THE CURRENT STATE OF PERFORMANCE BASED LOGISTICS AND PUBLIC-PRIVATE PARTNERSHIPS FOR DEPOT-LEVEL MAINTENANCE: OPERATING MODELS, OUTCOMES, AND ISSUES

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Executive Summary

This Report provides an in-depth look at the current state of performance-based logistics (PBL)[1] as relates to the U.S. Department of Defense's weapons system maintenance depots. The Report also reviews the public-private partnerships (PPPs) that execute these PBL contracts from the vantage point of success/outcomes, challenges, lessons learned and emergence of best practices in managing these often-complex public-private relationships.

The Report is divided into seven sections. Part I provides a brief overview of the pressures and challenges currently facing DoD with regard to weapons systems sustainment.

Part II assesses the state of depot-level weapons system maintenance today. It discusses PBL and PPPs—what they are and how they're used in the context of depot-level maintenance. This section also reviews the performance of PBL arrangements and PPPs since their introduction 10 years ago, and looks at how PPPs are used successfully in other countries.

Part III discusses PPP management structures—i.e., which party serves as overall managing lead in the partnership arrangement. Insights on the efficacy of the various management structure options are included.

Part IV offers an in-depth case study and performance analysis of the PPP to maintain F/A-18 auxiliary power units at the Fleet Readiness Center-East (FRC-East), Cherry Point, NC. The case study includes the most current performance data on fleet availability, cost savings, logistics response time, inventory savings and other metrics. The results of this PPP are impressive:

- $35 million in total cost savings and cost avoidance
- $8.5 million in annual inventory savings
- Supply material availability average, of the four programs, supported at the depot increased from 65 percent to 95 percent

[1] The term 'performance-based logistics' (PBL) is used to describe the purchase of support as an "integrated and affordable performance package designed to optimize system readiness and meet performance goals." See Page 5 for a more detailed discussion of the concept.

Part V reviews potential opportunities for improvement in PBL and PPPs, and quantifies what these improvements could mean for DoD with regard to budgetary savings.

Part VI summarizes key challenges facing PBL and PPPs today. These challenges include shifting political policy, obstacles to cultural change, the trend toward federal government in-sourcing, and revisions in acquisitions policy and practice within DoD and the federal government. The section discusses the impact of each of these trends.

Part VII provides the authors' specific recommendations as to how the practice of PBL and PPPs could be improved going forward. These recommendations address defense budgetary issues as well as methodologies for improving the consistency and performance of PBL and PPPs for depot-level maintenance.

Part VIII concludes the report with overall observations about the way forward.

Part I: Introduction- Converging Pressures

A convergence of factors is exerting new and highly challenging pressures on the U.S. military maintenance complex. Operations and support costs now account for two-thirds of all defense expenditures, and show every indication of continuing to rise.

> DoD faces the dual challenges of a persistent expeditionary military presence and a period of enduring conflict. Success in this context is measured by DoD's ability to sustain forces and maintain equipment, while preserving its ability to be flexible in meeting the evolving and changing operational conditions of irregular warfare and stateless actors.
>
> DoD also faces a new economic and political environment. Consequently, the Department can anticipate significant financial compression and a mandate to lean itself.
>
> DoD's appetite for resources has not lessened. Personnel cost growth has historically averaged 1 percent a year and operations and maintenance (O&M) cost growth has averaged 2 to 3 percent per year. Various base realignment and closure (BRAC) rounds, acquisition reform initiatives, and other sustainment cost reductions have not been able to effectively control these costs. This may cause resources for acquisition of new weapons systems to become increasingly scarce in the long term.[2]

In effect, the cost of operations and support is consuming the nation's defense budget. Not unexpectedly, this trend has caught the attention of Congress and the Obama Administration, both of which are exerting new pressures on DoD to utilize financial resources more effectively.

Ashton B. Carter, Under Secretary of Defense for Acquisition, Technology and Logistics recently outlined current defense budget challenges and the need for effective response in a memo dated June 28, 2010. In the memo, Carter observed:

> We are a nation at war, and the Department does not expect the defense budget to decline. At the same time, we will not enjoy the large rate of growth we experienced during the years after September 11, 2001. We must therefore abandon inefficient practices accumulated in a period of budget growth and learn to manage defense dollars in a manner that is, to quote Secretary Gates at his May, 2010 speech at the Eisenhower Library, "respectful of the American taxpayer and a time of economic and fiscal distress."
>
> The guidance memorandum I plan to issue will require each of you, as you craft and execute the Department's contracts in coming years, to scrutinize these terms to ensure that they do not contain inefficiencies or unneeded overhead….the guidance will focus on getting better outcomes, not on our bureaucratic structures. But it must also take note of where the government's processes and regulations contribute to inefficiency in our business relationships.
>
> …we in the Department cannot succeed at this task alone...We need the input and involvement of industry….Our industry partners are patriots as well as businessmen. This initiative should contribute to the continuing vitality and financial viability of the defense industry. It is intended to

[2] Department of Defense, *DoD Weapon System Acquisition Reform Product Support Assessment*. November 2009, 18-21.

> enhance and incentivize efficiency and total factor productivity. Most of the rest of the economy exhibits productivity growth, meaning that every year the buyer gets more for the same amount of money. So it should be in the defense economy.[3]

Another recent DoD memo made note of the fact that sustainment costs have five to 10 times more impact on total life cycle costs than do research, development, test and evaluation costs (RDT&E).[4] The figure below illustrates this statement as applied to four different types of weapons platforms.

Type System	**RDT&E**	**Procurement**	**Operations & Sustainment**
Fixed Wing Fighters	9%	30%	62%
Ground Systems	4%	24%	73%
Rotary Wing	6%	29%	64%
Surface Ships	1%	31%	68%

Source: Office of the Secretary of Defense, *Memorandum for Principal Deputy Under Secretary of Defense, SUBJECT: State of Reliability*, June 2010.

As a result of these economic realities, DoD is under increasing pressure to cut costs—including in the area of depot-level maintenance. This pressure has led to fresh scrutiny of performance-based logistics (PBL) contracting and public-private partnerships (PPPs).

Given this political and economic context, it seemed appropriate to undertake a thorough assessment of the current state of the use of PBL and PPPs in DoD maintenance depots. This research paper, therefore, offers a comprehensive review of how PBL and PPPs for depot maintenance have performed over the past 10 years, and explores how these arrangements can support Under Secretary of Defense Carter's mandate to improve efficiency in the logistics and sustainment arena.

The purpose of this report is five-fold:

1. It assesses the current state of PBL and PPPs in depot-level maintenance
2. It reviews specific PPP management models and discusses their pros and cons with regard to performance and cost outcomes

[3] Carter, Ashton B, Undersecretary of Defense for Acquisition, Technology and Logistics, *Memorandum for Acquisition Professionals*, June 28, 2010, 1-3.
[4]Gilmore, J. Michael, Office of the Secretary of Defense, *Memorandum For Principal Deputy Under Secretary Of Defense (Acquisition, Technology And Logistics.*

3. It provides an in-depth performance case study on one of the longest and most successful PPPs
4. It discusses lessons learned and best practices, and
5. It looks to the future, discussing barriers and challenges, and providing recommendations as to how the role and activities of PBL and PPPs could be changed to generate even more opportunities for cost reduction, service enhancement, and other benefits.

