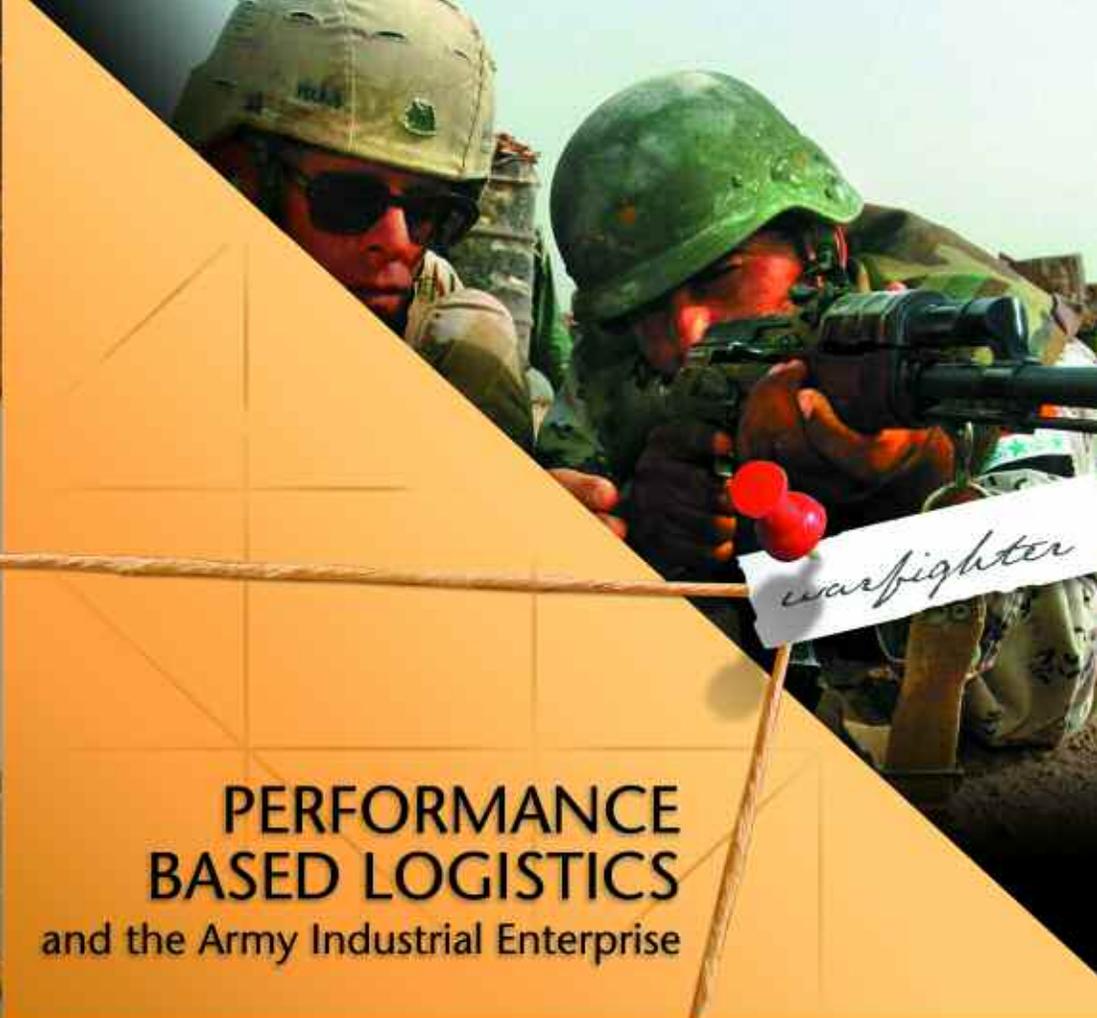
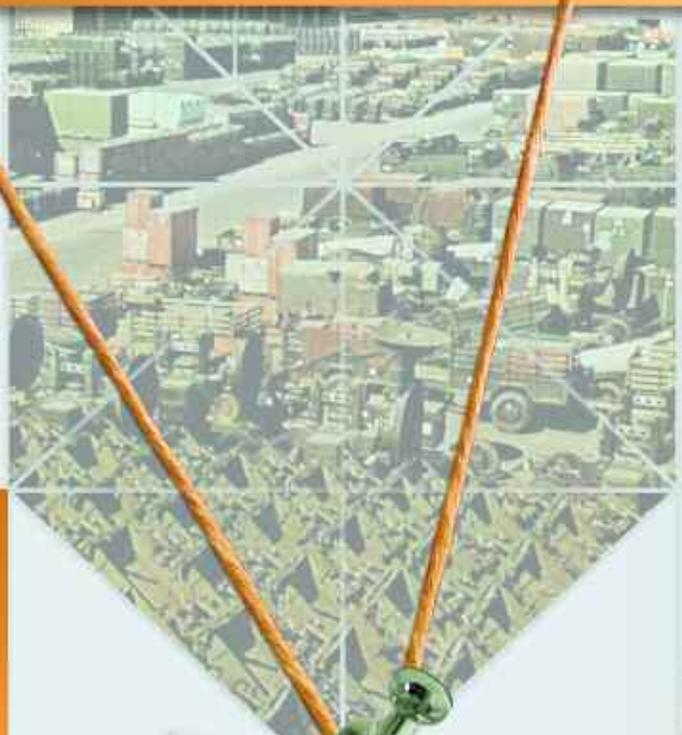


commercial



warfighter

**PERFORMANCE
BASED LOGISTICS**
and the Army Industrial Enterprise



government

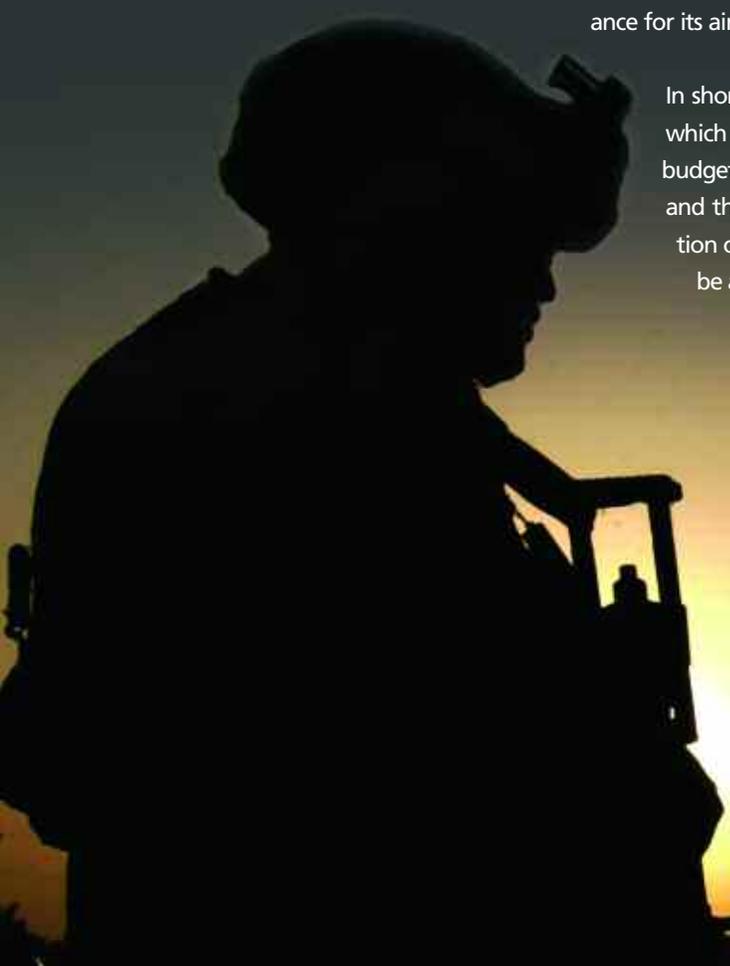


EXECUTIVE SUMMARY

In today's world, businesses manage vast, global flows of goods and products through advanced logistics systems that guarantee rapid, on-time and error-free delivery to customers worldwide. Continuous improvement in logistics processes has become a key competitive factor. Companies such as Wal-Mart, UPS, Maersk, Rolls Royce and Caterpillar are synonymous with logistics leadership.

