis on affordability across the life cycle led the Army to review and agree to an annual support cost per vehicle in consumables and repairables, compared to both what it was replacing, and the total expenditures in their heavy brigade portfolio.

Understanding the overall affordability now leads to better decision-making and a more supportable and affordable capability for the future warfighter. The Sustainment Quad Chart is the PSM's primary tool for highlighting the sustainment elements of a program, but a PSM's role does not end there. Capitalizing on the initiatives in the BBP memos, the PSM needs to understand how they affect their engagement in the program and its review process. While the largest potential savings are in the sustainment phase, an activist PSM should develop and present their program manager alternatives and analyses on the BBP tenets during the acquisition cycle. The current fiscal and political climate is ripe for aggressive promotion of affordability initiatives, with sustainment having an equal seat at the table for the first time.

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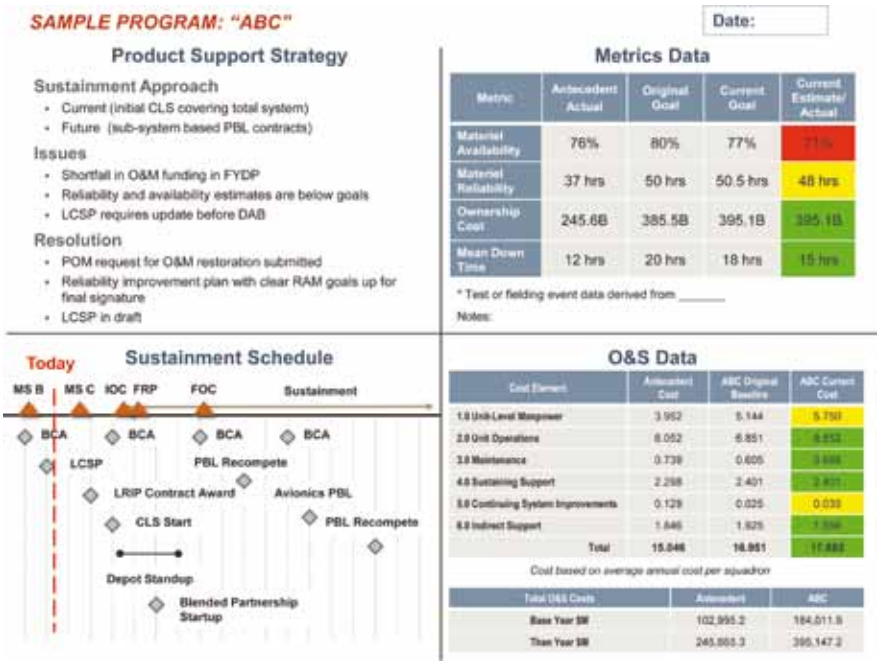
Figure 1. Sample Sustainment Quad Chart



Designing for Supportability

Driving Reliability, Availability, and Maintainability In...

Patrick M. Dallosta ■ *Thomas A. Simcik*

Weapon systems must provide a needed capability, meet user needs as evidenced by operational effectiveness and operational suitability, and must be affordable. While operational effectiveness addresses the degree of mission accomplishment in the intended environment, operational suitability addresses the degree to which a system can be satisfactorily placed in use, given reliability, availability, maintainability (RAM), supportability, and ownership cost, among other factors. These requirements are tested and quantified prior to fielding by the initial operational test and evaluation (IOT&E) process, and assessed against defined criteria. As illustrated in Figure 1, total ownership costs (TOC) incurred during the operations and support (O&S) phase may constitute 65 percent to 80 percent of total life cycle cost (LCC).

How then do we address the problem of high TOC while still meeting the warfighter's requirements? We do so by focusing on the causes of high TOC in both system design (quality) and logistics footprint (quantity). This includes the application of skills and processes in the areas of RAM, supportability, and supportability analysis as part of the revitalized systems engineering processes required by the 2009 Weapon Systems Acquisition Reform Act (WSARA).

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Simcik *is the performance learning director for life cycle management integration at the DAU Center for Logistics and Sustainment.*

...While Driving Costs Out

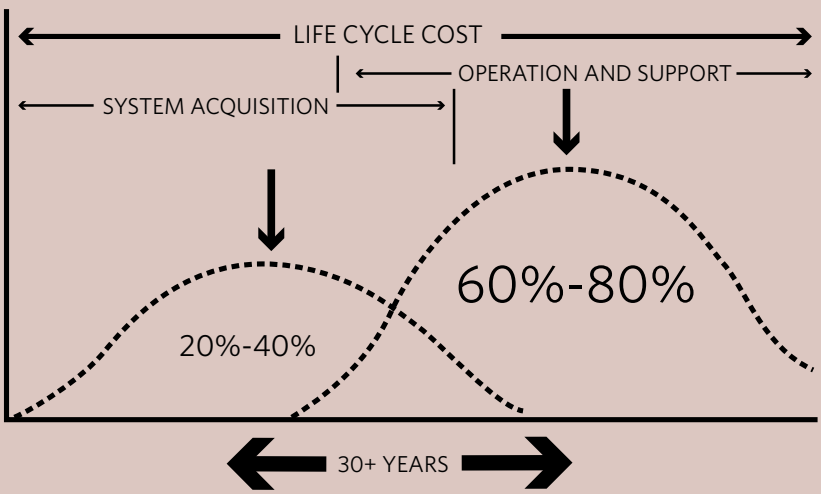
Supportability Analysis Framework

Supportability measures the degree to which a system can be supported both in terms of its inherent design characteristics of reliability and maintainability and the efficacy of the various elements of product support, to include the spare parts, tools, and training required to operate and maintain it.

Supportability analysis is a structured methodology to ensure the system is designed for supportability and the product support elements are identified and available to the user. The affordable system operational effectiveness (ASOE) model addresses the contributions of both system design (quality) and logistics footprint (quantity) to total ownership cost.

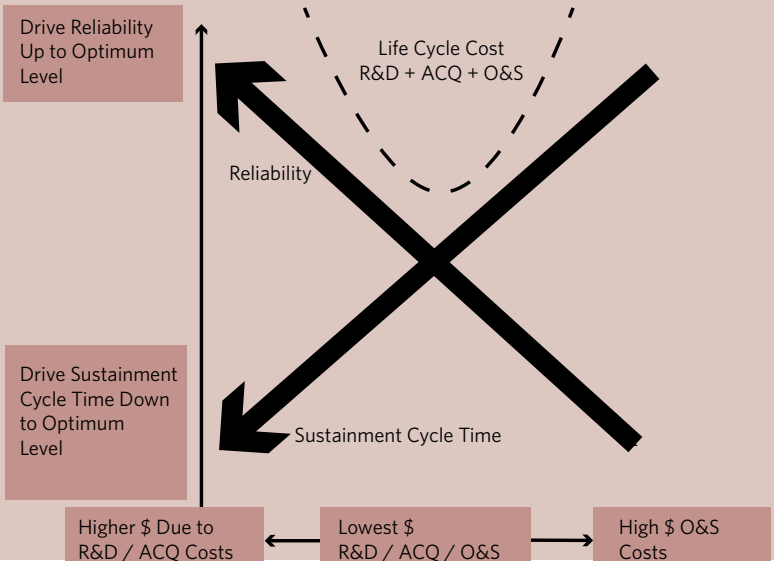
The ASOE model comprises two components. System design for operational effectiveness (SDOE) focuses on the impact of reliability and maintainability as design parameters and their role in meeting operational effectiveness and suitability requirements. The second component, the supply chain model (SCM) focuses on

Figure 1. Life Cycle Cost Distribution



Nominal Life Cycle Cost Distribution

Figure 2. Reliability, Availability, Maintainability—Life Cycle Cost Trade Space



the logistics activities that enable effective sustainment. (A full description is provided in *Designing and Assessing Supportability in DOD Weapon Systems. A Guide to Increased Reliability and Reduced Logistics Footprint*, available at the Acquisition Community Connection website.)

Together, the two models define a RAM/LCC trade space, as illustrated in Figure 2. The trade space bounds the values of reliability and sustainment cycle time to achieve the lowest LCC. The balancing is conducted throughout the life cycle to ensure an optimized solution. While early-phase considerations may exhibit higher R&D and acquisition costs due to the cost of implementing RAM programs, the reduction in O&S costs due to the improved performance and decreased sustainment costs far outweighs implementation costs.

Cumulatively, the models define the supportability and supportability analysis activities conducted collaboratively by the systems engineering and life cycle logistics domains, and provide a powerful and effective means of ensuring life cycle suitability for O&S.

The Supportability Analysis Life Cycle Framework in Figure 3 identifies key supportability analysis activities and their relationships, and serves as the framework for this process. The framework is described in terms of three distinct yet integrated processes.