Part II: Depot-Level Weapon Systems Maintenance—Current State

A. Size and Breadth of DoD Maintenance Activities

The U.S. military is a highly equipment-intensive military force. In 2008, DoD spent in excess of $132 billion in product support.[5] These funds went to support:

- 30,000 combat vehicles
- 280 ships
- 14,000 aircraft/helicopters
- 300,000 tactical vehicles, plus
- All the systems and subsystems that make up these weapon/equipment platforms.[6]

DoD maintenance activities occur on multiple levels. Generally, they consist of the following:[7]

- *Organizational maintenance*, which consists of the on-equipment tasks necessary for day-to-day operation, including inspection and servicing and remove-and-replace operations for failed components.
- *Intermediate maintenance*, which consists of off-equipment repair capabilities possessed by operating units and in-theater sustainment organizations. These capabilities can be quite extensive, and include remove-and-replace operations for

[5] Department of Defense, *DoD Weapon System Acquisition Reform Product Support Assessment*, 8-10.
[6] Department of Defense, *Depot Maintenance Strategic Plan, Executive Summary*, Part I-4 to I-5.
[7] Ibid.

subcomponents of line replaceable units, local manufacture, and other repair capabilities.

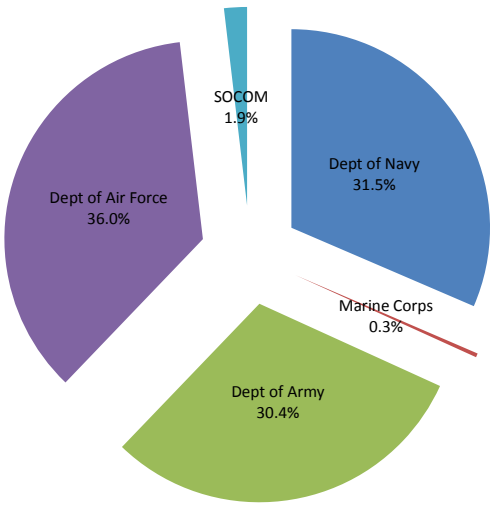
- *Depot maintenance*, which consists of all repairs beyond the capabilities of the operating units, including rebuild, overhaul, and extensive modification of equipment platforms, systems, and subsystems.[8]

DoD operates 20 major maintenance depots in the United States. Moreover, a significant portion of the maintenance funds spent (33 percent in fiscal year 2005) was split between organic and private sector depot support.[9]

DoD's depots are multi-product capable, meaning that each DoD maintenance depot possesses the tooling, fixtures, technical data, and a workforce with the required range of skills and task certifications, to repair and overhaul a wide variety of weapon systems and equipment.[10]

The division of depot maintenance expenditures among the Military Services is shown in Figure 1.

Figure 1: Distribution of DoD depot maintenance workloads (organic and private sector) for fiscal year 2009

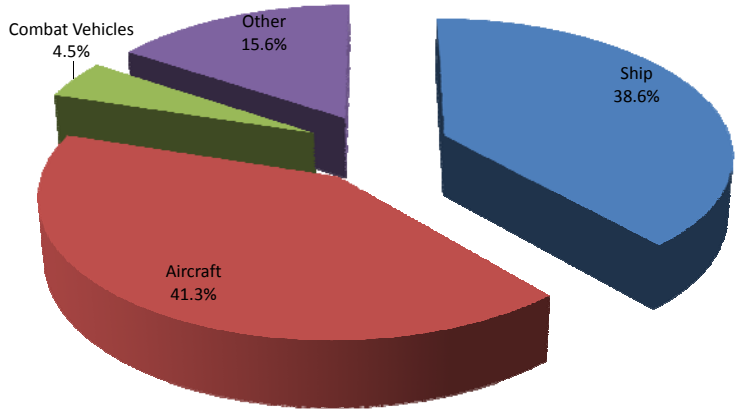


Source: Deputy Under Secretary of Defense for Logistics and Materiel Readiness, *Report to Congress on Distribution of Department of Defense Depot Maintenance Workloads, Fiscal Years 2007-2009*, April 2008.

[8] Department of Defense, *Depot Maintenance Strategic Plan, Executive Summary*, Part I-4 to I-5.
[9] Ibid.
[10] Ibid.

Figure 2 portrays the cost distribution by major commodity groups for depot maintenance.

Figure 2: DoD depot maintenance—costs by commodity group for fiscal year 2008



Source: Office of the Secretary of Defense, *Operation and Maintenance Overview*, February 2008.

The organic maintenance capability provided by the depots also helps to fulfill requirements under Title 10 of the U.S. Code, which directs the DoD to maintain a core logistics capability and limit the percentage of annual funding that may be used for depot maintenance performed by contractors. Current federal law requires that not more than 50 percent of funds that Congress makes available for depot-level maintenance may go to private contractors. (Appendix A provides a summary of the major rules and regulations that direct public-private partnerships and PBL arrangements).

B. Adoption of Performance-Based Logistics

DoD has been relying on contractors to support many of its weapons systems and, in 2001, identified PBL as its preferred support strategy.[11]

> The *Defense Acquisition Guidebook* defines Performance-Based Logistics as "…*the 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*

[11] Gansler, J. S. (2000, September-October). *Gansler testifies before Congress on transformation of DoD logistics. Statement before the House Armed Services Committee Readiness Subcommittee Logistics Transformation Hearing held June 27, 2000*, 68-69.

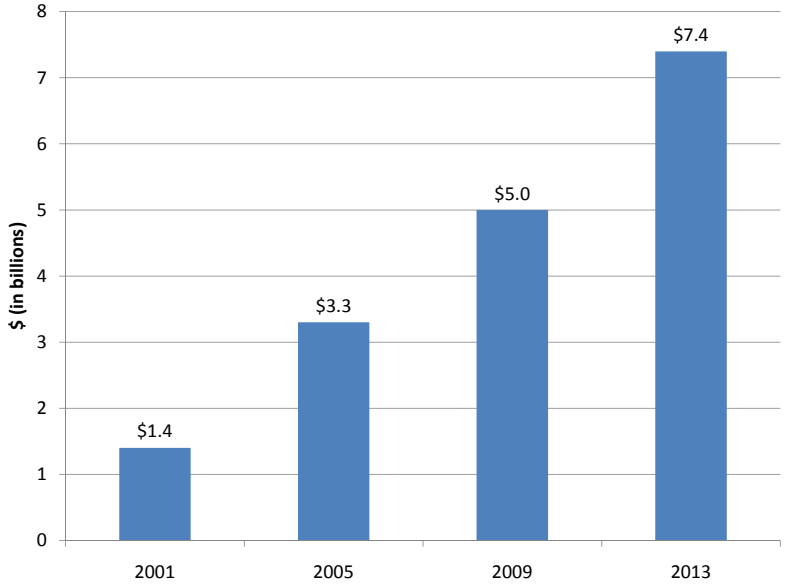
assembly level depending on program unique circumstances and appropriate business case analysis."