The Department of Defense (DoD) also must manage massive flows of goods and services and the military industrial base that supports these needs. Over the course of the past decade, DoD has borrowed heavily from these commercial best practices to transform the way it supplies and maintains weapons systems and other support for the modern warfighter. Performance Based Logistics (PBL) has been a centerpiece of this transformation. As in the commercial world, the purpose of PBL at DoD is to purchase a delivered capability, like the number of air hours a plane will fly, rather than an investment in stockpiles of parts and materials, such as cowlings and rivets. Essentially, PBL shifts responsibility for outcomes and results to the support provider while creating incentives to achieve best value performance. The government is buying the capability, not stockpiles of parts and resources; it no longer defines the process by which the results are achieved and now provides the performance specifications not the design specifications. In other words, DoD pays for results and the warfighter is the direct beneficiary.

Though still in its early stages, PBL is proving to be as valuable to the military as it has to the commercial world. In the current Iraqi conflict, for instance, the Army Stryker has achieved a 97 percent operational availability through a PBL agreement and public-private partnership between General Dynamics and Anniston Army Depot. Honeywell and Caterpillar have reduced the wait time for the Marine Corps/Navy Auxiliary Power Units from 35 to 6 days. The PBL between Corpus Christi Army Depot and General Electric has resulted in an 80 percent reduction in overhaul times for the T700 engines throughout the AH-64 Apache and H-60 helicopter fleets. And Rolls Royce has responded to PBL by pioneering the concept of "power by the hour," a guarantee of on-wing performance for its aircraft engines.



In short, PBLs offer a promising, proven opportunity in logistics transformation, which will become increasingly critical to DoD in face of reduced sustainment budgets. But, to realize greater benefit, the Office of the Secretary of Defense and the armed services will need to move aggressively to remove implementation challenges and to streamline the PBL process. The sorts of issues that must be addressed include standardizing definitions and implementation protocols (some of which is already underway in the Army); expanding education and training; creating job performance incentives to adopt PBL as the primary acquisition and procurement strategy; removing structural barriers to PBL within and between services; and exploring legislative and regulatory changes that will facilitate wider PBL use. The Army and the other services also need to work closely with contractors to clarify roles and responsibilities within Performance Based Logistics contracts.

The initial draft of this report was written by Ms. Carrie Hunter. Members of the Logistics Working Group had an opportunity to review and modify the final report.

INTRODUCTION

The United States historically has maintained an extensive defense industrial base that includes both private sector facilities and the military's own "organic" base, comprised of manufacturing arsenals, ammunition plants, maintenance depots, and research and development facilities. In the past, this "Arsenal of Democracy" was managed according to well-established industrial-age principles. The system could deliver enormous quantities of goods to the theater but it was slow, cumbersome and inefficient. In addition, it was often unresponsive to the specific, time-sensitive needs of the warfighters.

Following the Gulf War, the Department of Defense (DoD) recognized the need to transform the way it managed this base and the logistics systems used to support the warfighter. The nature of the threat had changed, limiting the ability to preposition forces and support. The tempo of operations had increased, necessitating a speedier logistics and support system. Finally, the size of the U.S. force posture had shrunk by nearly 50 percent making it imperative that forces and equipment be maintained in the field or returned to combat as soon as possible. As speed and agility figured more centrally in military planning, there was a need for the supply chain to respond accordingly. Defense planners came to view responsive logistics as a key U.S. force multiplier and a potential asymmetric strategic advantage.

There was another reason that compelled DoD to pursue logistics transformation: the nation could no longer afford the old system. It required costly maintenance of excessive inventories and involved too many people. The private sector already had discovered the value of streamlined logistics. Corporations such as UPS, Maersk, and KBR developed rapid, global, highly responsive supply chain networks. Others, such as Rolls Royce, Honeywell and Caterpillar pioneered efficient, agile fleet management and equipment repair and maintenance systems. DoD had much to learn from these leaders.

Beginning in the mid-1990s, DoD set out to transform its logistics and support system. The goal was to provide high quality, cost-effective and agile support to meet the

evolving needs of the 21st century warfighter. To achieve this, DoD sought to streamline and modernize its industrial enterprise, to integrate government and private capabilities, and to apply commercial logistics processes to defense logistics systems. With clear focus on warfighter support, the task became "getting the right element to the right place, in the right quantity, at the right time." That was and remains the challenge.

Under the umbrella of the DoD's Force-Centric Logistics Enterprise (FLE), the Department has begun implementing best practices from the private sector, including Lean Manufacturing, Six Sigma and Theory of Constraints. The cornerstone of FLE, however, is Performance Based Logistics (PBL), one of the most significant innovations in supply chain and support management ever pursued by DoD. The goal of PBL, as part of this quality and cost revolution, is to achieve high-yield improvements in logistics processes and best value sourcing for inventory, infrastructure, maintenance and service functions. The idea is to buy capability and performance — not large stockpiles. This outcome is best achieved by leveraging the knowledge, advanced logistics and technological capabilities of the private sector and the skilled labor of the organic industrial base. In some instances, the preferred PBL solution will be sole source from the private sector. More often, however, PBL will require collaboration between the private sector and the organic base.

The cost issues are significant. Approximately 70 percent of the total life-cycle cost of a weapons system is in its operating and maintenance costs. DoD spends \$80 billion annually for maintenance and materiel readiness. Specific Office of the Secretary of Defense (OSD) goals for PBL include shaving \$10-12 billion off this annual expense by 2011, while increasing weapons systems availability by 20 percent¹ and enhancing turnaround times on maintenance or upgrades by 30 percent.² OSD established a 50 percent PBL goal for dollars awarded to the armed services in fiscal year 2005. With this, Naval Inventory Control Point (NAVICP) is hoping to have at least half of their total dollar contract activities in the form of Performance Based Agreements (PBAs) within the next five years.

WHAT IS PERFORMANCE BASED LOGISTICS?

The Office of the Secretary of Defense has defined Performance Based Logistics as:

... 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.³

PBL calls for competitive comparison of private and public providers of support. DoD Directive 5000.1 specifies that Program Managers (PMs) “develop and implement performance-based logistics strategies that optimize total system availability while minimizing cost and logistics footprint.” They must utilize sustainment strategies that “include the best use of public and private sector capabilities through government/industry partnering initiatives, in accordance with statutory requirements.”

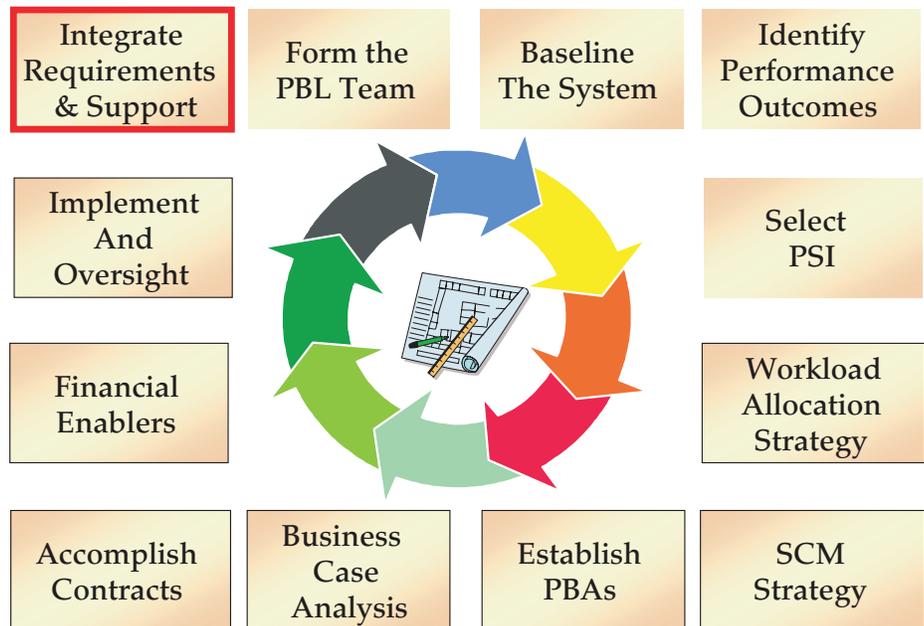
PBL can be used for acquisition from two viewpoints. One is from a System or Platform PM. The other is from a Commodity Manager (CM) of an Item of Supply. PM acquisition is focused only on what is good for their respective system or platform — a vertical acquisition approach (top-to-bottom). Commodity acquisition is focused only on what is good for their source(s) of supply — a horizontal acquisition approach (across common use piece parts, raw materials, or chemicals requirements).