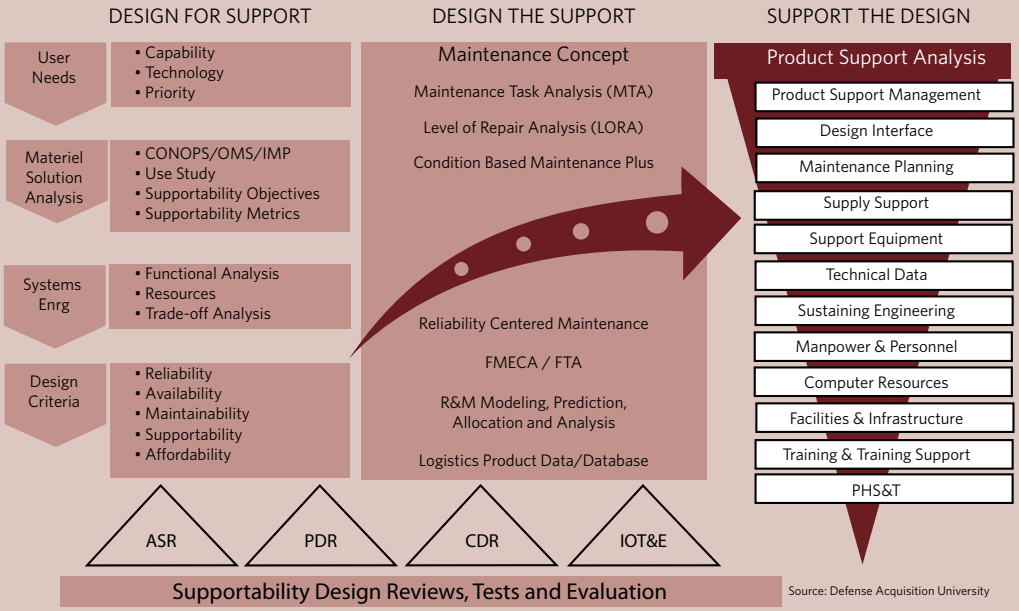
Design for Support

Decisions made up front during the early phases have a profound effect on life cycle cost. As illustrated in Figure 4, design decisions made by Milestone B establish a "cost commitment" of approximately 70 percent of a system's LCC, while actual "cost expended" values are still a small percentage of total expenditures.

"Design for support" activities begin at the earliest life cycle phase when user needs are identified, capabilities defined, and priorities established. During this phase, supportability objectives, their associated metrics, and the initial trade studies are conducted within the systems engineering/life cycle logistics process and result in the preferred system design and sustainment architectures with specific design criteria.

Key to these activities is the development of the maintenance concept, which specifies the levels of maintenance and their capabilities and assigns the preventive and corrective tasks to be accomplished at each level. The maintenance concept provides the construct by which systems engineering/life cycle logistics tasks are conducted. The tasks include reliability and maintainability (R&M) modeling, prediction, allocation and

Figure 3. Supportability Analysis Life Cycle Framework



analysis; failure mode, effects and criticality (FMECA); fault tree analysis (FTA); and condition-based maintenance plus (CBM+), and reliability centered maintenance (RCM).

The output of these tasks is the assessment of the impact of the system's R&M design characteristics on performance and sustainment. Improvements in RAM are achieved by the elimination of single points of failure, improved mean time between failure (MTBF) through the use of redundancy, and the reduction of mean time to repair (MTTR), through the implementation of accessibility, modularity and testability concepts. Overall reductions in maintenance are also achieved by CBM+ and RCM programs that focus on conducting maintenance based on the evidence of need rather than defined schedules.

From both a cost and logistics perspective, the level of repair analysis (LORA) is the most important business decision made in the program office. The LORA uses the detailed maintenance information provided by the maintenance task analysis (MTA), as well as operational factors and economic criteria to allocate the repair/disposal actions throughout the levels of maintenance, and to provide an LCC estimate for use in decision making. The LORA provides the information needed to finalize the maintenance concept as well as initiate maintenance planning activities.

Overall reductions in maintenance are also achieved by CBM+ and RCM programs that focus on conducting maintenance based on the evidence of need rather than defined schedules.

Design the Support

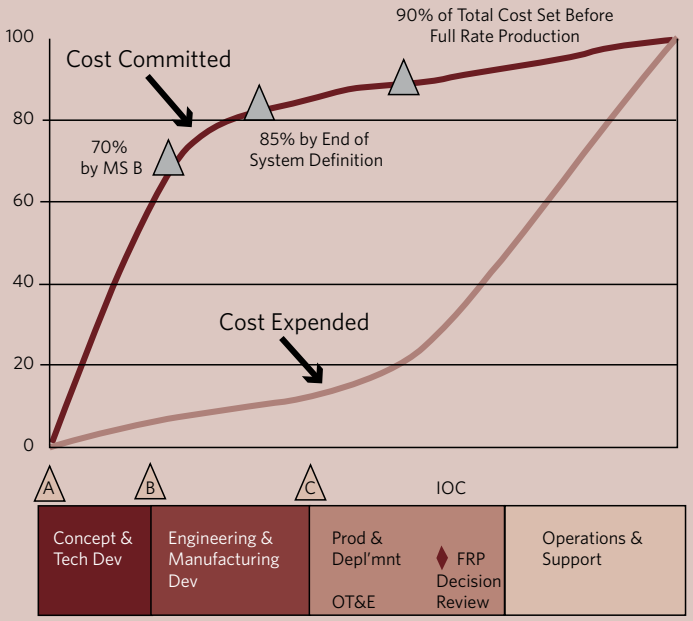
The "design the support" process is based on the output of the design for support process as described previously—i.e., the spares, common, peculiar, and unique tools and discrete and automatic test equipment, facilities, and maintenance training that must be specified and procured. For example, support equipment recommendation data (SERD) is generated as part of the product support analysis (PSA) process to specify measurement requirements and determine if existing equipment can be used or whether new equipment must be designed and procured. A properly tailored product support package, based on the technical requirements of the system, will yield the most affordable and operationally ready capability.

The DoDI 5000.02 acquisition process includes the preliminary design review (PDR) and the critical design review (CDR) to ensure requirements are defined, traceable throughout the design and that governance evaluates the effectiveness of their implementation and the implications on performance, cost, schedule and sustainment. The DoD systems engineering process uses the defense acquisition program support (DAPS) methodology to review the design and ensure supportability metrics are defined, implemented in the design as criteria, and that the design reflects their impact on the system in meeting performance and sustainment requirements.

DAPS provides the tailorable framework for conducting program reviews to assist program managers and DoD decision makers in preparation for milestone decision reviews. The methodology provides a standardized approach to conduct program reviews, and allows for the participation of a broad cadre of subject matter experts.

Chapter 9 of the *Defense Acquisition Guidebook* addresses the developmental test & evaluation (DT&E) and operational test & evaluation (OT&E) processes as the principal methods of ensuring the achievement of user needs as expressed in key performance parameters (KPPs).

Figure 4. Cost Committed vs. Cost Expended Curves



DT&E provides the verification and validation of the systems engineering process and must provide confidence that the system design solution is on track to satisfy the desired capabilities. Rigorous component and sub-system DT&E enables performance capability and reliability improvements to be designed into the system early. DT&E events should advance to robust, system-level and system-of-systems level T&E, to ensure that the system has matured to a point where it can enter production, and ultimately meet operational employment requirements.

OT&E focuses on testing the system in its intended use environment where two primary metrics reign: operational effectiveness and suitability. Operational effectiveness is the overall degree of mission accomplishment of a system when used by representative personnel in the environment planned or expected for operational employment of the system considering organization, doctrine, survivability, tactics, vulnerability, and threat. Operational suitability is the degree to which a system can be satisfactorily placed in field use, with consideration given to reliability, availability, compatibility, transportability, interoperability, wartime usage rates, maintainability, safety, human factors, manpower supportability, logistics supportability, documentation, training requirements, and natural environmental effects and impacts.

From both supportability and supportability analysis perspectives, DT&E and OT&E combine to provide quantitative measurement and qualitative assessment of both performance in terms of reliability and maintainability, and the effectiveness of the product support infrastructure and sustainment resources.

Support the Design

The "support the design" process is implemented through the resources of the Integrated Product Support (IPS) Package, as discussed in Appendix A of the *DoD Product Support Manager Guidebook* and is the ultimate outcome of the supportability analysis process. As shown in Figure 3, the 12 IPS elements are defined as a result of a robust product support analysis and provide the assets required for effective sustainment of the system.

Conclusion

Weapon systems must provide a needed military capability, meet user needs as evidenced by operational effectiveness and operational suitability, and must be affordable. Ensuring affordability starts at the earliest phases of a system's life cycle, where decisions drive acquisition costs and essentially lock in O&S costs. The supportability analysis process provides a tool that can be collaboratively used by the systems engineering and logistics domains to address the impact of the design characteristics of reliability, availability, and maintainability on the system design and the logistics footprint to achieve program outcomes.

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Affordable Logistics: Are We There Yet?

Lou Kratz ■ *Gil Diaz*

Illustrations by Jim Elmore

Ask any parent to name one of the most frustrating aspects of a family journey, and the inevitable answer will be the repetitive question from the back seat, "Are we there yet?" Despite comprehensive route planning and other travel preparations, the ultimate objective is not the travel, but successful arrival at the destination.

The same analogy applies to affordable logistics. We've gassed up the car, planned our route, and are following our planned itinerary. But the road we've traveled is only the means to arrive at the destination—not the end itself.

Over the last 13 years, in consonance with Congress' recognition of the increasing cost of weapon system sustainment, DoD conducted two landmark studies of how to identify and implement more affordable and effective product support. *DoD Weapon System Acquisition Reform Product Support Assessment* was published in November 2009. It concluded that most conclusions from the July 1999 *Product Support for the 21st Century: Report of the Department of Defense (DoD) Product Support Reengineering Implementation Team* remain valid but that clarification of roles and responsibilities within a product support business model (PSBM) framework is needed. This clarification, provided in the 2009 study, will better enable implementation of outcome-based support strategies integrating public-private capabilities through expanded use of partnerships. These findings were endorsed by the under secretary of Defense for acquisition, technology and logistics.