PBL arrangements focus on the purchase of measurable performance outcomes (such as the availability of functioning weapon systems) through long-term support arrangements rather than the purchase of individual elements of support—such as parts, repairs, and engineering support.[12] These performance measures ultimately tie into stated performance requirements for the warfighter. PBL is intended to increase weapon system readiness through cost-effective, integrated, logistics chains and public/private partnerships.[13]

Today there are approximately 200 PBL applications in DoD. Spending on PBL projects has more than tripled since their inception — from $1.4 billion in 2001 to $5.0 billion in 2009, a 17.2 percent compound annual growth rate (CAGR). Deloitte Consulting estimates that DoD spending on PBL contracts projects could continue to grow at a 10.3 percent CAGR to reach $7.4 billion by 2013. At the same time, the average PBL contract size has grown from an estimated $26.4 million in the 2000-2002 timeframe, to $59.5 million in the 2007-09 timeframe, for a 12.3 percent CAGR. Deloitte estimates average PBL contract size could continue growing at a rate of 7.6 percent CAGR to reach $85.8 million by 2013.[14]

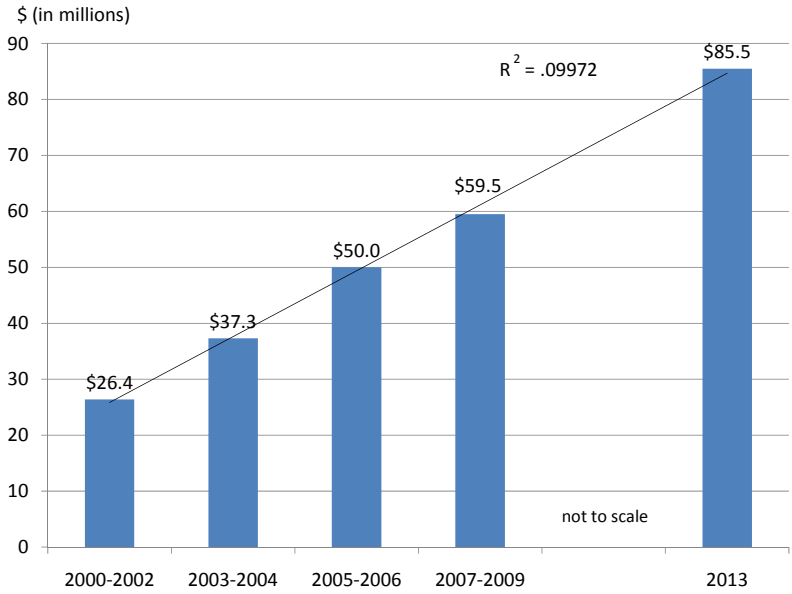
[12] Captain et al., *Performance Based Logistics*, 3.
[13] Landreth et al., *Performance Based Logistics for the FA-18/S-3/P-3/C-2 Auxiliary Power Unit at Honeywell: An Applied Analysis*.
[14] Captain et al., *Performance Based Logistics*, 2.

Figure 3: Annual DoD spending on PBL contracts



Source: Captain et al., *Performance-Based Logistics* (Deloitte), 2010.

Figure 4: Growth in size of PBL contracts



Source: Captain et al., *Performance-Based Logistics* (Deloitte), 2010.

PBL differs from DoD's traditional approach to weapon system sustainment in that these arrangements establish a single-point of direct accountability for a weapon system's life- cycle product support. This designated support integrator can be the original equipment manufacturer (OEM), a systems integration contractor, or a DoD engineering

or logistics activity.[15]

PBL was and is transformative.[16] It is designed to aid DoD in addressing what former Under Secretary of Defense for Acquisition, Technology and Logistics Jacques Gansler calls the "death spiral" of decreasing readiness and increasing costs:

> Our equipment is aging. We cannot replace much of that equipment in the near future. Consequently our operations and maintenance (O&M) costs will continue to escalate. This results in reduced readiness—yet at increasing costs. And, unless we reverse the trend quickly and deliberately we face what I have described as a "death spiral"—a situation where reduced readiness requires us to keep removing more and more dollars from equipment modernization and putting it into daily O&M, thus further delaying modernization, causing the aging equipment to be over-used, further reducing readiness, and increasing O&M—a vicious circle.[17]

By shifting resources to PBL contracts, the intent (of the DoD) is to gain significantly improved readiness at significantly reduced costs.

C. Use of Public-Private Partnerships

In some PBL arrangements, DoD's organic depots partner with industry in what are known as public-private partnerships (PPPs).[18] DoD outlined its policy concerning PPPs in a 2002 memorandum, which stated:

> It is DoD policy to use public-private partnerships for depot maintenance. In particular, the Military Departments shall shape partnership agreements to support DoD and Defense-related workloads. Partnerships can improve utilization of DoD facilities, equipment, and personnel. Partnerships can bring a wide variety of additional benefits to the parties involved in the agreement, and also foster improved support to the warfighter.[19]

A PPP for depot maintenance is an agreement between an organic depot maintenance activity and one or more private firms to perform work or utilize facilities and equipment. Depot capabilities that can be covered by such agreements include:

- Manufacturing (e.g., fabrication of parts, assembly of components, and final assembly and painting of end-use items)
- Repair (e.g., diagnostics, refurbishment, overhaul and rebuild)
- Technical services (e.g., testing and analysis, repair process design and in-

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[15] Office of the Secretary of Defense, "*Depot Maintenance Long-Term Strategy*" *Report to Congress.*
[16] Department of Defense, *DoD Weapon System Acquisition Reform Product Support Assessment*, 8-10.
[17] Gansler, *Statement before the House Armed Services Committee Readiness Subcommittee*.
[18] Office of the Secretary of Defense. "*Depot Maintenance Long-Term Strategy*" *Report to Congress*.
[19] Morales, *Memorandum for Secretaries of the Military Departments, January 30, 2002.*

service engineering).[20]

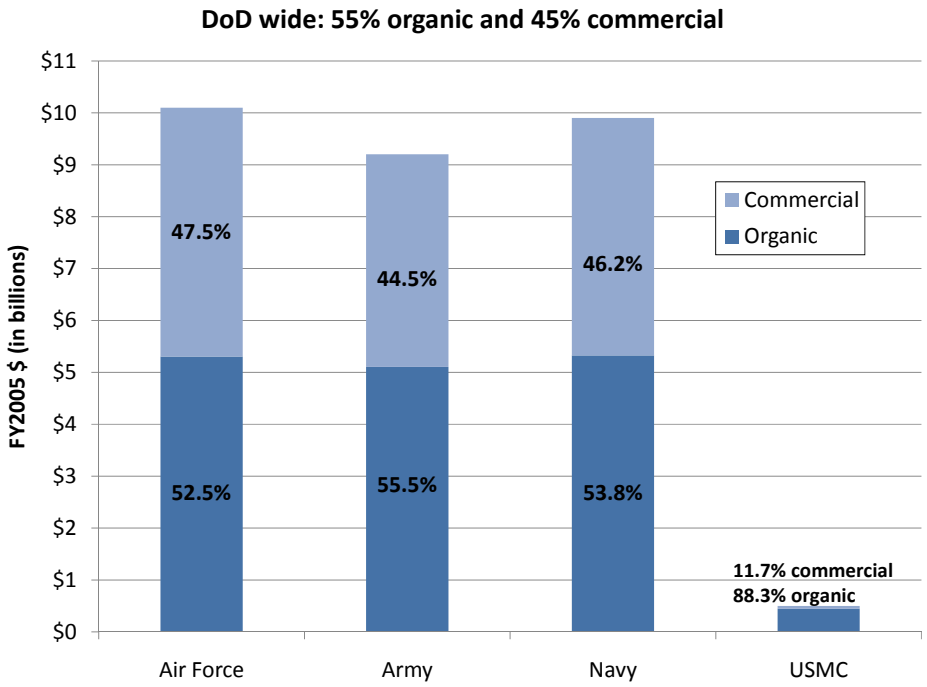
In general terms, PPPs aim to achieve five key military objectives:

- **Operational availability**. The percent of time that a weapon system is available for a mission or ability to sustain operations tempo.
- **Operational reliability**. The measure of a weapon system in meeting mission success objectives (percent of objectives met, by weapon system). Depending on the weapon system, a mission objective would be a sortie, tour, launch, destination reached, capability, etc.
- **Cost per unit usage**. The total operating costs divided by the appropriate unit of measurement for a given weapon system. Depending on weapon system, the measurement unit could be flight hour, steaming hour, launch, mile driven, etc.
- **Logistics footprint**. The government/contractor size or "presence" of logistics support required to deploy, sustain, and move a weapon system. Measurable elements include inventory/equipment, personnel, facilities, transportation assets, and real estate.
- **Logistics response time**. The period of time from logistics demand signal sent, to satisfaction of that logistics demand. "Logistics demand" refers to systems, components, or resources, including labor, required for weapon system logistics support.[21]

Figure 5 shows the distribution of depot maintenance workloads—commercial and organic—fiscal years 2007 through to 2009. Figure 6 depicts depot maintenance workload by major weapons system.

[20] Office of the Secretary of Defense, *"Depot Maintenance Long-Term Strategy" Report to Congress*.
[21] Landreth et al., *Performance Based Logistics (PBL) for the FA-18/S-3/P-3/C-2 Auxiliary Power Unit (APU) at Honeywell: An Applied Analysis*, 12.

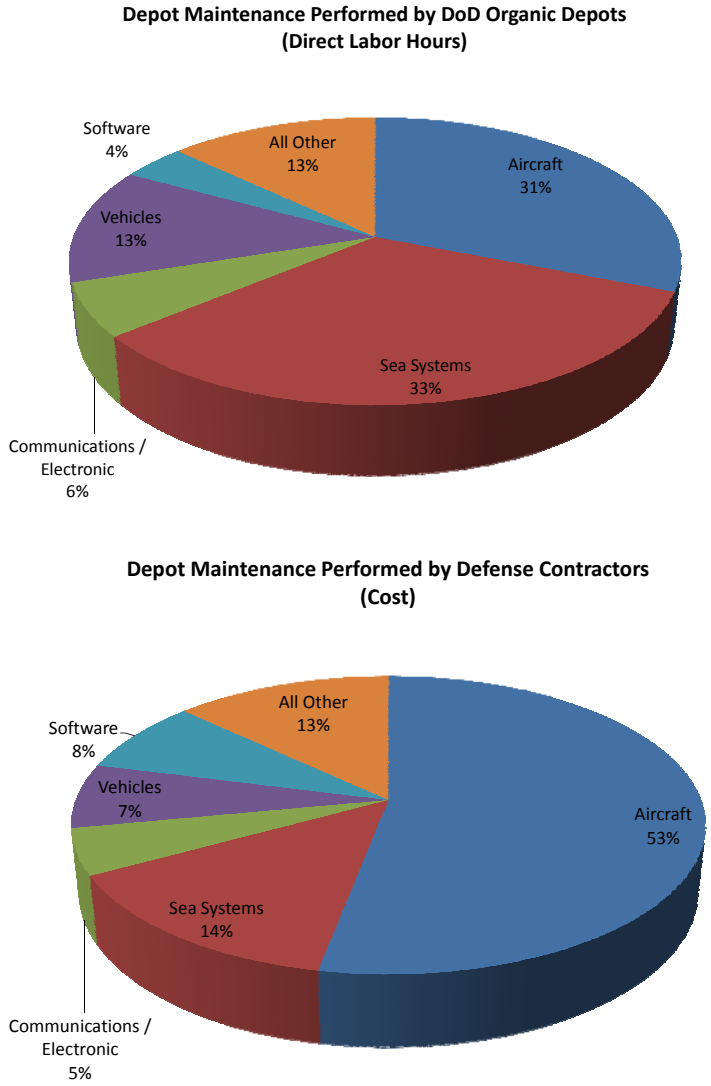
Figure 5: Breakdown of workload mix for depot maintenance – organic vs. commercial[22]



Source: DUDS (LAMAR) Distribution of DoD Depot Maintenance Workloads: Fiscal Years 2007 through 2009, April 2008.

[22] Department of Defense, *DoD Maintenance: Fact Book 2008*.

Figure 6: Workload distribution by major weapons system category[23]



Source: FY 2007 estimates from the Joint Depot Maintenance Activity Group's *Depot Maintenance Business Profile* 2006-2009.

With PPPs that are PBLs, because contractors are compensated based on performance, and may be penalized for performance shortfalls, they have a great incentive to maintain and modernize existing platforms and systems, conduct continuous product improvements, and to develop low-cost solutions for addressing aging systems.[24] After all, the fewer repairs and less downtime, the more profitable the contract is for the commercial PBL provider.

[23] Department of Defense, *DoD Maintenance: Fact Book 2008*.
[24] Goure, *Performance-Based Logistics: A Primer for the New Administration*, 3.

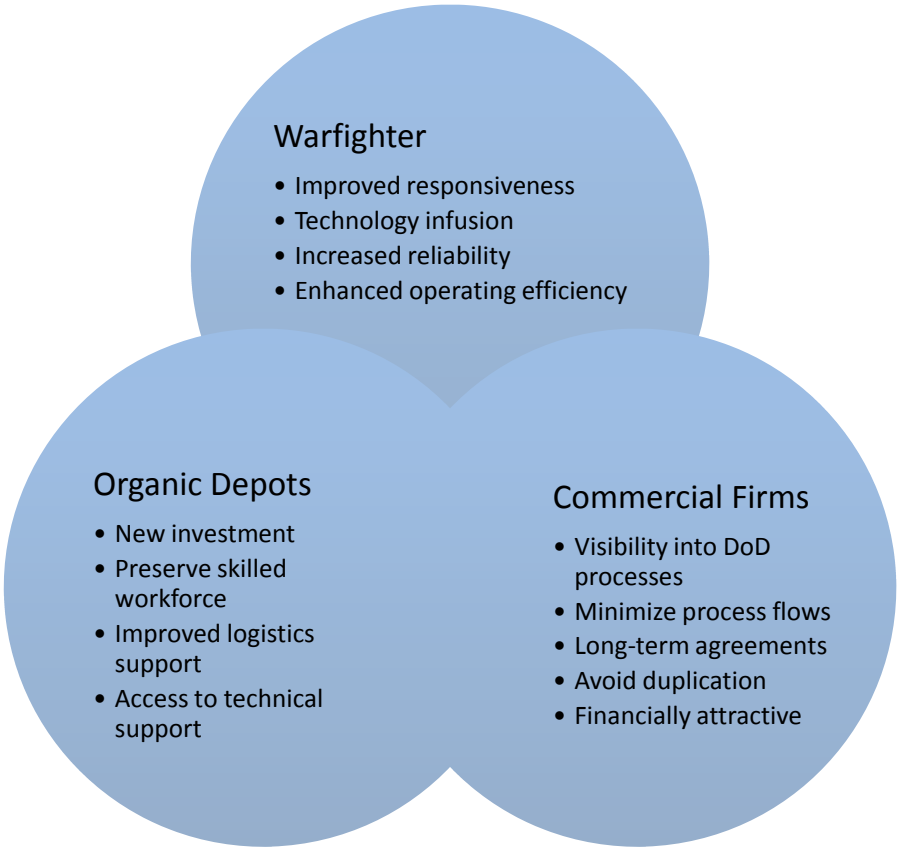
The Fleet Readiness Center-East-Honeywell-Caterpillar Logistics partnership profiled in Part IV of this paper successfully deployed this approach to improve reliability for aircraft auxiliary power units (APUs).