PMs designate Product Support Integrators to manage the Performance Based Agreement by integrating all of the product support providers (organic and

commercial). It is important to note that the Product Support Integrator can be a public, private or public-private partnership entity. DoD Directive 5000. 1 defined Performance Based Agreements as those that “maximize competition, innovation, and interoperability” and that “enable greater flexibility in capitalizing on commercial technologies to reduce costs.”⁴ Acquisition managers are directed to “consider and use performance-based strategies for acquiring and sustaining products and services whenever feasible” and to base decisions on “best support ... throughout the product life cycle.” Unlike prior contracts and Memorandums of Agreement, PBAs do not prescribe how product performance is to be achieved. PBLs may be applied not only to systems but also to subsystems, components/secondary items, assemblies, sub-assemblies or business processes.

There are variations in the definition of Performance Based Agreements and Performance Based Logistics by service and office. Themes common to all include performance as the deliverable, incentives and penalties for the provider and a life-cycle approach that links acquisition with life-long product support. They differ in the emphasis placed on the customer (warfighter), whether it provides whole system support, and where the decision-making authority lies. There are also

Exhibit: PBL Implementation Model ⁶



differences in how providers think of PBL. Ultimately, as the former Commander of Air Force Materiel Command General Gregory S. Martin stated: “Everyone uses the term, but they all have a different view; using the term allows them to be a part of the conversation.”⁵

Essentially, PBL shifts responsibility for outcomes and results to the Product Support Integrator (PSI) and the Product Support Provider while creating incentives to achieve best performance. The government is buying the capability, not stockpiles of parts and resources; it no longer defines the process by which the results are achieved and now provides the performance specifications not the design specifications. To help achieve best value, the DoD directives allow for important changes in design and development, including open architecture which can specify either commercial off-the-shelf or government off-the-shelf parts and components. Importantly, PBL is intended to support a full life-cycle approach to weapons systems development and sustainment which, as discussed below, is unlike any prior support arrangement.

PBL assigns responsibility for system/product support to a Product Support Integrator. The source of support decisions for PBL strategies do not favor either organic or commercial providers, but are based on a best-value determination, evidenced through a Business Case Analysis (BCA).⁷

Performance Based Logistics as applied to military systems is still a new concept and the areas for improvement are many. Too many arrangements exist that are classified as PBLs but are really limited to the delivery of spare parts or components for assembly. A PBL arrangement is inclusive from sourcing to end-customer delivery. While parts contracts have their place, they are not PBLs. Delivery of parts to a depot is a critical portion of a PBL. Moreover, the success of a PBL should not be measured in terms at the depot. A 95 percent service rate to a depot does not necessarily equal a 95 percent service rate to the warfighter.

The Defense Department’s principal goal in pursuing PBL is to achieve improved supply chain performance, generally without an increase in costs. Indeed, the BCA generally requires an outcome in which the cost to the government does not rise and, preferably, is reduced. Private sector firms have the additional requirement of achieving an adequate return on their investment. To achieve this, often they seek not simply to achieve improvement in the supply chain but in the product

itself. On a firm, fixed price PBA a contractor has a clear incentive to find ways of improving availability or reliability of the item in question to improve his returns. Harnessing the natural incentives of private companies is one of the benefits of PBL and should be supported by contracting offices.

THE VALUE OF PBL

Supply chain management (SCM) has come of age in the era of globalization. It reflects the commercial world’s move toward global sourcing and consumption which in turn required more sophisticated logistics and supply chain practices. Companies could only maintain lower costs of production and stay competitive in new markets through modernized logistics which led to just-in-time management of materials and products and supply chains that could operate worldwide, swiftly and accurately. Given the enormous costs and difficulties involved in maintaining such supply chains, corporations increasingly outsourced this part of the business. Supply chain management became a specialty in itself.

With predictable, well-defined theaters for action or potential action, the Cold War defense supply chain was large, linear, bureaucratic and slow. The traditional logistics base and supply chain met such needs reasonably well, as did the old relationship between the DoD and the private sector. Huge numbers of platforms and great quantities of materiel would typically get delayed in depots, arsenals and repair facilities. With the end of the Cold War, the nation was left with tremendous overcapacity in its aging military industrial organic base. Traditional logistics methods and maintenance practices were inefficient and unaffordable, especially in a time of declining defense budgets. Moreover, legacy logistics systems were not adequately responsive to the needs of warfighters engaged in new types of conflicts.

The need for a fresh approach to logistics and maintenance became self-evident. Even as the once venerated military logistics systems became more and more outdated, the rapidly globalizing business world began developing leading-edge logistics systems to allow quick response to opportunity and demand. From computer and auto manufacturers to global cargo companies, innovative logistics systems quickly evolved. New management systems, new technologies, and 24/7

customer needs drove the development of vast networks of services and partnerships. Lessons from this rapid shift in the private sector showed that moving large quantities of material, from natural resources to final product, could be done with great speed and effectiveness. Full service contracts were developed with partners up and down supply chains to guarantee performance while controlling costs. Effective supply chain management could also reduce total inventories and better match available supplies to changing demand.

Classic examples include the painted Ford car. Historically, DuPont sold large volumes of paint to Ford so Ford could paint its cars. Much of the paint didn't adhere to the cars, creating huge amounts of hazardous waste that was expensive to treat. Ford asked DuPont to partner with its engineers in re-formulating the paint and the drying shed and thus redefined the deliverable: no longer the volume of paint but the performance of the paint. DuPont was incentivized to redefine their product sales metrics, shifting from one of gallons of paint sold to numbers of painted cars. DuPont's profit now came not from how much paint it sold, but how little. Ford's costs per car dropped 35 percent, and some of these cost savings were split between the two companies, creating further incentives for DuPont.

In redefining service, Caterpillar created its version of PBAs in Customer Service Agreements for its heavy equipment division, based on price-per-hour and full equipment availability at a job site; if Caterpillar fails to keep the equipment working, it pays a substantial penalty. The incentive is to make sure that heavy machinery is fully operational, all the time. Used in massive construction jobs such as the Atlanta Airport expansion, Caterpillar paid a penalty if its equipment was not ready and available. It had a clear financial interest in keeping its equipment up and running.

These examples are replicated throughout the commercial world, from FedEx and UPS to Maersk; from Dell to IBM. Capital-asset intensive companies need to keep their equipment running in order to generate revenue. Airlines, shiplines, car rental companies, etc. require that their fleets are operationally available and moving so they can sell their capacity. The military really has the same issue but does not always view their capacity the same way. Borrowing lessons learned from the private sector

seemed to be a good idea for the aging organic base, as did teaming up with private partners.

DoD's *2002 Future Logistics Enterprise* is comprised of six complementary initiatives, including Total Life Cycle Sustainment Management (TLCSM), which applies a whole systems based approach linking initial product/service development and acquisition with long-term sustainment. Weapons systems procurement and sustainment have traditionally been managed by functionally distinct offices. This obfuscated huge opportunities to optimize sustainment at the time of a weapons system design and development. Roughly 5-7 percent of total life-cycle cost of a weapons system is in research and development, 13-25 percent in production and approximately 70 percent comes later in operating and sustaining the system. Within the logistics budget, sustainment costs consume 80 percent, but 90 percent of these costs are determined by the design. Obviously, to create a cost-effective weapons system for cradle-to-grave management, it was important to put these pieces together. TLCSM does this by providing an integrated approach to systems development, production and maintenance to optimize cost, reliability and availability of the system.