Since that endorsement, the DoD and industry have been cooperatively engaged in strengthening product support processes, practices, governance and workforces. The results of these actions lay the foundation for

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The compelling benefit of PBL vs. traditional transactional sustainment strategies is its ability, when implemented consistent with the PBBM, to achieve win-win results for industry and the DoD customer.

effective and affordable product support based on proven approaches and tangible results. The challenge going forward is to not only implement, but to standardize and institutionalize these practices across the extended DoD enterprise, including industrial partners, in order to meet the DoD mandate of reducing the cost of weapon system sustainment while providing required war-fighter operational readiness across the life cycle.

Product Support Business Model

The key tenets of effective and efficient product support are encompassed in the Product Support Business Model (PSBM), which defines the framework, roles, responsibilities, implementation agreements, and strategy preferences for DoD weapon system sustainment. The noteworthy results of the 2009 *Product Support Assessment* endeavor (and corollary statutory language cited in Section 805 of the 2010 National Defense Authorization Act) include:

- Establishing the role of the product support manager (PSM), a government-only agent responsible for the overall development, validation, implementation, management, integration, and execution of the product support strategy.
- Revalidating the effectiveness of performance-based logistics (PBL) sustainment strategies and their ability to consistently deliver warfighter outcomes at reduced cost.
- Clarifying and endorsing the role of product support integrators (PSIs) as a critical role responsible for delivering performance outcomes through management and integration of product support providers.
- Endorsing the continued use and expansion of public-private partnerships leveraging the best capabilities of the DoD and commercial industrial base.
- Establishing a consistent sustainment governance process institutionalizing a life cycle perspective on affordable and effective product support from acquisition through operations and support.
- Enhancing the focus on workforce development consistent with the responsibilities outlined in the product support business model.
- Emphasizing the competitive selection of product support providers.

Performance-Based Logistics (PBL)

The foundation of the PSBM is the requirement for a performance-based sustainment strategy. PBL, while simple in concept (i.e., delivering outcomes), is more complex in application and merits further explanation and emphasis.

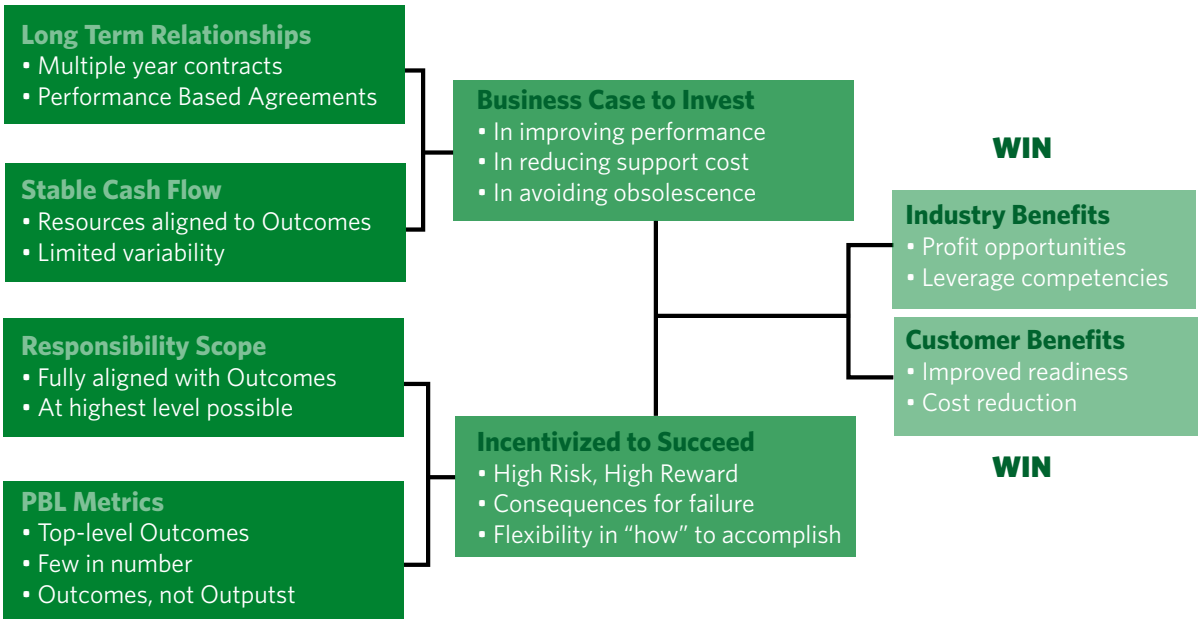
PBL, referred to as both "performance-based life cycle product support" and "performance based logistics" in the *Product Support Assessment*, is DoD's weapon system product support strategy as stated in enclosure 2-8 of DoDI 5000.02, "Operation of the Defense Acquisition System," December 2, 2008: "The PM shall employ effective Performance-Based Life-Cycle Product Support (PBL) planning, development, implementation, and management." The rationale for this requirement is cited later in the same paragraph: "PBL offers the best strategic approach for delivering required life cycle readiness, reliability, and ownership costs. Sources of support may be organic, commercial, or a combination, with the primary focus optimizing customer support, weapon system availability, and reduced ownership costs."

The effectiveness of PBL in providing warfighter outcomes at a reduced cost was further endorsed in the 2011 DoD-sponsored Project Proof Point, an objective, data-driven assessment of outcome-based product support strategies. The study examined 21 major PBL programs with encouraging results, confirming that "PBL arrangements reduce DoD's cost per unit of performance while simultaneously driving the absolute levels of system, sub-system, and component readiness/availability." In the Project Proof Point findings, it was noted that the single most critical factor to PBL success with commercial vendors was "long-term contract business arrangements."

Performance-Based Business Model

The product support business model endorsed the continued use of PBL, clarified the product support strategy framework and its hierarchy of roles, and provided guidance on determining the appropriate mix and partnering relationships of support sources. But it did not completely address the fundamental tenets of the business relationships that enable PBL success—a shortcoming that had been pointed out as early as 2008, when it was noted that the absence of a clearly defined busi-

Figure 1: Performance Based Business Model



ness model and inadequate training was a significant factor in the failure of some managers to implement PBL successfully:

A report of the Acquisition Advisory Panel sums it up best; "When individuals without the proper training and experience attempt to implement a performance-based contract, the results are understandably and expectedly poor...there is trouble consistently implementing it by an inconsistently trained workforce."

Now, with over 13 years of PBL application by DoD, the fundamental tenets of performance-based business arrangements have become evident to the point that a performance-based business model (PBBM) can be described.

The fundamental characteristics of the PBBM are characterized as follows:

- **Long-Term Relationships:** Enable sufficient time for industry to invest in weapon system improvements in reliability, maintainability, and supportability and to receive a return on that investment through financial incentives structured as part of the PBL contract.

- **Stable Cash Flow:** Enabled through fixed price or similar contracts providing confidence in cash flow sufficient to prompt investments as noted to recoup returns on those investments.

- **Responsibility Scope:** Enabled through alignment of industry Product Support Integrator (PSI) responsibilities to deliver contract-specified metric outcomes with oversight, management, and/or performance of those product support functions that drive those outcomes.

- **PBL Metrics:** Enabled through specification of true 'outcome' measures in the PBL contract consistent with warfighter requirements at a level adequate to provide industry flexibility in determining "how" to achieve the outcomes.

The compelling benefit of PBL vs. traditional transactional sustainment strategies is its ability, when implemented consistent with the PBBM, to achieve win-win results for industry and the DoD customer. Structured properly, PBL consistently delivers superior operational readiness at reduced cost to DoD, while enabling industry the opportunity to invest and create improved profit opportunities at no additional cost to the customer, as reflected in Figure 1.

Industry Efforts

The Aerospace Industries Association (AIA) and National Defense Industrial Association (NDIA) member companies actively supported DoD's assessment and implementation efforts to improve long-term product support planning, management, and execution. As DoD's leading industrial partners, our member companies also launched a complementary effort to ensure we remained responsive to DoD requirements. Industry actions are categorized in three broad areas:

- Performance-based partnerships
- Reducing Operations and Support (O&S) costs
- Professional development

Performance-Based Partnerships

The increasing complexity of weapon systems, diminution of the DoD industrial base, and DoD emphasis on leveraging the benefits of commercial processes has resulted in a sustainment model that utilizes the best mix of public and private capabilities. The success of partnering within depot

In the Project Proof Point findings, it was noted that the single most critical factor to PBL success with commercial vendors was 'long-term contract business arrangements.'

maintenance prompted the 2009 *Product Support Assessment* to not only capture and characterize the best practices of depot maintenance partnering, but to call for the expansion of partnering across the spectrum of integrated product support elements (IPSEs). Industry has aggressively responded to this broadened environment, assuming larger roles in supporting, integrating, and facilitating supply support, sustaining engineering, configuration management, information technology, transportation, distribution, and related product support processes to better enable enterprise solutions.

