DEFINING AND IMPLEMENTING PERFORMANCE-BASED LOGISTICS IN GOVERNMENT

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Performance-Based Logistics (PBL) is a mechanism to integrate the acquisition and sustainment of various systems in the Department of Defense. In this article, we report the results of a research study aimed at developing a working definition of PBL, the drivers for its use, and the infrastructure changes needed for its successful deployment. Utilizing our research findings and those of previous related studies, we suggest guidelines for successfully implementing PBL in organizations. We conclude the article by suggesting some useful directions for future research to fully realize the benefits of PBL.

Product acquisition and sustainment have traditionally been separate and not necessarily equal concerns. The government's primary focus has been on the acquisition of technology and systems. Additionally, the government has had a number of secondary concerns: sustainment of the system, technology transfer, and the development of an industrial base to support the system long term. The environment for government acquisition creates consequences for major programs that span years, if not decades. As the government strives to understand how to generate the best value for its systems, it is appropriate to study experiences in the Department of Defense (DoD) and in Industry in order to maximize performance for the life of the system.

The ultimate goal in an acquisition strategy is to build both partnerships and relationships that align the goals of all organizations for the duration of the program. Once the competition for the initial acquisition of a system has occurred, the ability of the government and the contractor to make substantial changes in the system is typically limited. Since some acquisition efforts last for decades, it is essential for the parties to explore the acquisition strategy carefully before embarking on a course of action. This is especially so as, over the life cycle of most systems, it has been estimated that about 30 percent of all dollars spent are used to acquire the system, while the remaining 70 percent of all dollars are used for support.

The goal of both acquisition and sustainment is to gain the most efficient and effective performance of the system for its entire life. In doing so, it is important to realize that acquisition and sustainment are not separate but simultaneous and integrative issues that require analysis and synthesis throughout the product life cycle. Ultimately, the challenge for the program manager is to structure optimal relationships with contractors through the use of appropriate contractual mechanisms, agreements, and incentives.

The Department of Defense initiated a long-term program to link performance to acquisition through a concept called *Performance-Based Logistics (PBL),* which represents an integrated Perfomance-Based Environment (PBE) for both acquisition and sustainment. This is very appropriate since dollars spent on maintenance continue to increase as systems age. Since the inception of PBL, various agencies have tried to develop definitions, implementation guidelines, and infrastructure to attain the goal of acquisition and sustainment integration through performance-based initiatives. While several organizations in various branches of the DoD have attempted to use PBL approaches in acquisition and sustainment efforts, no clear and universally acceptable definition of PBL exists. Therefore, there is no clear understanding of the drivers of PBL. Hence, implementation guidelines for PBL are at best ad-hoc and incomplete. This situation undermines the DoD's ability to use PBL to make Defense operations more responsive.

The purpose of this article is to identify the issues and complexities of the relationships that exist in making the transition to the PBL environment. Utilizing the relational exchange theory and new product development literature, along with the combined knowledge and resources of the government and in Industry, we develop a conceptual and working definition of PBL, identify the drivers for the deployment of PBL, propose the needed infrastructure changes to be effective and efficient in using PBL, and outline guidelines found useful in implementing PBL. Finally, we conclude the paper by summarizing our findings and suggesting some directions for future research to successfully implement PBL.

RESEARCH PROCESS

In this section, we briefly describe the combination of research processes and methodologies used to achieve the goals of this research. Basically, we used interviews as the primary vehicle to gather information about the definition and deployment of PBL. In addition to interviews, we hosted roundtable discussions. We also participated

in an Army Materiel Command (AMC)-wide PBL video conference at the Aviation and Missile Command (AMCOM). For the interviews, we used an emergent design process that employs a predetermined set of questions to start the interview process. In this approach, the set of questions are altered over time to reflect what was learned in previous interviews. Before the interview process began, each respondent was informed that the purpose of the research was to develop a workable definition and implementation approach for the transition to a PBL environment.

While a DoD-wide study of PBL efforts is useful, information is also available from the Industry's logistics strategies and approaches to solving problems.