OEMs that lead public-private partnerships typically do so because they are the weapon system developer. Hence, their personnel are highly experienced on the weapon system they support. In contrast, the military is constantly developing its workforce by providing on-the-job training to its junior maintainers. As a result, at any given time, a large percentage of the military maintenance workforce is fairly inexperienced, and the more experienced personnel are often conducting the training rather than performing maintenance tasks. In addition, military maintainers typically work on more than one aircraft model during their careers and thus do not develop the level of expertise OEMs do with a single model.[25]

Three different parties stand to benefit from a partnership. The parties may be represented as the depot itself, the commercial partner, and the ultimate end user or 'warfighter.' Figure 7 displays the potential benefits each of the three parties may realize in the partnership.[26]

[25] Boito et al., *Contractor Logistics in the U.S. Air Force*, 50.
[26] Erickson, *Public-Private Partnerships for Depot-Level Maintenance*, 15-16.

Figure 7: Three-way benefits with public-private partnerships[27]



Source: Erickson, Steven R. *Public Private Partnerships for Depot-Level Maintenance*, Logistics Management Institute, March 2002.

From the perspective of the organic depots, partnerships can have a number of positive effects. Commercial partners may bring in capital investment that would otherwise be unavailable. When partnerships involve facility and base operating support leases, they spread overhead across a broader base and reduce the incremental cost of production for all of a depot's workloads. When partnerships involve the production of goods or services, the added workload helps preserve the depot's skilled labor base and again, broaden the cost base for overhead allocations. Direct access to commercial expertise and management methods help improve overall logistics support. When the commercial partner is also the OEM, a depot can obtain improved access to technical support for depot maintenance production and process issues.[28]

Partnerships provide built-in surge capability that might not be readily available in the commercial sector. Most importantly, partnerships improve day-to-day support

[27] Erickson, *Public-Private Partnerships for Depot-Level Maintenance*,16.
[28] Ibid, 16-17.

responsiveness by applying the best of organic and commercial capabilities to the support requirement.[29]

A successful performance-based agreement (PBA) generally requires a continuous flow of high-quality information about the status and history of every element of the supply chain and about the parts, systems, or even platforms subject to the contract. This visibility is provided by state-of-the-art information management systems used by commercial firms. Continuous and accurate information enables the PBL contractor to anticipate demand, identify and implement desirable change in design, fabrication or transportation of items, and even alternative maintenance practices.[30]

D. PBL-PPP 10-Year Performance Record

There is ample empirical data that demonstrates that PBL works and produces desired benefits in the key performance metrics of availability, reliability, cost, and logistics footprint and operations. In this section of the report, we highlight recent PBL successes.

The first of these reports comes directly from Randy Fowler, Assistant Deputy Under Secretary of Defense (Materiel Readiness). Figure 8 outlines the total cost benefits achieved in four PBL programs.

[29] Erickson, *Public-Private Partnerships for Depot-Level Maintenance*, 17-18.
[30] Goure, *Performance-Based Logistics: A Primer for the New Administration*, 3.

Figure 8: Examples of PBL cost benefits

Program	System Description	PBL Owner	Total Cost Benefit (in millions)[31]
C-17	Transport aircraft	Air Force	$477
F/A-18	Fighter/attack aircraft	Navy	$688
AH-64	Attack helicopter	Army	$100
TOW-ITAS	Integrated mobile missile and targeting system	Army	$350
Sentinel AN/MPQ-64	Mobile Air Defense	Army	$302
CH-47	Cargo helicopter	UK Ministry of Defence	$250

Source: Fowler, Randy T, Assistant Deputy Under Secretary of Defense (Materiel Readiness), *Misunderstood Heroes: Batman and Performance-Based Logistics*, Defense AT&L, January-February 2009.

Figure 9 summarizes some of the performance benefits in availability improvement and cycle time reduction accrued by five PBL program applications. Performance benefits tend to be characterized in two primary dimensions—readiness or availability improvements, and cycle time reductions measured by logistics response time and repair turnaround times.[32]

Figure 9: Examples of PBL performance benefits

Program	System Description	PBL Owner	Availability Improvement (1)	Cycle Time Reduction (2)
F/A-18	Fighter/attack aircraft	Navy	23%	-74%
Tires	Aircraft tires	Navy	17%	-92%
F-22	Fighter	Air Force	15%	-20%
UH-60 Avionics	Utility helicopter	Army	14%	-85%
F404 Engine	Jet engine for the F/A-18 aircraft	Navy	46%	-25%

(1.) Ready for tasking, operational readiness, mission capable, etc.
(2.) Logistics response time or repair turnaround time

Source: Fowler, Randy T, *Misunderstood Heroes: Batman and Performance-Based Logistics*, Defense AT&L, January-February 2009.

[31] The report did not identify the time period for the cost benefit calculations.
[32] Fowler, *Misunderstood Heroes: Batman and Performance-Based Logistics*.

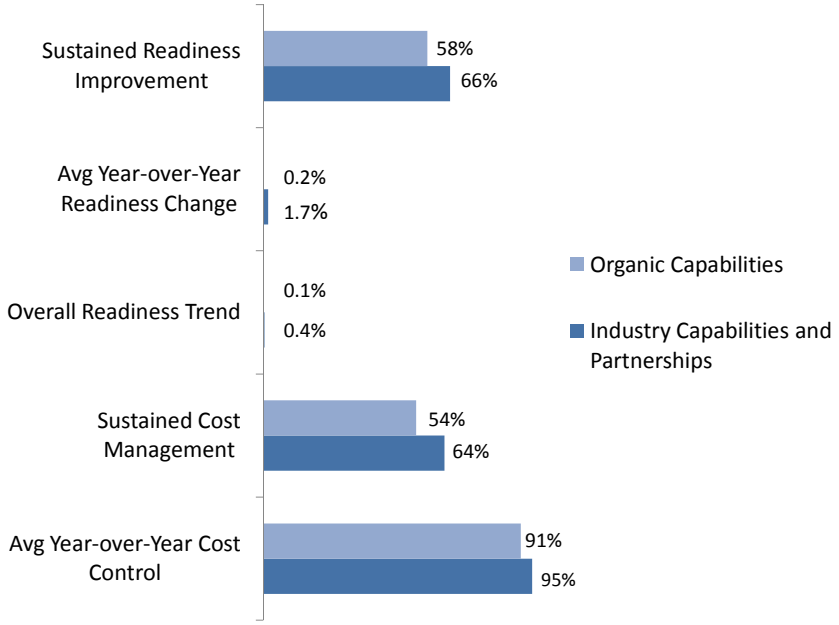
In a 2009 study, the Office of the Secretary of Defense reported that, according to a recent evaluation, 99 of the 348 depot maintenance partnerships demonstrate "explicit product support performance improvement". (The other 249 partnerships were not classified in the "explicit product support improvement" category and their performance was unidentified.)