Reducing Operations and Support Costs

A prime example of how a properly structured PBL can improve performance while reducing O&S cost is the Navy H-60 Tip-to-Tail Program, encompassing supply management and depot maintenance (via partnerships) for the Navy H-60 helicopter fleet. The primary performance metric is fill rate with a contract metric of 80 percent. Over the life of the PBL contract, fill rate has averaged 88 percent, exceeding the customer requirement. Prior to awarding the contract in January 2004, the Navy conducted a business case analysis, the results of which reflected that industry could accomplish sustainment for approximately 6 percent less cost than organic support over the planned 5-year contract term period while committing to deliver higher levels of performance. The Navy implemented the contract at the lower industry cost in a fixed-price contract for the period 2004 to 2009. During that period, industry achieved additional reductions in O&S cost through investments, which served as the basis for negotiation of the follow-on contract. The follow-on contract, signed in late 2010, included an additional price reduction negotiated by the Navy. The end result is that the Navy is paying significantly less per unit of operation for the covered H-60 components 8 years after entering into the PBL contract support arrangement and receiving improving, rather than declining, performance and readiness.

Professional Development

Finally, industry has initiated an ongoing effort to realign its workforce composition and business strategies through product support and systems engineering professional development activities to emphasize life cycle systems engineering and affordability as a design requirement consistent with the PSBM.

The positive foundation laid by the November 2009 *Product Support Assessment*, the quantitative validation of the efficacy of PBL strategies by Project Proof Point, and documentation of the PSBM and the PBBM clearly have moved us much further along the road to our destination of affordable logistics. But the answer to the question "Are we there yet?" is "Close, but we have a little more road to travel." Let's examine the remaining few miles as we close on our destination.

Next Steps

We have clearly recognized affordable sustainment as a priority, conducted research necessary to define and validate the appropriate PSBM and business arrangements that will achieve that objective, and documented the policy and guidance necessary to assure consistent implementation of same. But there remain a few challenges to negotiating the remainder of the route to our desired end state.

PBL, while fully recognized in policy and supported by in-depth quantitative research and real-world success as the most effective and affordable product support strategy, encompasses less than 20 percent of DoD weapon system sustainment, as noted in the 2009 *Product Support Assessment*. Extension of performance-based sustainment to the remaining 80 percent of DoD product support could reduce sustainment costs by an estimated $16 billion to $21 billion per year, according to the AIA publication *Modernizing Defense Logistics*.

PBL implementation, as validated by Project Proof Point, must be accomplished using long-term business arrangements as much as possible. Project Proof Point findings support no less than 3-year base periods, with preference for the 5-year statutory limit base period, with 5-year follow-on option periods as necessary to incentivize industry investment in reliability, maintainability, and supportability. Contracts would be recompeted at the end of the base period if incumbent performance is lacking, or at the end of the 10-year effort. Recognize that more frequent competition does not necessarily translate to cost reduction. Longer-term contracts provide industry with a sufficient planning horizon to invest in cost reduction initiatives that can translate to customer savings in follow-on contracts while retaining predictable competition points. The Defense Logistics Agency (DLA) is very successful with this model for commodity supply chains.

In addition, we should rapidly implement the November 2009 *Product Support Assessment* recommendation to expand partnering beyond depot maintenance to Service supply and engineering organizations, DLA, and the U.S. Transportation Command (USTRANSCOM), enabling true enterprise solutions and leveraging the best-integrated capabilities of the public-private industrial base.

Given that O&S costs make up approximately 70 percent of weapon system life cycle costs, we should make life cycle product support an inherent criterion in DoD solicitations for new acquisitions or competitions for legacy systems. The Missile Defense Agency, recognizing the need to focus on life cycle affordability, revised its ground-based midcourse defense (GMD) RFP to elevate PBL to the No. 1 factor in the technical volume, effectively making sustainment the highest-weighted source selection criterion for the program.

We also need to rapidly implement the November 2009 *Product Support Assessment* revisions to the product support business case analysis process to include full cost accounting of DoD/government costs and explicit consideration of inherent process performance efficiency to achieve true best-value sustainment solutions.

Finally, we must acknowledge that in properly structured outcome-based sustainment strategies, industry profit does not equal higher customer cost. PBL inherently places significant financial risk on industry. That risk is compensated by appropriate business arrangements that provide incentives for industry to reduce cost and create profit at no added cost to the customer and have led to reduced customer cost in follow-on contracts.

Conclusion

It's been a long trip. The kids in the back seat have nodded off, soft music is flowing from the radio, we are clearing the crest of the last hill, and familiar road signs tell us our destination is close. We're not quite there, but we've got enough gas in the tank, and the car is running smoothly. Just beyond the horizon awaits effective and affordable operational readiness for the warfighter that also benefits the taxpayer, the military Services, and the public and private-sector industrial base. We have charted our course well, from accomplishing rigorous analysis to establishing necessary statute, policy, and guidance. Let's hit the accelerator and drive these last few miles together. We still have work to do, but a collaborative approach will assure success. Safe travels!

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The Underappreciated Role of Product Support in Rapid Acquisition

Jim Farmer

Rapid acquisition has been called the "Wild Wild West" of acquisition. Rapid procurements, urgently needed for current operations, tend to violate hard and fast rules of standard defense acquisition. The balanced cost-schedule-performance baseline governs the standard acquisition program, whereas the rapid acquisition paradigm prioritizes schedule and accepts greater program risk. The life cycle framework of the Defense Acquisition System (DAS), as outlined by DoD 5000 series policy, ensures that sustainment considerations are integrated into weapons system requirements and design, so that DoD acquires systems that are supportable and affordable throughout the life cycle. In rapid acquisition, however, the

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emphasis is on speed and capability rather than life cycle efficiencies and integrated approaches. Nevertheless, certain key elements of sustainment must be seamlessly delivered with rapidly fielded equipment or the warfighter will not be able to use it immediately and effectively. This article highlights the critical role of the life cycle logistician in helping meet emerging warfighter needs within the rapid acquisition process.

Rapid Acquisition Vs. Standard Acquisition

Rapid acquisition in this context is defined as the procurement of critical military capabilities in support of current operations, where those capabilities cannot be provided through standard "traditional" acquisition. This definition implies three general conditions. First, the warfighter has a crucial capability need in support of current operations. This capability gap is often due to the enemy having adapted or evolved their tactics, or the emergence of a new threat that must be countered. Secondly, a technological response or similarly appropriate solution is available. Third, standard acquisition (such as the DAS) cannot provide a timely solution to support current operations. For example, improvised explosive devices (IEDs) are a weapon of choice for enemy combatants in Afghanistan. Counter-IED capability immediately became a critical need and was acquired in various forms, ranging from the mine resistant ambush protected (MRAP) family of vehicles to detection systems and protective clothing.

The traditional DAS is designed to produce a highly integrated, highly effective, cost-efficient solution to an enduring military capability need, and sustain the solution over several decades. The broad scope of statutory and regulatory requirements, the push for transformational capabilities and the complexity of new systems often make the standard acquisition process lengthy. It can take as long as 12 to 25 years to move from concept to initial operational capability (IOC). In contrast, the rapid acquisition paradigm is intended to provide a "75-percent solution" within 2 to 24 months. The "75-percent solution" may sacrifice affordability, interoperability, and operational suitability in order to field an effective capability more quickly.

As a result, the life cycle logistician is often forced to plan and execute support for systems that would not be deemed suitable in a program of record (POR) environment. In fact, sustainment is generally not considered in the documented requirement. Nevertheless, the life cycle logistician is vitally important. In the reactive world of rapid acquisition, the logistician must never waiver from his proactive stance, yet must be agile enough to tailor his thinking to the near-term needs of the warfighter.

The Logistician's Priorities in Rapid Acquisition

The first thing the life cycle logistician must realize when supporting a rapid acquisition program is that there are no product support or sustainment mandates to drive organizational effort; his or her influence on sustainment planning and execution will be to enable the warfighter to use equipment sooner and more effectively. Some sustainment planning and logistics activities of traditional acquisition are not relevant because of the short life cycle or small number of end items. The priority is to ensure immediate product support is provided in the right place and at the right time. The second consideration is to ensure funding and processes are in place to maintain continuity of operations and support. Efficiency is a third consideration—one that is easily overlooked with the availability of supplemental funds.

The tenets of rapid acquisition sustainment underscore the priorities of the logistician when directly supporting a rapid procurement; the logistician's activities and decisions

- Must support the delivery schedule
- Must support or enhance delivered capability
- Should be prioritized by
  - —Delivery of operational capability to the need
  - —Delivery of sustained capability
  - —Delivery of cost-efficient product support

In order to be operational, the equipment must be delivered to the right place, with timely and effective training, operating facilities and initial supply support. Sustained capability requires basic logistics such as spares, maintenance manpower, operating and maintenance facilities, and basic maintenance processes. After basic product support is in place, the logistician should look at supportability and overall cost-efficiency. The life cycle logistician (and the program manager) should plan for "catastrophic success." The demand for an item may suddenly and exponentially increase if the demonstration of capability is successful, regardless of the O&S cost burden. But costly sustainment and a large footprint will diminish the utility of a rapidly fielded capability and may ultimately prevent a system or capability from transitioning to a Program of Record.

The Impact of the Logistician

The life cycle logistician will ensure that rapid acquisition sponsors incorporate the twelve integrated product support (IPS) elements. (See the Acquisition Community Connection IPS home page for a discussion of the 12 IPS elements.) However, when sustainment integration is not accomplished, the impact to the warfighter is immediately apparent in 7 areas of product support: delivery, training, manpower, facilities, maintenance planning, supply support and life cycle management.

Delivery to the right place in theater without delays can be a challenge. Initial transportation may not be well coordinated if the product manager does not have appropriate logistics expertise on staff. Some acquisition leads may employ a "fire and forget" acquisition process that procures and ships equipment but provides no coordination to ensure delivery. The logistician identifies and coordinates special transportation requirements, making use of military, commercial and self-deploy modes of transport, and confirms positive receipt of equipment by intended users. The life cycle logistician is most

valuable when he is able to proactively identify transportability problems and offer early solutions.