As DoD implements this massive logistics modernization, its organic base is still tasked with maintaining expensive, obsolescence-challenged systems as well as with providing surge capacity for such systems and parts, from machine guns to missiles. PBL was proposed as a tool to meet both legacy commitments and new systems requirements to achieve the following key objectives:

- Increase operational reliability and availability;
- Decrease logistics response time and footprint;
- Decrease cost per unit usage; and
- Mitigate obsolescence.⁸

By shifting the logistics focus to total life-cycle management, performance results, rapid deployment, flexibility, sustainability, reliability of weapons and warfighter support, PBL involves large scale transformations and challenging goals. It has opened the door for organic facilities to slim down, speed up and tap best practices, and establish/develop new partners in the private sector. Implementation has involved wholesale change in communications, contracts, manufacturing, inventory control,



financing, performance metrics and rewards, and in the institutional cultures, both public and private. The traditional logistics system, with its bureaucratic, regulatory and financial constraints, along with its antiquated production and support practices, has presented a special test for these new objectives.

PBL changes the logistics culture. It encourages the creation of long-term relationships between the organic base and the private sector. It also changes the incentive structure for the original equipment manufacturer or support contractor from a focus on providing parts to one on providing services or even capabilities. The manufacturer is incentivized to make parts last longer and perform better. The program offices, in turn, cease being inventory managers and become partners in improving the overall availability, reliability or performance of the systems for which they are responsible.

PBL — HOW ARE WE DOING?

Performance Based Logistics is helping to transform the military's \$80 billion supply chain and has been applied to air, land and sea systems. According to DoD sources, PBL arrangements have resulted in multiple benefits to DoD including significant cost savings, increased weapons availability, reduced Customer Wait Times, and smaller logistics footprints. The old iron mountains of supplies are being converted to innovative weapons systems delivery, performance and sustainment. Army Materiel Command has helped pioneer many of the successes for PBLs.

PBLs can be "mini-stock," organic, partnership, or total commercial with variations in between. They have been applied to parts, supplies, inventory management and whole platform production and sustainability. Organic

facilities are providing workload support to commercial PBLs; the reverse also applies. There are innovative arrangements including a PBL between Anniston Army Depot and the U.S. Marine Corps under which Anniston provides the touch labor to maintain and overhaul Marine Corps heavy-armor vehicles. Initial successes are measured as improved reliability and readiness, reduced turn-around time in maintenance, reduced inventory and reduced "total ownership" costs.

Among successful programs is the Navy H-60 helicopter support contract for diverse components, from drive trains to rotors. In 2003, the Navy awarded a 31-month PBL contract to Sikorsky for a limited number of components, and based the award on a fixed price per flying hour concept rather than number and type of repairs. NAVICP estimated that the \$113 million contract would result in \$2.9 million short-term and \$8 million long-term savings.⁹ Following this success, the Navy awarded a greatly expanded five-year, \$417 million PBL "Tip-to-Tail" contract to provide supply support, spares and repairs for the H-60 to a Sikorsky-Lockheed Martin joint venture. There is profit incentive for the contractor in keeping the aircraft

available and flying. The Navy gains greater fleet reliability at reduced cost.¹⁰

One of the most innovative PBL programs involves the repair of aircraft auxiliary power units. Participants in this PBL include the Naval Aviation Depots in Cherry Point, NC and Jacksonville, FL, Honeywell and Caterpillar Logistics. Honeywell manages the work flow and provides parts for the auxiliary power units (APUs) using Caterpillar Logistics' enterprise management software. The labor is done at the depots.

The F/A-18 FIRST program is another successful Navy PBL. NAVICP has created a virtual program office that coordinates among a number of government stakeholders in the F/A-18 program and the Navy's supply chain. Boeing manages the array of contractors.

Stryker (a system still in production) is another example of a well-implemented PBL public-private partnership strategy in which support is provided by both General Dynamics Land Systems and Anniston Army Depot. More than 1,000 Stryker vehicles have been produced under this PBL



agreement, two thirds of these at the depot.¹¹ Anniston Army Depot provides General Dynamics with test facilities, performs finishing operations, paints the vehicles and provides production services. General Dynamics conducts vehicle test and acceptance and supplies all parts and material for the production of the vehicle. Both the depot and the contractor perform vehicle assembly. Annual revenue to Anniston Army Depot is estimated at \$2 million. Achieving 97 percent operational availability, Stryker vehicles have performed well under the harsh theater conditions in Iraq. General Dynamics and Anniston also partnered to rebuild the MIA1 Abrams Tank to extend service life, improve reliability and reduce operation and maintenance costs.

Corpus Christi Army Depot and General Electric have had ongoing successes with their PBL partnership. A recent contract for overhaul of the T700 engines will convert the T700 series to power the entire AH-64 Apache and H-60 helicopter fleets. This builds off prior successes in this partnership with reduced overhaul times of 80 percent, tripled production capacity, and backlog elimination for engines while achieving three times operating tempo in follow-up missions. The T700 powered aircraft accounted for roughly 70 percent of the Army's flight hours during Operation Iraqi Freedom. The PBL partnership is expected to lower life-cycle costs while providing increased engine power and twice the normal hot section durability.

The Army's Shadow Tactical Unmanned Aerial Vehicle (TUAV) was awarded the first ever Department of Defense PBL Achievement Award in 2005 for readiness and mission success in Operation Iraqi Freedom. AAI Corporation was the prime contractor for the Army and through its PBL incentives provided a TUAV system which flew more than 12,200 sorties in support of the warfighter in Iraq.

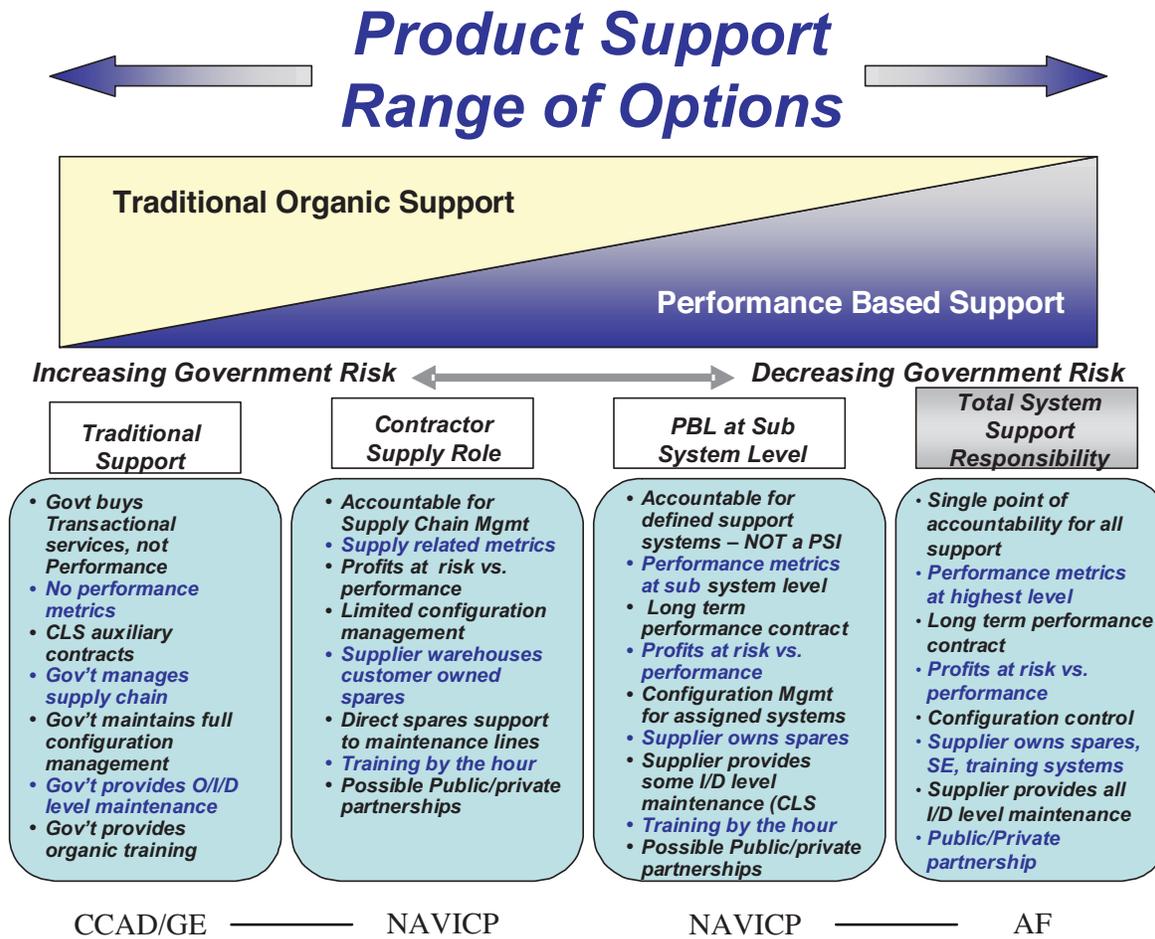
Another form of PBA is a program called Continuous Technology Refreshment (CTR). This CTR process includes an initial analysis to determine whether a particular part is a candidate to be re-engineered to lower cost, increased reliability and technology refreshment. Next, the industry partner develops a Business Case Analysis that includes a Technical Approach, Qualification Requirements, Test Approach, Integrated