Additionally, in that study, 48 arrangements reported some form of improved business practice or updated technology to the depot-level maintenance activity as a result of the partnering. The most common category reported was exposure to or implementation of a commercial best business practice. In most cases best business practices led to an improvement on the depot floor such as increased efficiency, improved schedule conformance, or quicker turns. In that same study, cost avoidances totaling $158.3 million were reported in 22 arrangements; 84 of the maintenance public-private partnering arrangements increased facility utilization at the DMA.[33]

The 2009 study data show that strategies involving partnering with industry yield an 8 percent higher sustained readiness than pure organic approaches. They also yield a 10 percent higher sustained cost management (cost management translates into reduced costs of services, with increased value being delivered to the customer), as shown in Figure 10.[34]

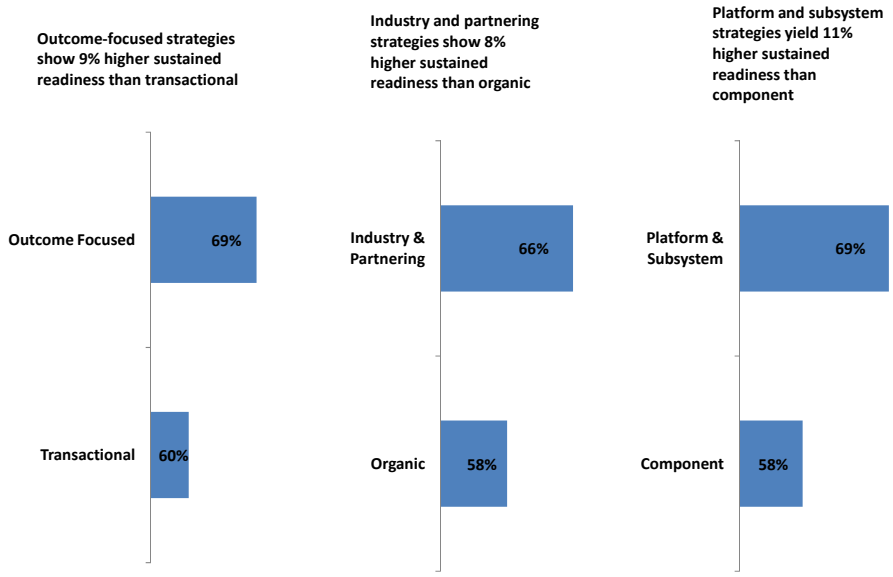
[33] Office of the Secretary of Defense, *Public-Private Partnerships for Depot-Level Maintenance through the End of Fiscal Year 2006*, II-27-II-28.
[34] Department of Defense. *DoD Weapon System Acquisition Reform Product Support Assessment*, 45-46.

Figure 10: Industry partnerships yield better readiness improvement and cost management than organic-only depot operation



Source: Department of Defense, *DoD Weapon System Acquisition Reform Product Support Assessment*, November 2009, 46.

Figure 11: Subsystem and platform-level industry partnerships designed to achieve target outcomes yield higher sustained readiness improvement

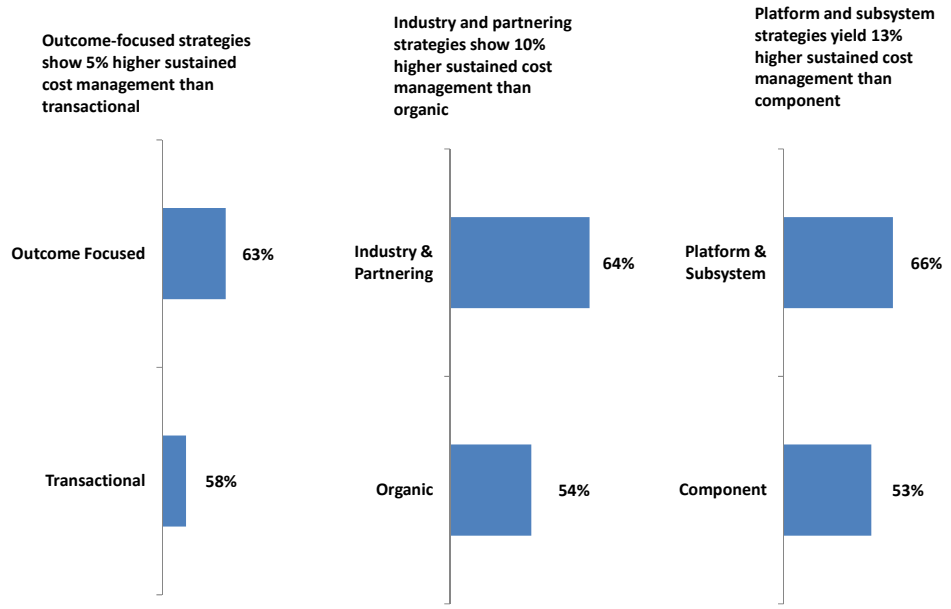


Notes:

1. Sustained Readiness Improvement is the number of years over the span of 1999 through 2007 where a weapon system saw no decline in availability or saw a decline of lesser magnitude than the domain average.
2. F-22, FMTV, MTVR, and Stryker data does not span from 1999 through 2007 due to their newness.
3. USAF C-130 APU contract awarded to Honeywell in August 2007—not enough time had occurred yet to include it as a partnership for this evaluation.

Source: Department of Defense, *DoD Weapon System Acquisition Reform Product Support Assessment*, November 2009, 88.

Figure 12: Subsystem and platform-level industry partnerships designed to achieve target outcomes and manage cost best



Note: Sustained Cost Management is the number of years over the span of 1999 through 2007 where a weapon system saw no increase in cost per unit usage or saw an increase of lesser magnitude than the domain average.

Source: Department of Defense. *DoD Weapon System Acquisition Reform Product Support Assessment*. November 2009, 88.