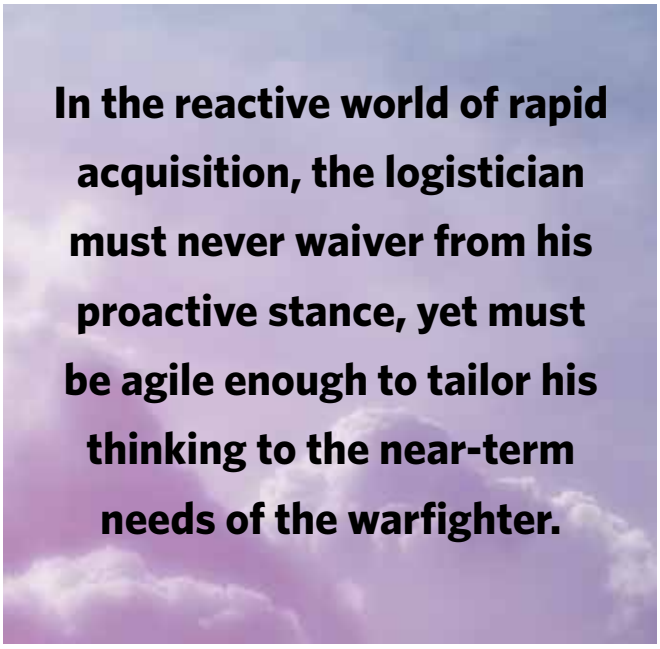
Immediate utility of delivered equipment is enabled by timely and effective training. This requires coordination of resources, end items and facilities for training, and a certain amount of technical data. Training must be prepared in advance of delivery. To illustrate the impact of training, consider a survivability upgrade to a weapon system. Proper use of survivability enhancements reduces combat casualties, whereas improper use negates the benefit and may cause additional, unforeseen issues. In other words, a life-saving system delivered without proper training and support is clearly not as effective. An urgently needed life-saving capability deserves full attention to training and continuity of sustainment.

Maintenance, manpower requirements, facilities and supply support must be implemented and coordinated so that the warfighter can continue to use the equipment after initial delivery. The logistician must determine the maintenance approach and repair strategy. Even though contractor logistics support (CLS) is widely used, the unit personnel must still be able to identify failed equipment, remove and replace if needed, and properly disposition a failed item. Absent maintenance planning, end users will not be able to process retrograde actions. Other times, failed items may be deprioritized for transport. The potential result is an "iron mountain" of failed parts that fills up storage facilities and further strains production lines to replace failed items rather than simply repair them. The logistician can monitor the equipment reliability and coordinate the retrograde of depot returns and failed items. This coordination may be underappreciated but is of tremendous benefit to the warfighter.

Special test equipment, support equipment, tooling and facilities requirements must be identified early because extensive coordination and lead time may be necessary. Some systems may need support from "contractors on the battlefield," requiring ancillary synchronization to ensure adequate housing, force protection and basic quality of life.

A good example of the importance of early sustainment planning comes from the area of animal handling. Any type of animal, such as military working dogs, requires specific facilities, special transportation and handling, trained personnel, special food (supply support) and many other unique support considerations. Poor sustainment planning will delay use and could result in loss of the animals. Emphasis on schedule and accelerated delivery vice logistics considerations increases the possibility this type of disconnect might occur. The acquisition lead and program manager must ensure rapid acquisition initiatives receive appropriate life cycle logistics support and may need to look outside their organization for sustainment expertise.

Typically, the acquisition lead includes training, training assets, spares and contractor logistics support as deliverables on the procurement contract, unless organic support is already available because of similarity to a fielded system. But this does not always happen. Consider the MRAP, for example, which has myriad configurations. Configuration management and technical data had to be rectified post-fielding at significant expense, and some technical data was permanently lost. This makes maintenance more difficult, creates supply chain inefficiencies and increases logistics footprint. Earlier influence from a corps of life cycle logisticians might have lessened the sustainment burden of current MRAPs.



Life Cycle Management in Rapid Acquisition

Life cycle planning ties together the elements of rapid acquisition sustainment. Managing the life cycle of a rapid acquisition solution is quite different from standard acquisition because the acquisition timeline and period of sustainment are compressed. The life cycle of a rapid acquisition solution may be only 2 to 6 years. Initial systems may or may not be evaluated formally by an operational tester, and suitability is deemphasized. (DoD 5000 series is being updated to include a rapid acquisition instruction that will better define general assessment and sustainment requirements.)

During its short life span, a system may be used by different Services and for varying missions. The scope of how many systems must be sustained and for how long is constantly in flux. The acquisition sponsor may not fund sustainment or may only partially fund it, expecting one of the Services or combatant commands to pick up the tab after fielding. Changes in ownership—much more common with Joint Urgent Operational Needs (JUONs) acquisitions because they are joint, with requirements not originating in a single Service—create potential funding gaps for sustainment.

Moreover, the Planning, Programming, Budgeting, Execution System (PPBES) doles out funds with almost a 2-year lead

time (a 1-year lead time for supplemental funds). For example, a sponsor might provide a year of sustainment funding in addition to procurement funds to support its fielded solutions. While this should provide O&M funding continuity, product support funding runs out in the middle of the next fiscal year. The Service or sponsor might not be able to fund the remainder of that year and has nothing budgeted for the next year for procurement or O&M, creating a funding shortfall that may require emergency reprogramming action to continue operations. To avoid funding hiccups, the program manager and sponsor should map out the sustainment funding and execution responsibility for the anticipated life cycle of the system.

Ultimately, the life cycle logistician should be thinking long-term as a system begins to demonstrate its effectiveness in current operations. The prospect looms that irregular warfare will increasingly become the norm, and many of the capabilities provided by non-program of record, rapidly fielded systems in use today will be needed as an enduring part of our military capability. The reality is that less than 20 percent of rapid acquisition capabilities transition to programs of record, although this number may increase as supplemental funding decreases and programs are forced to transition to the normal budgetary process. Those rapid acquisition programs that transition will need product support manager (PSM) guidance to rein in O&S costs and determine appropriate supportability and sustainment requirements.

Transition to a program of record changes the product support game; now the paradigm moves into cost-efficiencies and long-term sustainment planning. One challenge is that the rapid acquisition process typically fields prototypes, not mature systems. In many cases the best long-term option will be to transition the next generation of a technology to a POR, rather than sustain what we have in the field. The PSM provides key insight into sustainment requirements and O&S cost drivers and has significant impact in shaping the acquisition baseline and requirements of the new program of record.

Conclusion

Rapid acquisition represents significant challenges for product support today and is an area of knowledge and experience that will increasingly be in demand as the DoD continues to drive a shift to a more rapid and agile acquisition paradigm. The day-to-day role of the life cycle logistician within programs continues to evolve. Nowhere is this more true than in the world of rapid acquisition, where the life cycle logistician's role is not always well defined, but nonetheless crucial. What a waste of precious resources it is to rapidly acquire and deliver to the warfighter an item that cannot be used right away because adequate product support was not delivered at the same time. The proactive and agile logistician is underappreciated but vitally important in the success of rapid fielding.

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The Product Support Triad: A Critical Convergence

Terry Johnson ■ *Dave Floyd*

In the "bad old days" of the Cold War, the United States relied on a strategic deterrence "triad:" long-range bombers, land-based intercontinental ballistic missiles (ICBMs), and mobile nuclear submarine-based ballistic missiles. The combination of these deterrents ensured that a viable strategic deterrence was always maintained.

Similarly, effective product support relies on a triad of focused (and carefully chosen) sustainment outcome metrics, effective interaction among the integrated product support (IPS) elements, and appropriately comprehensive governance.

Over the past several years, statute and DoD policy changes have significantly reinforced product support activities and procedures that, while always acknowledged as best practices, have often fallen victim to budget constraints and real-world events. The enhancements facilitated by the 2009 Weapon Systems Acquisition Reform Act (WSARA), OSD policy memoranda, the *Weapon System Acquisition Reform Product Support Assessment*, and

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implementing DoD and Service guidance are not radical; the cumulative effect has been to significantly strengthen the role of life cycle logisticians in weapon systems acquisition and to strongly re-emphasize the need to design for support, design the support, and support the design. In other words, deliver affordable readiness to the warfighter—and "affordable" in this case applies not only to the acquisition of the weapon system itself, but to its sustainment "tail." How does the triad enable these best practices?

Why Are Sustainment Outcome Metrics So Important?

Most acquisition professionals are aware that sustainment outcome metrics are focused on warfighter requirements, principally the availability components as well as materiel reliability, mean down time, and ownership cost. The sustainment key performance parameter (KPP) and key system attributes (KSAs) form the basis for development of performance-based life cycle product support metrics.

It is an article of faith in the life cycle logistics community that emphasis on reliability early in the life cycle will pay substantial supportability (and availability) dividends once a system is operational. Of particular note is the R*eliability, Availability, Maintainability–Cost* (RAM–C) *Rationale Report Manual*. The purpose of this manual is to assist combat developers, program managers, engineers, and life cycle logisticians in designing RAM into systems early in a program affordably, helping reduce overall life cycle costs.