Logistics Impacts, Cost Estimates and Schedule. With this information, the requiring government offices can make a determination to enter a contract for the qualification of the item and then produce an initial quantity. This contract effort is funded with Army Working Capital Funds (AWCF) as a normal buy for hardware to replenish supply quantities. It is successfully being used to support a variety of aviation and missile systems.

One of the major challenges for PBL is the establishment of meaningful, measures of effectiveness (MOE). Cost reduction is only one potential MOE and in many instances, has been of lesser significance than other MOEs. Metrics for PBL success employed in various programs include:

- Improved Availability: Close-In Weapons Systems from 80 percent to 89 percent; F-14 Targeting System from 73 percent to 90 percent; F/A-18E FIRST from 67 percent to 85 percent with enhanced reliability; F404 engine availability pushed to 90 percent with maintenance time reduced from 65 to 30 days;
- Better Response: F-18 Stores management dropped Customer Wait Time from 47 to 7 days; APU Customer Wait Time was 35 days, now 6; the Army slashed depot maintenance time on UH-60 Black Hawk T700 engine from 261 days to 76 days;¹²
- Guaranteed Reliability: Radar Warning Receiver improved 53 percent;
- Reduced Inventory: Aircraft tires moved to zero inventory with improved availability from 81 percent to 98 percent; APUs decreased by 40 percent;¹³ and
- Reduced costs: Navy T-45 program estimates savings of \$144 million over 5 years.

PBL agreements can be modified as needed, based on changing warfighter requirements, system design changes, or as in the case of the Navy T-45, performance outcomes. In this latter case, by tracking aircraft availability and higher-than-estimated costs per flying hour, the Navy re-wrote the PBL at the subsystem level



(airframes and engines). This leaves the role of platform integration with the Navy, a strategy that mirrors use of PBL in the private sector.

PBAs can vary from Memoranda of Agreement (MOA)/Memoranda of Understanding (MOU) to formal contracts. Successful PBLs are based in healthy, collaborative relationships between providers (organic and commercial), Program Support Integrators and Program Managers.

Some companies, commands and commodities are more amenable to early PBL application. The rigor of aircraft maintenance requirements seems to make this commodity an easier fit for PBL arrangements. The C-17 program (a system still in production), for instance, has been a huge success for both the Air Force and Boeing. One of the controlling factors has been a firm rule that mechanics in the

theater of Operation Iraqi Freedom may not cannibalize parts from other aircraft; the intact plane must be returned stateside for maintenance on a regular basis. Unlike the stringent maintenance, repair and operations (MRO) guidelines for aircraft and engines, there is no similar set of rules for land commodities such as tanks. In the end, a company like Boeing can predict MRO costs for a C-17 in ways that General Dynamics could not for a returning tank. This has an impact on PBL feasibility and desirability for a commercial vendor. In cases where operator behavior has an impact on usability of a weapons system, there is more opportunity to control this within the aviation environment through training and guidelines. The Army has instituted a materiel maintenance policy¹⁴ to change field logistics support from the historical "repair forward" to "replace forward, repair rear." In theory, this should make MRO costs on its land and marine systems somewhat more predictable. There are also plans to install

sensors on such systems to make system status clear, allowing a return for maintenance prior to failure.

The Army Javelin pilot project was audited by the DoD Office of the Inspector General. It reports that the PBL strategy was not fully implemented hence the Army will not realize the expected performance benefits or cost savings. It calls for the Army to update its PBAs with the warfighters and to modify the contracts with Lockheed Martin and Raytheon to provide life-cycle support incentives and penalties that would better support a PBL strategy.¹⁶ DoD and the Army did not agree with the DoD Inspector General's report. The rationale was that the Javelin program did, in the Departments' view, comply with existing PBL guidance and procedures that were available at the time of the inspection.

The Base Realignment and Closure Act for 2005 moved all the service's depot level reparable procurement management to the Defense Logistics Agency (DLA). This includes a wide variety of systems or system components either under PBLs or potential PBLs — e.g. all tracked and wheeled vehicles, diesel engines, transmissions, aviation engine components, air frames and landing gear. The Army logistics and supply chain management has already instituted "cradle-to-grave" weapons systems life-cycle management, under which DLA has participated in PBL contracts as a partner. How well this has worked is still an open issue. As to the future, the implications are that DLA will need to team with a service early in the design phase of specific public-private partnerships and Performance Based Logistics. That said, the transfer of responsibility for the aftermarket to DLA could improve the management of the DoD supply chain. There is the potential to bundle depot level activities in ground/air/sea systems and missile/electronics across the services.

In expanding the role of PBL, the Army in particular needs to recognize the industrial capability and the role in weapon system sustainment and support that is performed at the various Class 1 installations (i.e. Ft. Riley, Ft. Sill and Ft. Hood). The Army has extensive well-supported industrial capabilities at these sites for ground systems, missiles, electronics, etc. FORCECOM has control over the organizational level of maintenance and controls the Contract Maintenance Facilities at the Class 1 installations. Each of the facilities has Directors of Logistics that plan

and execute organizational levels of maintenance on the weapons system resident at their facilities. But these installations are overflowing with equipment due to the reset requirements from the war in Iraq. Installations are awarding contracts to the private sector to supplement their capacity for reset close to their installation. It is noteworthy that General Dynamics has entered into an agreement with Ft. Lewis on the Stryker for organizational maintenance that complements their agreement with Anniston Army Depot on depot-level maintenance.

Discussions regarding the expansion of PBL need to include consideration of the requirements and problems associated with Class 1 sites. There is a need to standardize repair standards at depot and Class 1 facilities. The PBL concept, if properly implemented, can help to reduce the level of redundant capability at Class 1 and depot facilities. PBL can also assist with resolution of fundamental decisions about where to perform maintenance and reset activities. The funding for Class 1 sites is operating under direct appropriations while reimbursement for specific programs is through the Army Stock Fund.

MAKING IMPROVEMENTS TO THE PBL PROCESS

As with any transformational effort, however, there have been difficulties in achieving the expected levels of enhanced warfighter readiness and weapons systems support. There are questions of definitions and metrics, and of disparate views of a bottom line based on full operational value, not just cost savings. There are issues of legislative constraints, aligned funding mechanisms, training and institutional cultures.

A large part of the problem lies in the tensions between differing objectives: efficiency, effectiveness and compliance — the peacetime desire for efficiency, the wartime requisite for effectiveness, and the need to comply with the laws and policies that may preclude achieving either. One could argue that pursuit of cost-effective solutions is the preferred outcome, but then the practices and policies which promote efficiency and compliance over effectiveness need to be addressed.

Many contractors complain that there is too much focus on cost in developing the BCA. Army BCA policy/guidance does require that recommendations and decisions be based on best value (both operational and economic considerations). NAVICP requires that costs of a PBA be equal to or less than the current arrangement, regardless of the other benefits.

One of the major challenges facing PBL is that it is about outcomes — generally based on a provision of services — and not about products. A PBL provides a service. This is part of the culture change in the logistics community which PBL represents. It is easy to deliver a repaired engine and see what you “bought.” It is not so easy to see a “service.” Therefore, there is a tendency to view the PBL providers as making large profits while delivering little. From the providers perspective it is “new” to recognize revenue against a service.