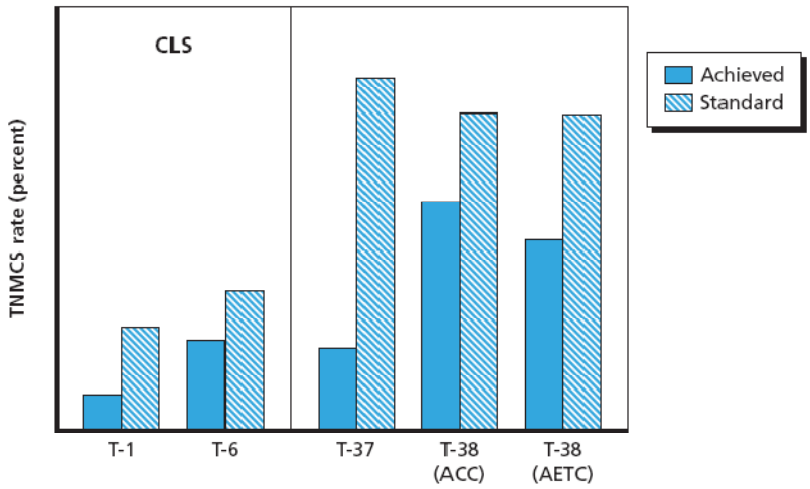
The Rand Corp. last year conducted a thorough assessment of contractor logistics in the Air Force. Rand made two kinds of comparisons of supply-system performance. One comparison measured the Air Force standard for total "not mission capable" for supply (TNMCS) for each aircraft against the achieved rate over the three-year period from the second quarter of FY 2003 through the second quarter of FY 2006. The term "supply" in this context refers to the maintenance support supply system for aircraft. The achieved rate represents the average of the quarterly rates over the three-year period.[35] NOTE: Because the study data remains classified, only relative values are displayed.

The second comparison is of the achieved TNMCS rate between contractor logistic support (CLS) and organic aircraft with the same mission. The comparisons are shown in Figures 13-16. The solid bar on the left of each pair is the achieved TNMCS rate, and the hatched bar on the right of each pair is the TNMCS rate standard for the aircraft indicated. Of course, the lower the TNMCS rate, the better.

[35] Boito et al., *Contractor Logistics in the U.S. Air Force*, 93.

Figure 13 shows TNMCS rates relative to Air Force standards for selected trainer aircraft. The T-1 and T-6 are contractor logistics support (CLS) aircraft and the T-37 and T-38 are organically supported, except that the T-38Cs have CLS for equipment that is unique to the C variant. All the trainer aircraft met the relevant Air Force standards, even though the standards for the CLS programs are set to be much more difficult to achieve. It is important to note that The T-1 and T-6 are significantly newer aircraft.[36]

Figure 13: TNMCS achieved rates and standards, selected trainer aircraft[37]

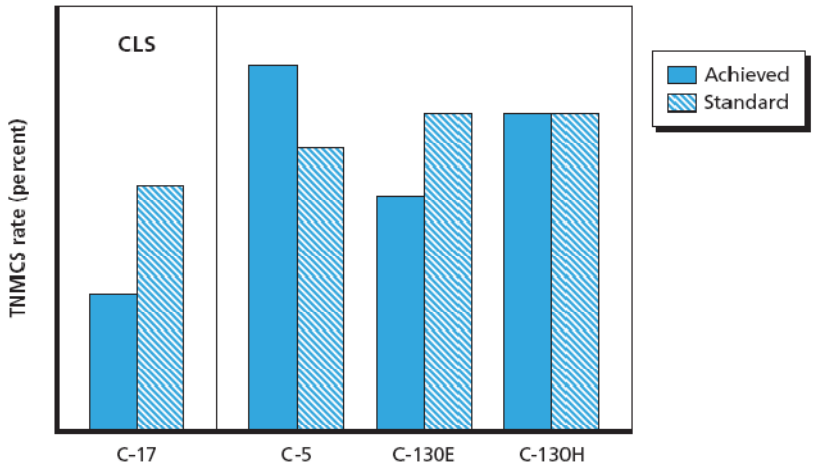


Source: MERLIN data for the active fleet, average rate from second quarter FY 2003 through second quarter FY 2006, October 2006.

Figure 14 shows achieved TNMCS and the standard for active-duty cargo aircraft, including the C-17 ICS/CLS aircraft and organically supported cargo aircraft. The C-17 has a more-demanding standard, and its achieved performance was better, both absolutely and relatively, than that of the organically supported aircraft. The C-130E and C-130H aircraft met their Air Force standards. The C-5 does not, but has always been notorious for reliability problems.[38]

[36] Boito et al., *Contractor Logistics in the U.S. Air Force*, 94.
[37] Ibid.
[38] Ibid.

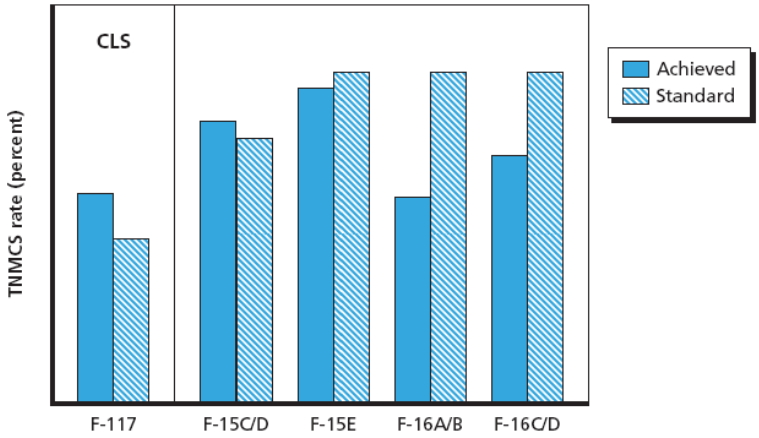
Figure 14: TNMCS achieved rates and standards, selected cargo aircraft



Source: MERLIN data for the active fleet, average rate from second quarter FY 2003 through second quarter FY 2006, October 2006.

Figure 15 shows achieved and standard TNMCS rates for active duty fighter aircraft, including the F-117 CLS aircraft and selected organically supported fighters. The F-117 program had two unusually bad quarters during this period, which pushed its average achieved rate above its more-demanding standard. It still performed better than most of the organic fighters, except that its TNMCS rate was nearly equal to that of the F-16A/B. All the organically supported aircraft, except the F-15C/D, met their standards, which are looser than those for the F-117.[39]

Figure 15: TNMCS achieved rates and standards, selected fighter aircraft[40]

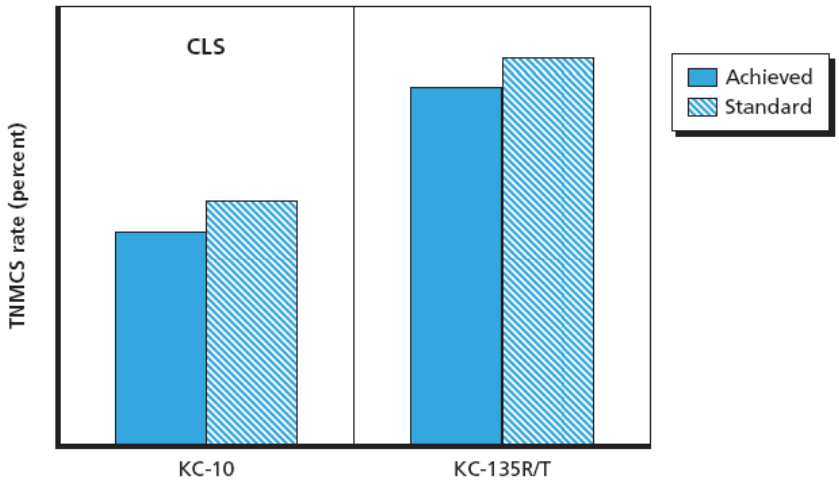


Source: MERLIN data for the active fleet, average rate from second quarter FY 2003 through second quarter FY 2006, October 2006.