Whether purely organic, purely commercial, or (most likely) a combination of public and private product support arrangements, DoD's clear preference for performance-based product support, articulated in DoD Directive 5000.01 and DoD Instruction 5000.02, dictates a careful selection of life cycle sustainment outcome metrics upon which these arrangements can be based. Great care must be exercised in determining these metrics; they must reflect and support the warfighter's requirements, particularly those contributing to operational availability, while bearing in mind the axiom, "Be careful what you ask for; you may get it."

Why Are integrated product support (IPS) Elements So Important?

The 12 recently established IPS elements, outlined in the April 2011 DoD *Product Support Manager Guidebook* (https://acc.dau.mil/psm-guidebook), serve as a powerful enhancement and update to the traditional ten Integrated Logistics Support (ILS) elements. Why was this done? The two additional elements, product support management and sustaining engineering, reflect the PSM and life cycle logistician's enhanced enterprise roles and responsibilities that transcend the traditional logistics domain.

The PSM, a key leadership position established by Congress in Public Law 111-84, Section 805, needs to be able to interface effectively with senior leaders from other functional domains including program management, contract management, business and financial management, and systems engineering, in order to develop and implement a viable product support strategy. The IPS elements not only address this need by identifying and defining the associated activities of the PSM, but more importantly convey how these activities are to be accomplished. Furthermore, the product support management element in particular provides the framework for the integration of all the other 11 IPS elements so that the product support solution that is delivered to the warfighter is fully integrated and meets the warfighter's needs in terms of readiness, reliability, and affordability.

Sustaining engineering, another of the 12 IPS elements, reflects the full life cycle focus of the PSM and the kinds of design interface activities, including reliability (the ability of a system and its parts to perform its mission without failure under a prescribed set of circumstances), availability (the degree to which an item is in an operable state and can be committed at the start of a mission at a random point in time), maintainability (the ability of an item to be retained in, or restored to, a specified condition), supportability (includes design, technical support data, and maintenance procedures to facilitate detection, isolation and timely repair or replacement of system anomalies), and affordability (the degree to which the life-cycle cost of an acquisition program is in consonance

Sustainment Metrics Definitions

Availability KPP: Mandatory for ACAT I; sponsor decision for ACAT II/III. Two components:

- **Materiel Availability:** Percentage of the total inventory of a system operationally capable of performing an assigned mission at a given time (Number of Operational End Items/Total Population)
- **Operational Availability:** Percentage of time a system or group of systems within a unit are operationally capable of performing an assigned mission (Uptime/(Uptime + Downtime))

Mandatory KSAs:

- **Materiel Reliability KSA:** Probability that system will perform without failure over a specified interval. MTBF = (Total Operating Hours/Total # of Failures)
- **Ownership Cost KSA:** Based on Cost Analysis Improvement Group (CAIG) elements: unit operations, energy/POL, maintenance, sustaining support, continuing system improvements, regardless of funding source (O&S Costs Associated w/ Materiel Readiness)

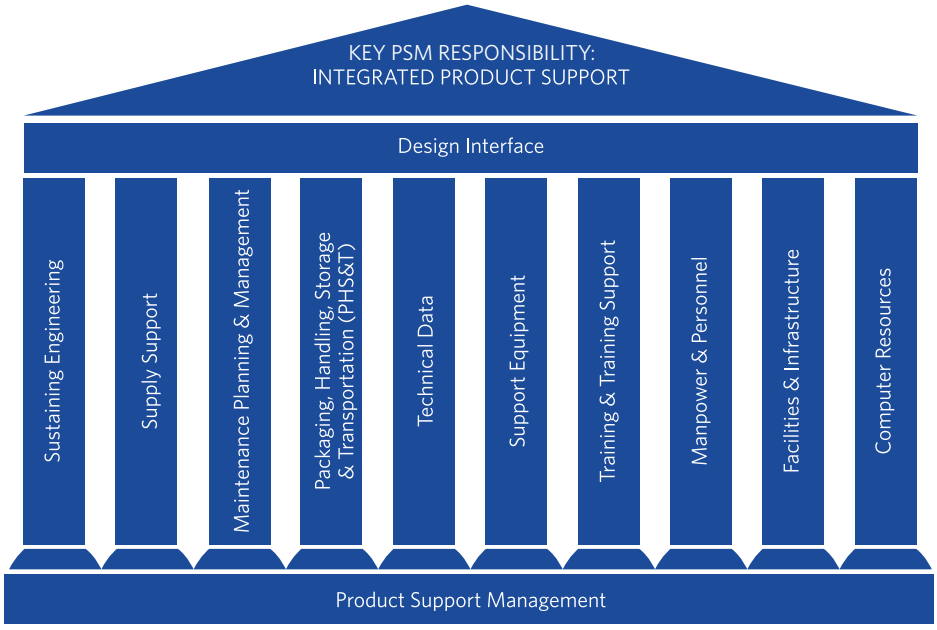
Plus a fourth Sustainment Outcome Metric: Mean Down Time

- A measure of average Total Downtime required to restore an asset to its full operational capabilities. MDT = (Total Down Time for All Failures/Total Number of Failures)

with the long-range investment and force structure plans), which carry over into the operations and support (O&S) phase of the life cycle. Other modifications to the traditional 10 ILS elements include:

- Maintenance planning transitions to maintenance planning and management, to incorporate maintenance management and execution activities along with the maintenance planning activities
- Training and training equipment becomes training and training support, emphasizing the life cycle focus of the training strategy and implementation
- Facilities becomes facilities and infrastructure, highlighting the fact that facilities are more than simply "brick and mortar" buildings
- Computer resources support changes into computer resources, bringing the computer resources support ILS element up to date by providing more focus on the information technology aspects of computer resources.

Figure 1. IPS Element 'Pillars'



To facilitate implementation, execution, and understanding of these 12 elements, the *IPS Element Guidebook*, fielded by DAU in November 2011, provides detailed information about each of the 12 elements and complements Appendix A of the *PSM Guidebook* by providing definitions for each IPS element and sub-element. It also identifies key activities and products for each IPS element and provides a much-needed "how to" for these activities throughout the life cycle. The guidebook is an invaluable reference in helping the program logistician answer the "what, how, and when" product support planning and execution questions.

Key Product Support Governance References

DoD Directive 5000.01
https://acc.dau.mil/CommunityBrowser.aspx?id=314789

DoD Instruction 5000.02
https://acc.dau.mil/CommunityBrowser.aspx?id=332529

Defense Acquisition Guidebook, Chapter 5
https://dag.dau.mil/

Product Support Manager Guidebook
https://acc.dau.mil/psm-guidebook

Business Case Analysis (BCA) Guidebook

Reliability, Availability, Maintainability, and Cost Rational Report Manual
https://acc.dau.mil/CommunityBrowser.aspx?id=298606

Integrated Product Support Element Guidebook
(link to be provided—not published as of 11-15-11)

Why Is the Added Emphasis on Governance So Important?

What exactly is governance? For our purposes here, "governance" relates to "consistent management, cohesive policies, guidance, processes and decision-rights for a given area of responsibility." Simply put, the increased emphasis on life cycle management governance is intended to both improve product support and enhance the tool kit available to program product support personnel. As a life cycle logistician in weapon system acquisition, what am I supposed to be doing—and when? The recent emphasis in public law, OSD policy, and specific areas addressed by the new guidebooks all strive to answer not only the "what?" but also the "how?" Outcomes are critical, but we also need to make sure our workforce knows routes as well as destinations.

The recent emphasis on product support and life cycle management governance can be categorized as both strategic and tactical. The strategic governance addresses—among other topics—the increased emphasis on affordability in the acquisition of weapon systems, initiatives grouped under the broad rubric of better buying power. Strategic governance also continues to emphasize and clarify the roles and responsibilities of key program personnel (e.g., the product support manager). As another example, the sustainment "quad chart" (Figure 2) mandated by DoD policy for major defense acquisition programs (MDAPs), focuses on those areas key to effective product support: the sustainment approach and related issues, schedule, metrics, and cost. While required only for MDAPs, the focus areas actually apply equally to all programs; the chart provides an excellent "snapshot." Is any of this re-

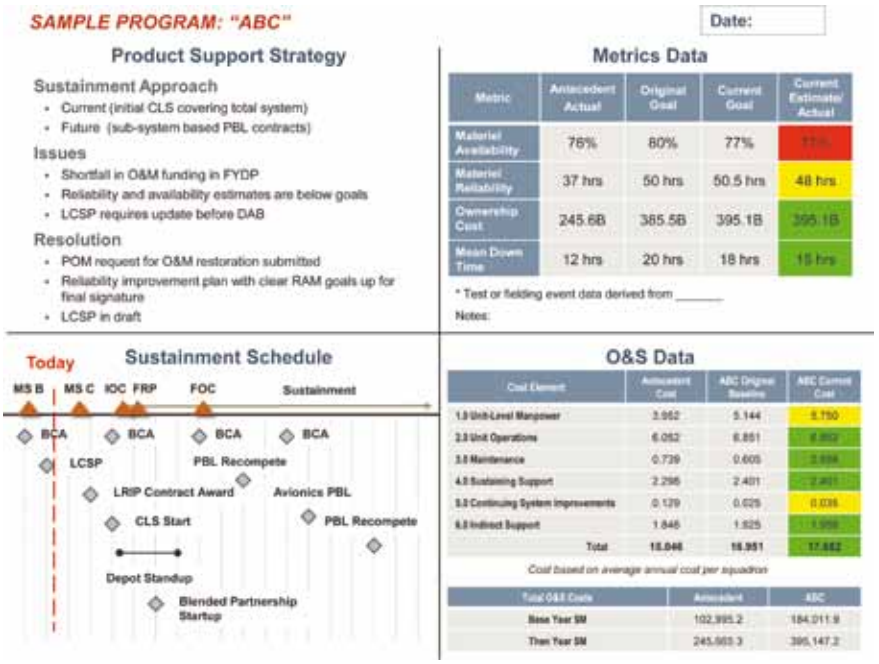
ally new? Generally not; most of the recently issued product support governance policy seeks to reinforce and reemphasize practices and procedures that experience has taught will lead to effective and affordable supportability. The "quad chart" has become a critical component of major program reviews as well as milestone decision reviews; the emphasis on planning for affordable sustainment has migrated from "the last bullet on the last chart in 'backup'" to the forefront of acquisition decisionmaking.