Following a review of the PBL literature, we identified individuals and organizations engaged in PBL-type activities. We then grouped potential respondents into four categories: Army, Navy, Air Force, and Industry. We conducted in-depth interviews, often lasting many hours, with contractors and DoD project managers. For example, interviews were conducted at Warner Robins Air Force Base, Wright Patterson Air Force Base, Naval Inventory Control Point (NAVICP) in Philadelphia, and at PBL Conferences. We used each interview to document and investigate how PBL is both defined and operationalized. In some instances, we also conducted telephone interviews including those with people from Headquarters (HQ) Navy, General Accounting Office (GAO), Defense Logistics Agency (DLA), RAND, and selected contractors. In general, there was a very high level of cooperation at all levels among both government and Industry participants.

RESPONDENTS

A review of literature on PBL-related activities revealed that, in 1998, DoD established 30 sustainment pilot programs, of which 24 adopted some type of innovative product support strategies (Product Support for the 21st Century, 2001). We contacted project managers from the pilots to schedule visits and interviews. Table 1 lists the 30 initial programs and highlights the programs interviewed by our research team.

In addition to the pilot programs listed in Table 1, we also interviewed managers from the Soldier Focused Logistics (SFL) program, a collaborative effort between AMCOM and the Cargo Helicopters Project Manager's (PM) Office to support the CH-47 fleet sustainment using PBL strategies.

TABLE 1.
PILOT PROGRAMS FOR PRODUCT SUPPORT STRATEGIES

DoD PILOTS FOR PRODUCT SUPPORT STRATEGIES		
Abrams M-1 Tank	Advanced Amphibious Assault Vehicle (AAAV)	Airborne Warning and Control System (AWACS)
Advanced Field Artillery Tactical Data System (AFATDA)	AEGIS Cruiser	**B-1B Lancer**
Apache AH-64	**ASE/CASS**	**C-17 Globemaster**
Chinook CH-47	Common Ship	**C-5 Galaxy**
Comanche RAH-66	CVN-68	Cheyenne Mountain Complex
Crusader	**EA-6B Prowler**	F-117 Nighthawk
Guardrail/Common Sensor	**H-60 Helicopter**	F-16 Falcon
Heavy Expanded Mobility Tactical Trucks (HEMTT)	Landing Platform Dock-17 (LPD-17)	**Joint Surveillance Target Attack Radar System (J-STARS)**
High Mobility Artillery Rocket System (HIMARS)	Medium Tactical Vehicle Replacement (MTVR)	**KC-135 Stratotanker**
TOW/ITAS	**Standoff Land Attack Missile-Expanded Response (SLAM-ER)**	Space-Based Infrared Systems (SBIRS)
ASE/CASS = Aviation Support Equipment Consolidated Automated Support System TOW/ITAS = Tube-launched, Optically-tracked, Wire-guided Improved Target Acquisition System		
Highlighted programs were included in our Performance-Based Logistics research through interviews or presentations.		

While a DoD-wide study of PBL efforts is useful, information is also available from the Industry's logistics strategies and approaches to solving problems. Therefore, we interviewed Industry managers from AutoZone, UPS, Target, Caterpillar, Intergraph, Dell Computers, Royal Caribbean Cruises, and the University of Toronto. Since the term *Performance-based Logistics* is not used in the private sector, we widened the scope of logistics to include inventory management, spare parts acquisitions and repair, and maintenance activities.

DEFINITION OF PBL

The first objective of our research was to review existing definitions of PBL used in the Army, Navy, Air Force, and Industry to provide insight into the tenets of PBL. We found no single definition for PBL. Yet, various PBL definitions revealed several common themes. The three main themes are: 1) integration between acquisition and logistics for total system life-cycle, 2) incentives, and 3) performance goals.

Generally, the contracting agency seeks to improve performance throughout the life of a weapon system in some measurable way without dictating the specific methods of performance. Moreover, the agency is willing to provide incentives to the contractor to meet these performance objectives. PBL integration replaces the practice of attempting to define specific methods of operation by describing desired results and uses incentives to ensure success.