Legislative Issues

Additional hurdles are caused by legislative and policy constraints. As OSD and the armed services began to address overhauling the logistics support systems in the 1990s, slimming down redundant or excess capacity and increasing participation by and reliance on private sector sustainment, there was a backlash in the Congress. With great concern that DoD was moving too quickly to eliminate industrial base facilities and jobs that might later prove critical to the nation’s ability to respond to a military crisis, Congress enacted legislation to slow the process down. PBLs must be managed in a way that stays within the requirement that the services maintain: 1) a core organic maintenance industrial base; and 2) that the organic base retain not less than 50 percent of the funds appropriated annually for depot maintenance.

Title 10 USC 2464, “Core,” requires the military departments to own and operate (i.e. government employees on government facilities) a large enough depot maintenance industrial base to support the plans of the Joint Chiefs of Staff, and to provide enough workload of the right type to that industrial base to maintain its capability. This section of the law exists to support warfighting with little or no lead times. The purpose is to preserve capabilities that “provide effective and timely response to surge demands and sustain institutional expertise.”¹⁷ Many argue that this merely protects excess infrastructure and creates additional overhead cost burdens that must be factored into weapons systems sustainment costs.

The “50/50” rule established in section 2466 of Title 10 requires that no more than 50 percent of the funding provided by Congress for depot maintenance can be used for external contracting. Again, the purpose is to preserve organic capability. The unintended consequence is that it limits the ability to achieve best value through artificial labor limits. If a contractor performs work under the supervision of the government, these hours count against the 50 percent cap. Tracking the 50/50 division must be reported to Congress on a yearly basis, requiring yet additional cost and labor. All the services are near their limits as they struggle to find ways to meet warfighter needs through more commercial contracts, yet uphold this 50/50 rule.



New legislation for depot maintenance facilities, (reference Title 10 USC 2474) "CITES," allows commercial contractors through public-private partnerships to hire depot maintenance workers as sub-contractors, whether producing defense or private sector products. This legislation facilitates greater use of PBL at depot maintenance facilities.

In 2003, the Administration reissued OMB Circular A-76 to ensure that procurement activities underwent sufficient public-private competition. This required that all agencies assess whether jobs were core or non-core. All core activities were to be performed by government employees and non-core activities were to be competed between government personnel and the private sector. Determination of contract award is based on least cost. This stands in direct contrast to the best value-based determination of success in PBL arrangements. Industry has complained that organic facilities need only give cost estimates as if these facilities were run as a Most Efficient Organization, while industry is required to give detailed cost bids. Moreover, industry notes that costs are defined very differently, e.g. accounting for overhead, and that this again creates unfair advantage to the organic facility.¹⁸

Funding

Part of the potential value of a PBL strategy is to reduce the time and labor involved in contract specifications and estimates for organic and headquarters staff. By focusing on acquiring and sustaining a capability, staff can eliminate costly, time-consuming preparation of prescriptive specifications for processes and parts. In theory, this reduces the complexity of systems management, especially from a funding point of view.

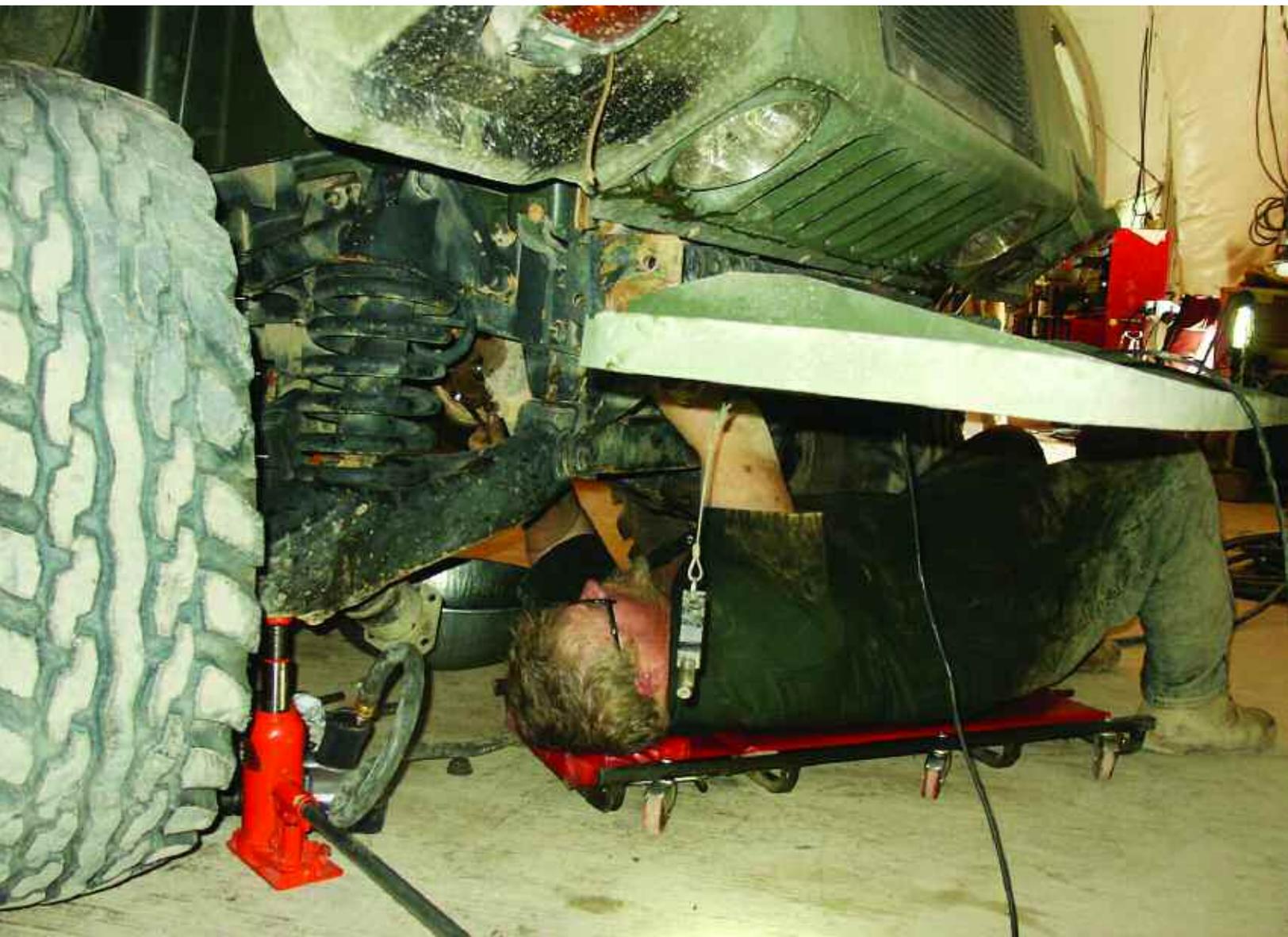
However, there are at least three different sources of funding for MRO and "color of money" is an oft-cited reason for frustration and failure in PBL arrangement procurement, RDT&E, and operations and maintenance. The Army Working Capital Fund budget process defines the available level of funding to support a wide range of logistics and maintenance activities, including PBAs. Management of depot level repairables must submit estimates to the annual AWCF budget process as well as to the procurement-request order number, a six-year rolling budget. Repairs cannot be made until Congress has approved procurement of repair parts in the annual

AWCF budget. This can create delays in program implementation but has the additional impact of causing depots to carry over approved repair work from one fiscal year to the next, to keep the workforce occupied. Upgrades are also restricted; an attempt to structure modernization of the AH-64 Apache helicopter as a PBL was denied when it became clear that the AWCF would lose over \$50 million.

To fulfill the value objective for the warfighter of avoiding obsolescence, the ideal PBL arrangement would allow for obsolescence/Diminishing Manufacturing Sources and Material Shortages risk management to support upgrades of parts and components as part of MRO activities. These parts are considered an upgrade and must be funded from procurement, which may or may not have approved such upgrades in advance.