The governance tactical focus is on "news you can use." *The PSM Guidebook, the BCA Guidebook, the Logistics Assessment Guidebook*, and others still in development (all of which can be accessed at https://acc.dau.mil/productsupport) each concentrate on the "how to and when" aspects of product support planning and implementation. See sidebar for a list of some of these important tools. Again, most of the content of these documents is not radically new—but for the first time, the life cycle logistician and program leadership have comprehensive, detailed resources that will lead to supportability success.

Three-Legged Stools Are the Most Stable

The renewed—and increased—emphasis on metrics, integrated product support, and product support governance is important to the program logistician, certainly. But this emphasis also benefits the customer, the program manager, the system engineer—basically all stakeholders—because it focuses activities and resources on a common goal and contributes directly to integrating program efforts toward a common goal.

Figure 2. Sample Quad Chart



These three key areas—sustainment metrics, the integrated product support elements, and governance—meld together to provide program managers, product support managers, system engineers, and life cycle logisticians a detailed structure and body of process knowledge leading to our ultimate goal: delivering to the warfighter weapon systems that meet their validated requirements, and which the taxpayers can afford.

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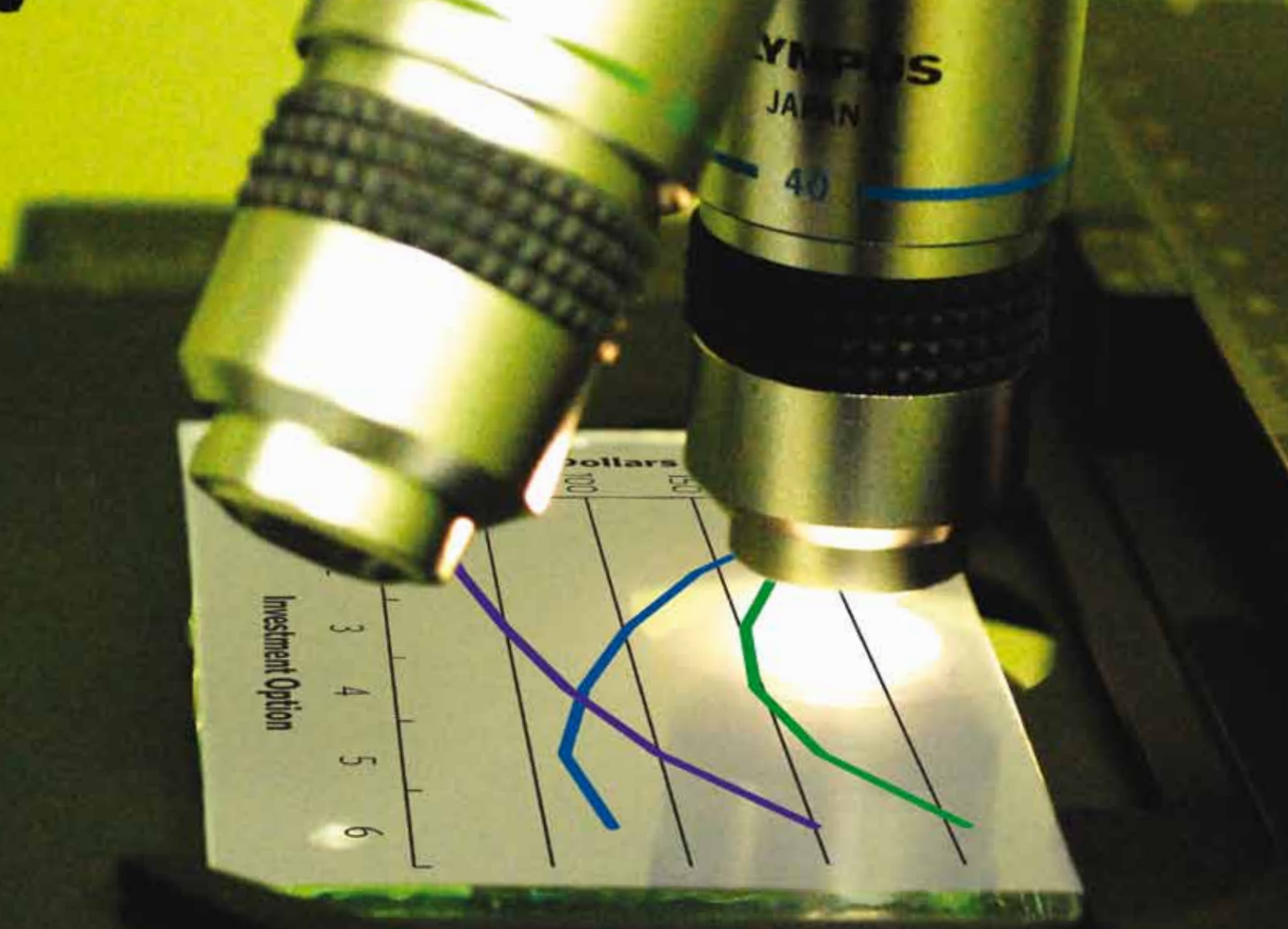

Attributes of an Effective Product Support Business Case Analysis

Joseph "Colt" Murphy

Never in the field of acquisition was so much requested by so many with so few dollars.

This play on Winston Churchill's famous Battle of Britain quote reflects the recent history of America's expectations for national security coupled with an austere budgetary environment. This raises the question, "How do we achieve what we need to within a context of diminishing resources?" The answer lies in finding efficiencies, relying on value-based decision making, understanding trade-offs' second-order effects, and managing acceptable risks. Business case analyses (BCAs) powerfully deliver all these benefits.

The April 2011 DoD *Product Support Business Case Analysis Guidebook* (https://acc.dau.mil/bca-guidebook) represents the harvested fruit of many years of difficult, complicated efforts in establishing and understanding the

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Good decisions are those that when taken on the whole and over an extended period produce better results than decisions made in an uninformed manner or using "gut feelings."

product support related decision-making processes and materials through which DoD senior leaders maneuver. One of the most complex and impactful decisions within the Acquisition community is the development and execution of major weapons systems' sustainment strategies. As a reaction to new statutes and past GAO reports, the Department put forth the *BCA Guidebook* to address concerns and satisfy decision makers' needs for high quality decision support tools. DoD has successfully applied the principles within this guidebook to a myriad of decisions ranging from beach front land development, to total force integration manpower efficiency studies, to 5th generation fighter sustainment strategy development.

What is a BCA?

No matter the subject, the BCA's fundamental structures and attributes remain consistent with any professional analytical study. In its most basic form, a BCA is any non-advocate, objective, transparent analysis of the benefits, costs, and risks of multiple options. This type of analysis is the best way to identify satisfactory responses to a given problem statement. Although DoD organizational structure is aligned toward functional roles, the BCA structure necessarily crosses lanes. The BCA accomplishes and integrates analyses across multiple, simultaneous fields while leaving no subject off limits. It must be comprehensive and strategic in structure in order to paint as complete a picture as possible for the decision maker.

An informed customer is a better customer. The BCA analytical, governance, and staffing processes provide department-wide opportunities for increased understanding and education. Learning occurs and spreads in both directions from a BCA such that subordinates more quickly identify an optimum course of action, while senior leaders blend information across diverse subject areas. This allows decisions to effectively account for both the cost of something, as well as the course of action's beneficial return. Field-level personnel learn on-the-job skills by executing the BCA, and headquarters governance bodies and senior leaders can learn from the cross-pollination of ideas and analytical outcomes to impact their own organizations and the enterprise as a whole. The BCA tells a story of possibilities; after all, it is not an audit of past performance but a decision-support function focused on future activities. These possibilities though, ripple through geography, time, and organizations. It is up to the BCA team, working in tandem with strategic level senior thinkers, to explore and assess BCA alternatives' effects on other organizations and agencies across the enterprise.