The official definition from the Defense Acquisition Guidebook (2004) is:

> Performance-Based Logistics is the purchase of support as an integrated, affordable, performance package designed to optimize system readiness and meet performance goals for a weapon system through long-term support arrangements with clear lines of authority and responsibility. Application of Performance-Based Logistics may be at the system, subsystem, or major assembly level depending on program unique circumstances and appropriate business case analysis. (p. 5.3)

The Navy provides the inclusive term "provider" which demonstrates that functions can be performed by any entity. A key addition to the Navy definition is the inclusion of the term "empowered," implying that additional power in decision making is granted to the provider. This illustrates the move away from centrally controlled performance to more localized performance. Below is the Department of the Navy (2003) definition.

> A PBL strategy is an agreement, usually long term, in which the provider (organic, commercial, and/or public/private partnership) is incentivized and empowered to meet overarching customer oriented performance requirements (reliability, availability, etc.) in order to improve product support effectiveness while reducing TOC. (p. 1)

The Army elevates PBL to a strategy. While not focused on the customer, per se, the definition does link PBL efforts to the purchase of *readiness*.

> A strategy for weapon system product support that employs the purchase of support as an integrated performance package designed to optimize system readiness. It meets performance goals for a weapon system through a support structure based on performance agreements with clear lines of authority and responsibility. (Hill & Hamerlinck, 2003, p. 7)

The Air Force does not use the term PBL. Instead the Air Force uses Total System Support Responsibility (TSSR), Total System Performance Responsibility (TSPR), Flexible Sustainment, and Total Life-Cycle System Support. While the terms are different, the concepts are the same. Air Force programs focus on systemwide support to provide total system sustainment and system level readiness. The implications of the Air Force definitions are that systems should be acquired and sustained for the long-term. The Air Force concept is similar to definitions used by the Deputy Under Secretary of Defense for Logistics and Materiel Readiness and Naval Air Systems Command (NAVAIR).

Since Industry does not specifically use PBL terminology, no definition of PBL exists. Industry uses the term *Supply Chain Management (SCM)* to describe efforts similar to PBL. In general, the logistics support function involves inclusive contracts with service providers to provide a level of service that is required by the acquiring company. Traditional commercial products seldom require the degree of sophisticated systems as the DoD. However, commercial high technology products do involve high levels of sophistication and exact specifications. In some cases, items that require on-going logistical support and repair are outsourced with a third party managing the entire process.

We developed the following comprehensive definition of PBL to capture the various tenets discussed above.

> An integrated acquisition and sustainment strategy for enhancing weapon system capability and readiness where the contractual mechanisms will include long-term relationships and appropriately structured incentives with service providers, both organic and non-organic to support the end user's (warfighter's) objectives.

DRIVERS OF PBL

In general, DoD focuses on developing programs designed to enhance performance and reduce total system cost over the life of a weapon system. The desire by DoD to change the way they conduct business led to the PBL initiative. Our interviews revealed numerous reasons for the adoption of PBL. We report seven primary drivers for PBL in Table 2.

Inherent in these drivers for PBL is both the perception and the reality that weapon systems are expensive to maintain, difficult to upgrade with new technology, and take a long time to diffuse to the field. Moreover, this is also true for the repair and maintenance of fielded (new and legacy) systems. These PBL drivers focus on changing the current environment by suggesting strategic directions for the future.

TABLE 2. DRIVERS FOR PBL

DRIVERS FOR PERFORMANCE-BASED LOGISTICS
1. Rising cost of maintenance, operations, and support for new and legacy missile systems.
2. Needed tool for Logistics Transformation and other actions required by Congress.
3. Needed reduction of customer wait time in support of the war fighter.
4. Needed modernization of weapon systems to enhance combat capability.
5. Needed solutions to weapon obsolescence problems.
6. Documented savings from commercial logistics support operations.
7. Documented improvements from implementation of performance—based acquisition.

INFRASTRUCTURE CHANGES

A major challenge for conversion to a PBL environment is to adopt business practices more common in commercial organizations. To meet the objectives of PBL, both government and Industry must agree on business practices that provide the greatest value for all parties.