Various contracts seem to get around these funding restrictions, e.g. those with Rolls Royce and Sikorsky. Sikorsky Aircraft Corporation is working side-by-side with Corpus Christi Army Depot to improve repair/overhaul turnaround time for the H-60. This joint collaboration has improved business processes, depot repair methodology, and more responsive product support, using Corpus Christi Army Depot touch labor with only four onsite contractor jobs.¹⁹

Rolls Royce has responsibility for keeping engines on the wing and flying; if they need to remove an engine for repair, they replace it with one of their own to keep that aircraft flying. Upgrades as part of repair are done to maintain their power-by-the-hour objectives: the less time an engine spends in the shop, the greater the return to their bottom line. The question then is how to replicate this success, especially in addressing “color of money” for other PBL arrangements.



Though there are numerous incentive structures available, there is still a cultural disconnect to creating incentives or disincentives that drive cost-effective solutions, whether in PBL or in traditional arrangements. Understandably, this has not been part of the traditional government mindset. Additionally, Defense Working Capital Funds have zero balance as a goal; and unlike the Ford-DuPont example, there are no provisions for sharing cost savings at the facility level. In fact, there are few examples of systems of incentives or disincentives at work in the public sector other than risk mitigation and compliance.

There is the additional risk of creating a PBL strategy at such a small part or component level that the agreement creates the wrong incentives: parts churning. This defeats the purpose of the PBL by raising costs and total cost of ownership, and raises the issue of the appropriate application of PBL — system, subsystem, component, etc. Where is best value to the warfighter? The Army is planning to approach this issue by placing additional emphasis on applying PBL strategies to secondary items and components. Like the Navy, the Army believes that realizing the “biggest bang for the buck” means attacking the high cost and readiness drivers with a PBL strategy first; over time, an increasing portion of the entire weapon system itself will fall under a PBL strategy.

It is easy to consider PBLs from only one perspective, that of the PM or the CM. These are two different sets of “acquisition realities” for DoD and industry, and at times they conflict, regardless of PBL considerations. Somewhere between the two approaches to acquisition is the optimal cost-effective balance. An optimum long-term solution would involve both, perhaps in a virtual program office. The Navy’s F/A-18 FIRST program is a successful example of a PBL that includes representatives from both communities.

Finally, there is the issue of contracting flexibility. A PBL arrangement only makes sense to a private company if it can accurately manage the flow of work. However, the realities of national security often create unanticipated surges in demand. In addition, government contracts are often of insufficient duration to create incentives for corporations to invest their own resources in the PBL strategy. Any PBL contracts with a commercial entity require enough flexibility to protect the participating



corporations while assuring the government that all necessary services will be provided. Currently, multi-year contracting generally is limited to five years; however the law does permit contract terms of up to 10 years in length. How program managers award the contract varies widely so one company could be incentivized to invest dollars in a facility through a multi-year contract in one service, but limited to single year contracts with another service. It can be a risk averse but costly strategy to limit contracts to single year.

Management, Leadership and Education

Various reviews of DoD progress identify a common set of themes, issues and challenges for the PBL process. These difficulties range from definition, structure and process to management systems and corporate culture. Some of the “bumps in the road” include:

- Lack of top leadership commitment to and/or clarity on using a PBL strategy limits the ability of industrial base facilities to implement, including the U.S. Army Materiel Command;
- The HIMARS and C-17 PBL strategies exposed lack of familiarity with the basics of PBL in a PBL environment, hence the need for contract training;
- Navy Advanced Shipbuilding Enterprise revealed the need for surge clauses, the need to make the deal attractive to industry, and the need for clarity on funding and cash flow;
- Lack of consistent definitions of PBL;

- Lack of clarity as to the appropriate level for PBL strategies that will achieve greatest optimization (whole platforms, subsystems, components, parts, services, secondary items etc.);
- Lack of consistent leadership among PMs and facility commands creates confusion as to opportunity in industry and unpredictable results for headquarters of logistics commands; and
- Questions regarding value, as defined as cost savings and operational effectiveness.

The General Accountability Office has recently released a critique of PBL strategies in the DoD, with a review of 15 major weapons systems across the services.²⁰ In essence the report states that DoD has failed to prove the benefits of PBL, either in terms of improvements in warfighter

effectiveness or cost savings. The DoD concurred with the observation that the underlying BCAs for the reviewed systems were out of date and/or lacked verifiable and reliable data from contractors. But what does this really mean? When the metrics for success include, as directed by DoD, full and best value to the warfighter (weapons availability, reliability, reduced logistics footprint, reduced Customer Wait Time, continuous improvement, and cost effectiveness), then where does the balance lie between cost savings and total value in judging success? There seems to be a real difference of opinion on this matter between the General Accountability Office and the DoD, or indeed in the BCAs required in-house.

As one provider noted, where is the judgment made regarding best value to the warfighter? If the BCA focus on delivery time to a depot or material handling facility, but not weapons system reliability (which, for instance,

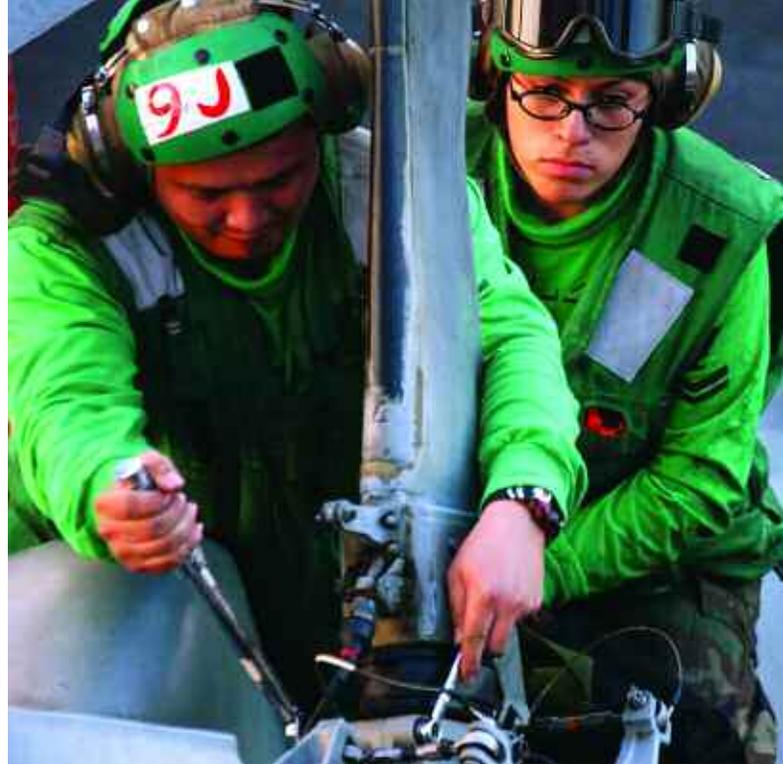


results in materiel sitting on the dock and not in the hands of the warfighter) what do you gain? Or, if a PBL calls for 90 percent parts availability but the status of the residual 10 percent precludes achieving mission ready status, where is best value? The provider may have achieved the PBL requirements but the warfighter lacks the system. The PM decides the best value — operationally and economically. In this case, parts availability is a very poor metric, and is exactly what PBL is trying to get away from. A better metric might be an Operational Readiness Rate of 90 percent — the warfighter gets the weapon system 90 percent of the time. If not, the supplier doesn't get his incentive.

Another problem is the lack of adequate incentives to encourage the services to pursue PBL. Performance Based Logistics requires questioning the status quo and putting personal risk into the equation. It is much easier to hide behind policies than to find alternate solutions. What incentive does the provider have? There is very little risk in the current mode of time/material versus the risk of proving a service level. As mandated by OSD, Performance Based Logistics is the preferred acquisition and sustainment strategy. It must be considered for any ACAT I or II system, but it is not mandatory for it to be implemented.

A major inhibitor to successful implementation of PBLs is the contracting process, specifically as it relates to developing the BCA. As industry has lamented, the process is “too long, tedious and time-consuming.” The complete process from the time a request is placed with industry to final award can often take several years. This kind of delay makes it unattractive for industry to want to partner with the DoD and also makes it difficult for industry to justify to its shareholders the large expenses incurred in competing for such contracts. Likewise, industry is not willing to invest in the necessary infrastructure or processes that would be beneficial to the warfighter.