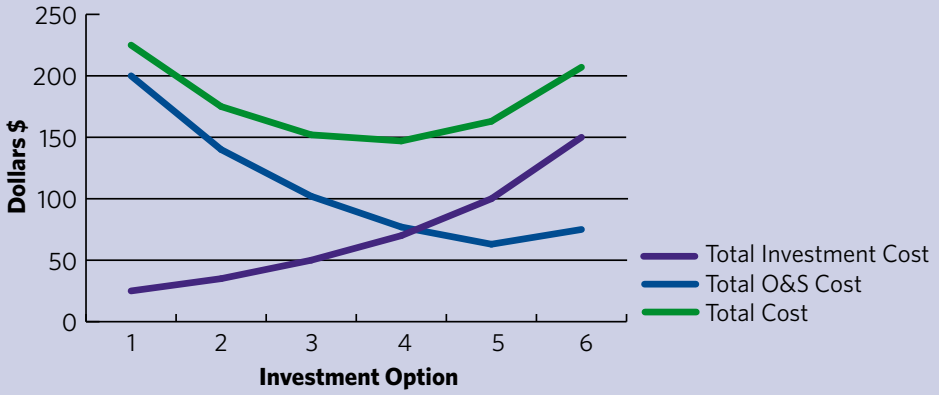
For example, one such high-profile aircraft-sustainment BCA showed tremendous savings to the taxpayer across a number of alternatives. The recommended alternative included a shift in who performed the maintenance work and, subsequently, a shift in how the same tasks were ultimately funded. While the activities remained mostly constant, the organization structure itself provided the roadblock to executing a plan that would net the taxpayer savings of over $100 million a year for 2 decades. The BCA analysts identified this scenario but also recognized the essentiality of senior DoD leadership working across functional areas, without which the savings and execution plan could never be enacted. A cost of manpower increase in one Service would drive a Service bill increase but would subsequently drive down rates and costs of doing business for other Services. The successful balancing of changes and savings across Services to functionally pay for the shift in work required all three Service departments, OSD(AT&L), comptroller, as well as OMB and congressional involvement. Through this example, personnel throughout the chain of command witnessed how their portions of the process are interwoven and connected throughout the entire DoD enterprise. It's interesting how all of this essentially came from studying who should turn wrenches on a single Service's aircraft.

That example highlights the strategic and operational implications of a BCA, but BCAs perform an important role at the tactical level too. They often highlight capability gaps and areas for improvement in a relatively non-threatening environment. A BCA is not an official audit, source selection decision document, or punitive exercise but an internal decision making process and document to inform strategic decisions to be made by senior leadership. This provides an opportunity for the subordinate organization and people to evaluate their value proposition while simultaneously assessing their work and products in the context of the greater Department and national security structure as a whole.

What is a Good Decision?

A good outcome does not mean the decision was a good one. As an example, winning the lottery does not mean that buying lottery tickets was a sound and logical method of planning for retirement. Sound decision making occurs when a repeatable, best-informed decision is made from an objective perspective. Good decisions are those that when taken on the whole and over an extended period produce better results than decisions made in an uninformed manner or using "gut

Figure 1. Trade off Analysis



feelings." Since making a half-court shot in basketball does not justify all follow-on shots coming from half court, neither should one successful decision made "on the fly" justify the decision maker generating all decisions in an uninformed, knee-jerk manner.

Understanding the retirement and basketball analogies, the institutional purpose behind the BCA process begins to take shape. The Department makes countless decisions, impacting hundreds of billions of dollars each year. Some of these decisions are good decisions with negative consequences; some decisions are poor decisions with positive outcomes. The BCA process doesn't remove uncertainties, risks, and undesired outcomes from reality, but by increasing the knowledge base among those making and supporting the decision, those uncertainties become less uncertain, the risks are better prepared for, and overall undesired outcomes occur less frequently.

Objectivity Rocks!

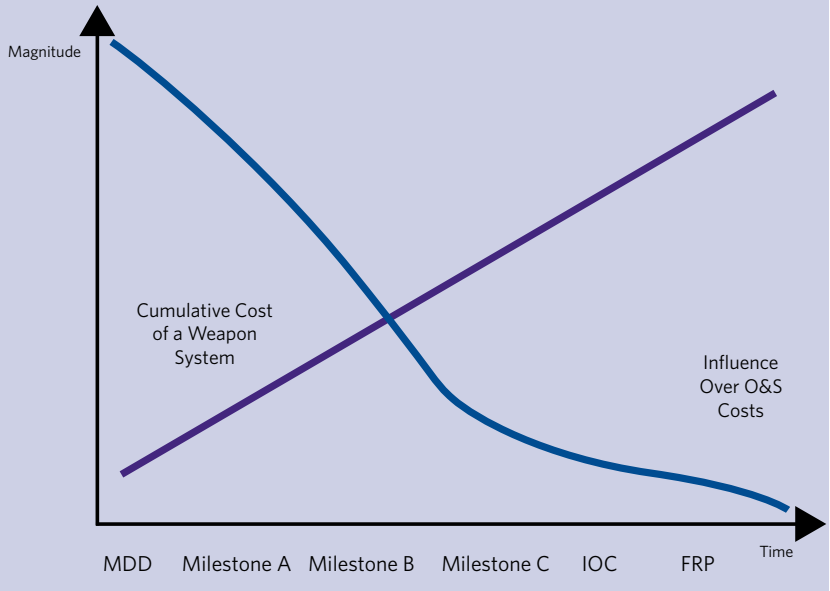
Besides informing decision makers who are potentially setting the strategy for the use of billions of taxpayers' dollars over many decades, the BCA process itself provides additional benefits not necessarily measurable in terms of money. The credibility of the BCA derives from the transparency, independence, and fully documented attributes the DoD *Product Support BCA Guidebook* describes. The BCA is not a report intended to substantiate a decision that has already been made. Although a recent statute (National Defense Authorization Act 2010, Section 805) uses the term "revalidate" in describing sustainment strategy BCAs, this is in reference to the BCA itself. Assumptions, data sources, constraints, environmental factors, and the like are components and inputs to the BCA that justifiably, and now statutorily, must be updated at regular intervals.

The Department's decision makers now have a process that includes governance, continuous updates, enterprise perspectives, and standardized methodology, while also allowing for the flexibility required by an organization and subject matter as diverse as the DoD acquisition community. The process is not so rigid that ACAT 4 programs must follow ACAT 1D DAB (Defense Acquisition Board) governance requirements; yet even small-scale decisions should have some reviewing process. Furthermore, the BCA expects positives and negatives to be presented for all alternatives, including the recommendation! Given that a BCA is not a persuasive paper, decision makers should be presented not just the positives of the recommended course of action, but also the challenges, issues, risks, and problems.

Get Out and Be Seen

The objectivity of the analytical team and the BCA is best judged at the point of conclusions and recommendations, where the explanations and descriptions of the findings and overall best course of action are thorough and without hyperbole. The best summaries don't just make a recommendation for one alternative but also discuss the trade space around multiple alternatives. A well-communicated recommendation presents highlights and weaknesses in a way that lets the decision maker choose the best option for himself or herself, rather than the option that the analytical team concludes is the best

Figure 2. Relationships between Time, Ability to Influence O&S Costs, and Cumulative Cost of a Weapon System



decision. A realization of the BCA process finds that the final decision maker often does not have time to participate within governance boards or on BCA workshops. He or she relies on these steering committees and activities to get the BCA in the ballpark of the right answer. Once in the ball park, senior decision makers then bring in their own perspective, experience, and insight to settle on the ultimate solution.

Now armed with this objective supporting analysis and clear and concise rationalization for their decision, leadership has the paper trail for substantiating and explaining their position. Rarely does a multi-billion-dollar decision not generate questions. The Department now has the documentation that traces the final decision all the way back to the analytical building blocks and inputs.

Beyond using the BCA as a mechanism for answering outside scrutiny, the BCA is also used within the organization. The recommendation section is robust enough to help explain the philosophy and the "why" behind each alternative. The entire document is a repository of data sources, methodologies, and explorations of alternatives of such thoroughness that it can inform follow-on work years later. This traceability enhances continuity and breathes efficiencies into future efforts that are no longer wasting time, reinventing the wheel.

Conclusion

From identifying optimal solutions, balancing benefits, costs, and risks, to generating a document trail to serve as a basis for future work, the BCA process and report is the optimal decision-support tool within DoD. The process, governance, and communication are standardized and flexible while adhering to principles of analysis that are logical and inherently intuitive. The Department's need to squeeze every bit of value out of every dollar has never been greater. Nor has the internal and external scrutiny of decisions ever been closer. With the DoD *Product Support BCA Guidebook*, we now can focus on the possible decision rather than the way the decision came about. In the process, the warfighter, the program office, and the taxpayer all come out winners.

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Defense AT&L

Writers' Guidelines in Brief

Purpose
Defense AT&L is a bimonthly magazine published by DAU Press, Defense Acquisition University, for senior military personnel, civilians, defense contractors, and defense industry professionals in program management and the acquisition, technology, and logistics workforce.

Submission Procedures
Submit articles by e-mail to datl(at)dau.mil. Submissions must include each author's name, mailing address, office phone number, e-mail address, and brief biographical statement. Each must also be accompanied by a copyright release.

Receipt of your submission will be acknowledged in five working days. You will be notified of our publication decision in two to three weeks. All decisions are final.

Deadlines
Note: If the magazine fills before the author deadline, submissions are considered for the following issue.

Issue	Author Deadline
January-February	1 October
March-April	1 December
May-June	1 February
July-August	1 April
September-October	1 June
November-December	1 August

Audience
Defense AT&L readers are mainly acquisition professionals serving in career positions covered by the Defense Acquisition Workforce Improvement Act (DAWIA) or industry equivalent.

Style
Defense AT&L prints feature stories focusing on real people and events. The magazine seeks articles that reflect author experiences in and thoughts about acquisition rather than pages of researched information. Articles should discuss the individual's experience with problems and solutions in acquisition, contracting, logistics, or program management, or emerging trends.

The magazine does not print academic papers; fact sheets; technical papers; white papers; or articles with footnotes, endnotes, or references. Manuscripts meeting any of those criteria are more suited to DAU's journal, *Defense Acquisition Research Journal (ARJ)*.

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