Our research reveals that a move to PBL requires several infrastructure changes. To keep the study at a strategic level, we focused on the need to change the culture of the implementing organization since it was the recurring theme throughout our PBL research. Organizational culture is "a pattern of beliefs and expectations shared by organizational members" (Hellriegel, Slocum, & Woodman, 1986). These shared beliefs and expectations determine the behavior of the members of the organization. Changing organizational culture is complicated by the fact that people tend to surround themselves with others of like opinions and values, thus reinforcing their common beliefs and expectations (Schein, 1981).

For example, an AMC HQ's team identified 21 issues that must be addressed prior to PBL implementation. One-third of these issues reflect a culture or belief that would not be supportive of PBL implementation. Table 3 presents several examples obtained from our interviews of *Old Culture* beliefs that are juxtaposed with PBL examples of *New Culture* or new ways of doing business. Several models for successful change management can be found in the management literature (Camm, Drezner, Lachman, & Resetar, 2001). There are also excellent examples of government success in changing the culture of specific organizations.

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For instance, in September 2002, GAO (2002) issued a report that stated, "DLA does not provide a 'single face' to its customers for addressing their issues." Customers are "sometimes confused over whom to call and reported difficulties with getting in touch with the right person to resolve their problems" (p. 21). GAO recommended DLA create a single face to customers to improve customer satisfaction. DLA has since implemented a customer relationship management (CRM) program to learn more about its customers' needs and behaviors. They have also realigned the DLA organization structure. They now have functional field chiefs reporting to directors at headquarters and established a new Customer Operations Directorate.

TABLE 3. CULTURE EXAMPLES

COMPARISON OF CULTURE EXAMPLES	
The C-17 aircraft is the focus of a Boeing - Air Force partnership. They do joint off sites and work specifically on their relationship. They have joint weekly, monthly, block, etc., meetings and reviews. Every employee who works on the C-17 wears a plastic card the size of their badge, imprinted with the partnership agreement signed by Boeing and Air Force leaders.	✦ Arms length, adversarial relationship between government and contractor. ✦ All communications in writing to create an audit trail. ✦ Interact as little as possible, conduct bi-annual performance reviews. ✦ Maintain objectivity *don't get too close to the contractor.* ✦ Contractor driven by *profit motive* vs. nation's defense. ✦ Government close holds information.
NAVSEA established an e-marketplace using a one-page flowchart showing what it wanted its electronic services procurement system to look like. The five steps represented the full operating capability (FOC) of the desired system, with the extensions and clouds being areas for future scalability in the eventual system. The Navy simply handed the flowchart to potential vendors and asked them, "How much of this picture can you deliver and at what price?" (IBM - Seaport Study, p. 18)	✦ Lengthy statements of work developed by government requiring office—with an attempt to document every possible situation, process, regulation, milspec, service, and government expectation for the bidders. ✦ Independent government estimates. ✦ Elaborate processing of Statement of Work through technical data, system engineering, legal, etc., all with organization-specific word requirements.
Air Force Joint Surveillance Target Attack Radar System (JSTARS) Total System Support Responsibility (TSSR) partnership has multiple agreements in place supporting the sustainment of JSTARS. In most cases, these agreements stand alone—they are not part of the contract between Northrop Grumman Corporation (NGC) and the Air Force. The Partnering Agreement (PA) between NGC and the Warner Robbins Air Logistics Center (WR-ALC) has been incorporated into the prime TSSR contract as the guiding basis for the Air Force providing the depot-performed workloads to the contractor.	✦ Finger pointing between government and suppliers over delays and cost increases. ✦ Request for Proposal describes services and scope of work in great detail. ✦ Numerous change orders as soon as work starts and RFP omissions are identified. ✦ Government defines service delivery means and process through inclusion of government regulations and directives. ✦ Contract administration role vs. partner role. ✦ Only acceptable relationship is a contractual one.
Sikorsky Aircraft Corporation (SAC) is working side-by-side with Corpus Christi Army Depot (CCAD) to reduce repair/overhaul turnaround time for the H-60. This joint collaboration has improved business processes, depot repair methodology, and more responsive product support, with only four contractor jobs directly attributable to the partnership.	✦ *Expert* role assigned to government employee. ✦ Use of design specifications where the government tells the contractor *how* to provide the service. ✦ Contractors in the government workplace viewed as personal service. ✦ Quality assurance processes defined by government specialists. ✦ Government employee relies on *guidance* from HQ.
The Navy Inventory Control Point (NAVICP) has an F/A-18E/F Integrated Readiness Support Teaming (FIRST) prime contract with Boeing under which Navel Air Depot (NADEP) North Island performs depot repair services to Boeing as a *subcontractor.* Boeing provides funding, repairable units, repair parts, obsolescence management, and shipping. The NADEP North Island provides touch labor, facilities, technical data, equipment, production engineering, and packaging. Fifty-seven government jobs were created or sustained by this partnership.	✦ Contractors are taking jobs away from government workers. ✦ Government is buyer of services, not seller. ✦ All payments to government are deposited in the U.S. Treasury account. ✦ Private sector cannot use government facilities and equipment to perform work.