The causes of the delays are many, but one of the biggest hurdles is establishing a baseline for the PBL. The BCA requires access to historical data and usage rates. This data must be accurate and complete. Inaccurate or incomplete data makes it difficult for both parties to do a BCA. The assessment of risk is a second major impediment to speedy conclusion of the PBA. Risk assessments will vary depending on how the PBA's requirements are



defined. NAVICP, for example, tries to ensure that it includes as requirements only those things over which the prime contractor has control.

PBL — WHERE FROM HERE?

There are clear, numerous challenges for full implementation of logistics transformation in ways that meet current and projected military needs. Common themes to address in enhancing PBL success include:

- Developing and adopting a uniform definition of PBL; one vendor notes that many contracts counted as PBL strategies are in fact Direct Vendor Delivery contracts. The Army recognizes that there are definitional problems with PBL and is developing criteria that will define what constitutes a PBL arrangement.
- Obtaining buy-in on existing metrics and standards, enforcing standards and tracking outcomes among all stakeholders; metrics should ultimately measure delivery to and support of the warfighter; there are debates over the metrics of reliability versus availability or readiness. The Army is developing a standard set of metrics from which a PM can select, including definitions, formulae, etc.

- Identifying business transformation metrics and tracking the same.
- Aligning budgeting, planning and financing to support PBLs.
- Identifying levels at which PBL is to be applied.
- Designing flexible contract templates.
- Developing and rewarding collaborative, innovative organizational relationships.
- Developing incentives to encourage PBL arrangements.
- Facilitating knowledge transfer, nonlinear communication flows and decision-making across traditional stovepipes, service and commercial boundaries.

More broadly, there are issues involving the structure of defense logistics, the processes by which PBL strategies are developed and pursued, and the nature of military/organic base culture that must be addressed if the vision of the Force-Centric Logistics Enterprise is to be realized. Structural issues include the conversion of the organic base from stovepipe hierarchies focused on functions to horizontal integration that facilitates whole systems support in a joint environment. How far and how well depots and arsenals can push the responsiveness of logistics support may also require statutory and regulatory changes that promote greater flexibility in acquisition, sustainment, funding, partnerships and workload requirements.

PBL is a major new step in government contracting and public-private partnerships. Process issues involve significant change in management systems and supply chain processes. There is need to identify and build new core competencies. Some of the early experiences with PBL arrangements suggest a need to examine incentives that “churn” parts of systems, a costly result that defies the objectives of PBLs. And there is also the need to understand that this is no “silver bullet” but a process evolution that will take experience to refine effective implementation.

A number of weapons programs have instituted Six Sigma, Theory of Constraint, Lean Manufacturing and the

Army’s own Velocity Management. Generally, these efforts have been successful. PBL issues that must still be addressed include:

- Finalizing process ownership and establishing accountability, from factory to foxhole.
- Realigning funding and working capital funds.
- Providing training in PBL contracts, communications, and support.
- Improving short- and long-term planning to e.g. reduce backorder rates and Customer Wait Time.
- Implementing standardized database architecture and decision-making software.
- Improving BCA inputs and verification of contractor numbers.
- Improving performance metrics (uniformity, tracking, inputs).
- Creating capability to measure life-cycle costs, fully and accurately.
- Clarifying workload definitions and requirements.
- Managing surge capacity and responding to surge.
- Managing stakeholder relationships.
- Moving to non-hierarchical communications and decision-making.
- Improving supply chain visibility.

Finally, there are the cultural issues. Institutional culture creates the conditions for success or failure. The management adage applies: if you don’t manage your culture, it will manage you. PBL challenges organizations to change old world to new world thinking, to work in collaboration with contractors and customers to create the triple win in an environment where the customers will need to select best value, whether organic or not. This in turn requires a customer service mentality and response, with job and institutional performance metrics that support this focus.



Another hurdle is in building learning organizations that reward, and do not punish failures in, innovation. Finally, cultural conditions must encourage constant information flow in all directions for PBL to optimize warfighter readiness and weapons systems effectiveness.

RECOMMENDATIONS

The DoD and the Army have made significant progress in instituting best practices for organic activities as well as in engaging with commercial partners to create best value for the warfighter. There are clear areas for improvement and some issues that need to be revisited.

1. There is a need for improvements in the Business Case Analyses process of PBLs. These cases would allow independent analysis of what is working, and what needs to be changed in order to achieve best value while protecting organic capacity, whether in surge or reset. Despite the

achievements to date, various legislative, statutory, funding and contracting constraints preclude achieving the most effective warfighter support possible. Appropriate BCA would help determine where the balance lies among these in achieving desired results, including an analysis of full market potential for PBL under different levels of constraint. The BCA should include a thorough investigation of true value to the warfighter in terms of full cost, full value accounting, and operational considerations. The BCA should evaluate all feasible product support strategies, using the Army BCA policy/guide, and serve as the vehicle by which to determine and justify best value support decisions.

As the war with Iraq winds down, it will be important to understand the role of PBL in surge response at the height of the war, as well as the implications for cost savings and support effectiveness with drawdown and reset. Is one a predictor of the other? A pilot project that reviewed

program and facility successes in PBL since the onset of the war in 2003 and followed these same programs and facilities through a defined period of drawdown and reset could inform future steps towards achieving DoD goals for PBL.

2. There is wide agreement that standardization of definitions, metrics, application level (system, subsystem, component, etc.) and contract language for PBLs is needed. A pilot project could develop a template for such standardization. Given that “one size doesn’t fit all” for contracts, it would be important to explore a “menu” based approach for PBL contracts that would create flexibility, yet with a common basis. The Army is establishing common definitions and a single framework.

What is clear is that the measure of merit for PBL should relate to the customer, the warfighter, and not be internally focused on the logistics system or the activities of a particular government or commercial entity. Prior to pursuing a PBL arrangement the interested organization must conduct a BCA. While cost can be an important element, factors such as timelines of response and reliability

of work may be more important to the warfighter. In addition, it is important that contracting organizations distinguish between Direct Vendor Delivery contracts and true PBAs.

3. The services need to decide how much of the supply chain they are willing to turn into PBAs with private contractors. Some private contractors are advocating total system PBAs. This may enhance efficiency but also increase costs relative to a family of arrangements that reflect overall best value. In a number of instances, PBAs necessitate the presence of private contractors on the battlefield. This causes problems for field commanders and private contractors alike.

4. Because of the Army’s move to a two-level maintenance system, AMC and FORCECOM need to work together to develop a common approach to PBL. PBL makes the most sense if it addresses supply requirements as broadly as possible. Maintenance actions that are accomplished at Class 1 sites needs to be included into the 50/50 rule calculations. A two level maintenance system is even more justification for including this into the calculations.





5. Ways need to be identified to reduce the time it takes to develop a PBL arrangement. It is not uncommon for a PBL arrangement to take three or more years to finalize. For this reason, some companies are reluctant to begin the process of negotiations. DoD needs to develop standardized approaches, a rule book, which will reduce the time it takes to develop a PBL. Implementing a PBL strategy includes determining whether or not a PBL arrangement is appropriate. Then requirements need to be specified and the BCA conducted. Differences in data used to conduct the BCA can prolong the process and complicate negotiations with providers.

6. DoD needs to expand education and awareness about PBL throughout the services. The acquisition system is characterized by risk-averse behaviors. PBL is a relatively new concept, often without well-established metrics. As a result, some in the acquisition community are reluctant to pursue PBL programs, despite DoD's clear statements on their desirability. This suggests the need for greater training and guidelines for local commands that will reinforce

consistency in application of PBL definitions and reward distributed leadership decision-making, a model which provides for facile and agile response.

7. DoD needs to identify approaches for creating PBAs while also meeting the legislative requirements for "Core" and "50/50." One approach that has worked well is allowing the depot to become a subcontractor to the PBA prime. Compliance with "Core" and "50/50" can also be made performance requirements in the PBA.

8. DoD needs to establish recognized points of contact on PBL. Among other barriers for the private sector is the lack of clarity regarding the point of contact with the offices responsible for overseeing PBL. A review of points of contact, and how the services are facilitating PBL with industry once contact is made, would provide important input on how PBL arrangements can be streamlined and improved.

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