GUIDELINES FOR IMPLEMENTING PERFORMANCE-BASED LOGISTICS

Based on our research and the incorporation of the findings from RAND and the Aberdeen Group (Camm, Drezner, Lachman, & Resetar, 2001; Leahy, 2003), we propose the following six guidelines to successfully implement PBL:

1. **Assign responsibilities clearly throughout the firm**—Blanket statements about policy changes that imply that *PBL is everyone's responsibility* are typically ineffective. Experience suggests that anything that is everyone's responsibility is no one's responsibility. To varying degrees, the Navy, Air Force, and DLA all address this issue. Each of these organizations requires that responsibility for the success of any PBL program be assigned to a specific unit.

2. **Design metrics to motivate the right behavior**—The cliché *successful firms manage what can be measured* can be overstated. Nevertheless, RAND found that proactive firms *do* rely on metrics as the foundation for managing improvement (Camm, Drezner, Lachman, & Resetar, 2001). Accordingly, metrics designed to motivate the right behavior must be carefully crafted and applicable across the entire organization. Effective metrics must induce the decision maker to pursue [organizational] goals, be compatible with the constraints that the decision maker faces in each setting, be easy to collect and verify, and be mutually understood and accepted by the decision maker and oversight authority (Hellriegel et al., 1986). For instance, Naval Inventory Control Point (NAVICP) is responsible for the Navy PBL program and NAVICP Operations Research (OR) Group is focused on developing appropriate performance metrics for logistical operations.

   Defining the right PBL metrics is difficult for both government and contractors. NAVICP is using its OR group to answer these questions. Initially, it may be easy for contractors to exceed expectations and improve performance. After the initial changes take place, it becomes increasingly difficult to continue to gain higher levels of performance. Contractors and government employees predicted future difficulties in this area. For instance, one Navy contractor indicated that he is currently engaged in negotiations for more difficult metrics while his firm's current performance is within acceptable performance expectations. At the same time, NAVICP is attempting to quantify their requirements. For example, NAVICP might purchase a three-day delivery when a ten-day delivery would be acceptable. Finally, metrics and incentives should be designed simultaneously to ensure that performance is measured correctly and rewarded appropriately.

3. **Manage failures to limit disincentives for risk-taking**—Failure is part of the learning process. The term *failing forward*, describes the process of "creating forward momentum with the learning derived from failures" (Leonard-Barton, 1995). While most commercial firms understand failing forward, we found little insight into how to implement the concept in DoD. The PBL requires interdisciplinary organizations and teams, consisting of professionals with advanced interpersonal, analytic, and computer skills, and requires knowledge of contracting, logistics, funds management, metrics,

and organizational effectiveness and efficiency. It also requires building relationships with contractors and operating from a holistic view of the organization.

4. **Develop a supportive organizational context for tools**—These tools include *middleware* to standardize decision making based on legacy system output and tracking systems to document performance improvements and lessons learned across the organization. The Warner Robins-Air Logistics Center(WR-ALC) uses Supply Chain Common Operating Picture (SCCOP) to provide a common operational view of the total supply chain and specific details on all factors that affect weapon system availability. Each data element is obtained from the designated authoritative source for the information. This is accomplished through the retrieval, display, and integration of information captured from multiple legacy data sources.

5. **Manage relationships with stakeholders**—Continuing communication with stakeholders is one way to gain their support. In the case of environmental management, Procter & Gamble invested time to train state regulator personnel on issues relevant to the Industry. The DoD Inspector General (IG) is a similar regulator that may have some difficulty accepting PBL required changes in contract management and administration. The DLA Customer Relationship Management (CRM) Office provides a consolidated approach to developing and delivering information related to DLA business goals to key stakeholders and DLA customers. Using an Integrated Product Team (IPT) network of customer-touch points, strategic level information at headquarters (from public affairs offices and current DLA publications staff) is integrated with field level activities. The CRM office then develops content and tools to provide the needed message to customers.

6. **Benchmark to promote continuous improvement**—In order to find how well initiatives are working, compare results through the benchmarking process. This requires finding the best practices in Industry and government and the identification of those firms and agencies that are the best performer for a specific activity. Utilizing these findings, identify the gaps and develop a plan to close the gaps. In order to be successful in implementing PBL, such benchmarking and improvement processes need to become a habit for an organization rather than ad-hoc actions. Many of the organizations that we interviewed provided insight into how the PBL transition was linked to developing Lean processes. At both the Air Force and Navy, the benchmarks were developed based on the leaner, more efficient organizations and then used to become the basis for continued improvement. The Air Force maintains an on-going contract with RAND to provide benchmarking services

These six guidelines are derived from a variety of lessons learned. We have synthesized our research and the findings of other researchers to provide a starting point for the implementation of PBL. Each organization must create an atmosphere of trust and commitment with both its customers and suppliers. The organization must focus on its core competencies and create relationships or do strategic sourcing with organizations to enhance the value of offerings for customers.

CONCLUSIONS

We have reviewed the best practices and lessons learned in DoD and Industry for managing and sustaining a complex system in a performance-based environment. Specifically, we identified issues and key criteria for developing strategies and policies to define the required relationships, contractual mechanisms, and incentives to achieve the objectives of PBL in government. Our research efforts resulted in the development of a definition of PBL to be used to guide deployment efforts. We also identified the drivers for PBL and the infrastructure changes needed to successfully use PBL in government. Based on our research findings and those of previous related studies in government and Industry, we proposed six guidelines to successfully implement PBL.

...Future research directed toward the development of methodologies and algorithms for creating performance specifications will enhance the implementation and acceptance of PBL approaches in government.

This research also suggests some directions for future efforts needed to successfully implement PBL in government. First, an educational program to clarify the understanding and comprehension of the definition, scope, and purpose of PBL will mitigate some myths and fears about its use. Second, each of the six guidelines requires further research to develop specific policies, procedures, and measures for their use and effectiveness. Third, while the conceptual framework for PBL envisions an organizationwide adoption, in actual practice it is more incremental in nature. Therefore, further research is needed to develop a quantitative method to rank order projects that are candidates for an early adoption of PBL.

Fourth, since the PBL approach emphasizes performance, appropriate performance expectations need to be specified. This requires the development of the performance specifications needed from the customers using the systems being acquired and sustained. Therefore, future research directed toward the development of methodologies and algorithms for creating performance specifications will enhance the implementation and acceptance of PBL approaches in government. Finally, development and implementation of performance-based incentives that include some form of innovation and technology enhancement will be required to realize the full benefits of PBL. While this research has resulted in creating suitable guidelines for implementing PBL, more research is needed to make it a reality.

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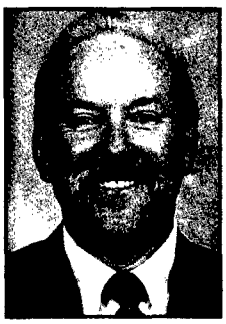

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ACKNOWLEDGMENTS

The authors would like to thank the following organizations for helping us with our research. NAVICP Philadelphia, Warner Robbins ALC, Wright Patterson AFB, Dayton Aerospace Inc, RAND Corporation, NAVAIR, NAVSUP, AMCOM, Defense AT&L, HQ Army and HQ Navy. Additionally, we would like to thank Ms. Lynsey Delane, Ms. Betisa Brown, Mr. Derek Cameron, Mr. Larry Garvey, and Ms. Tonya Sparks.