[39] Boito et al., *Contractor Logistics in the U.S. Air Force*, 96.
[40] Ibid.

Figure 16 shows achieved and standard TNMCS rates for active duty tanker aircraft, including the KC-10 CLS tanker aircraft and the organically supported KC-135R/T variants. Both aircraft met their standards, although, once again, the CLS aircraft has more difficult standards than does the organic aircraft. However, the KC-10 has an average age of roughly 22 years and the KC-135 is twice as old; and the KC-10 has significantly lower break rates.[41]

Figure 16: TNMCS achieved rates and standards, tanker aircraft[42]

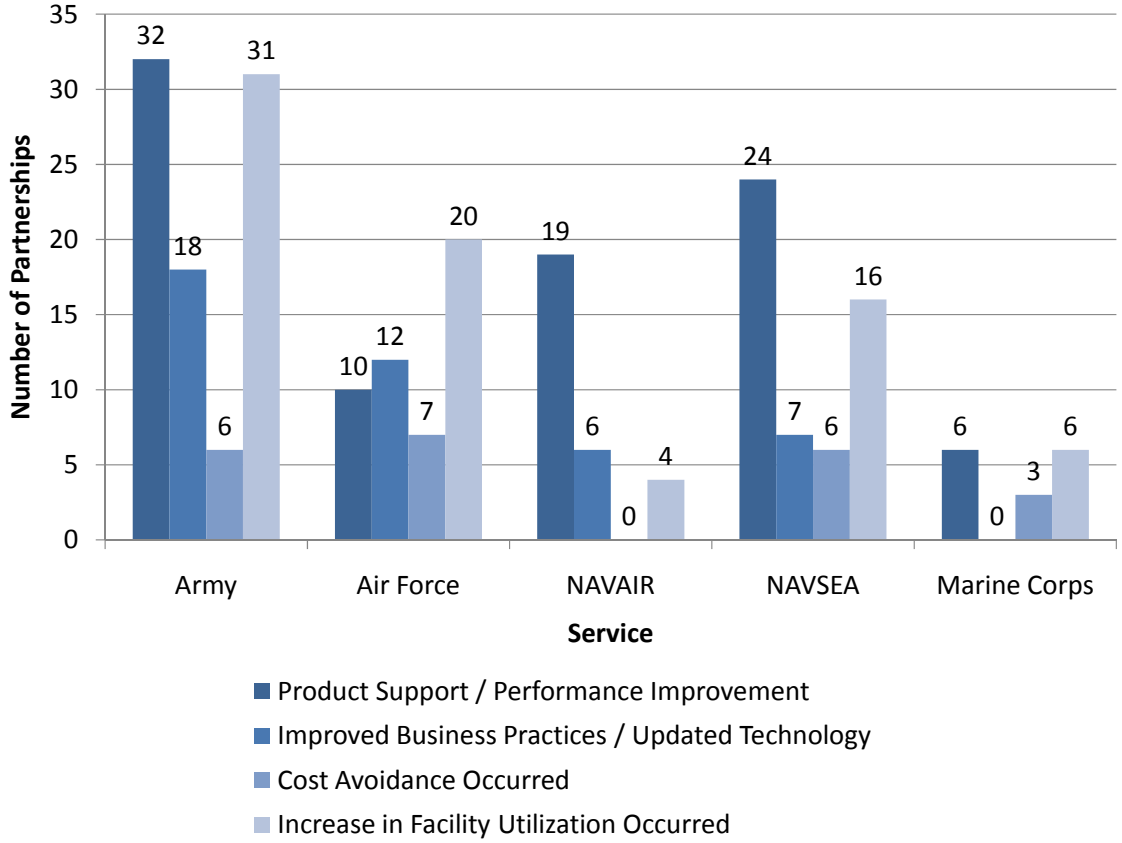


Source: MERLIN data for the active fleet, average rate from second quarter FY 2003 through second quarter FY 2006, October 2006.

Finally, we highlight a 2005 report, issued by the Office of the Secretary of Defense (OSD), on public-private partnership performance. The OSD report showed performance improvements generated by PPPs in the areas of reduction in the amount of time associated with the maintenance, repair or overhaul of items, or systems and reduction in the amount of time for related material/parts support (Figure 17).

[41] Boito et al., *Contractor Logistics in the U.S. Air Force*, 97.
[42] Ibid.

Figure 17: Performance improvements due to PPP, by service



NOTE: Cumulative public and private sector performance improvements in FY 2005 and earlier public-private partnerships by service.
Source: Office of the Secretary of Defense, *Public-Private Partnerships for Depot-Level Maintenance through the End of Fiscal Year 2005*, April 2006, II-21-22.

Other performance benefits included reduced product support/logistics costs, improved weapon system availability, reliability and maintainability, enhanced performance of the weapon system for the warfighter, improved crew training, efficient use of labor, improved quality and enhanced testing/diagnostic/inspection.

> Forty-four arrangements entailed some form of improved business practice or updated technology to the [depot] as a result of the partnering. The most salient category reported was exposure or implementation of a commercial best business practice. In most cases best business practices led to an improvement on the depot floor such as increased efficiency, improved schedule conformance, or quicker turn-around-time. By having new technology at the [depot], the capability to accomplish workload to support core and weapon systems.[43]

Cost avoidances totaling $158.3 million were reported in 22 of the 348 PPP arrangements through the end of Fiscal Year 2005. (Cost avoidance was not measured as a category for

[43] Office of the Secretary of Defense. *Public-Private Partnerships for Depot-Level Maintenance through the End of Fiscal Year 2006.*

the balance of the PPPs studied.)

The OSD report indicated that cost avoidances covered a number of areas. Some of these cost avoidance areas also incorporated cost savings as well. Thus, the combined cost avoidance and cost savings fell into several categories, including:

- Process improvements in production and repair (cost avoidance and cost savings).
- Reduction in the need to create redundant capability at multiple facilities, either organic or commercial (cost avoidance).
- Reduction and/or elimination of transportation costs (cost savings).

Seventy-eight of the 264 depot-level maintenance public-private partnering arrangements through Fiscal Year 2005 involved increased facility utilization at the depot, according to the OSD report. In 68 of these arrangements, increased facility utilization resulted from additional workload accomplished by federal government direct-labor workers. Eighteen partnerships increased facility utilization through accomplishment of workload by direct-labor contractor personnel. In eleven arrangements, a combination of contractor and federal government direct-labor workers accomplished workloads that increased facility utilization.

E. Public-Private Partnerships Usage in Other Countries

It is interesting to note that, while the United States continues to debate the merits of public-private partnerships for weapons system support, other countries have embraced it enthusiastically, with very positive results. In the United Kingdom, for example, public-private partnerships are known as “through-life support.”

Beginning in 1998, the UK Ministry of Defence (MoD) began changing the way in which it buys and maintains equipment, and supports the armed forces. A core element of the defense restructuring has been an emphasis on the development of strategic, long-term supply partnerships between defense customers and suppliers. Major supply partners are now expected to take on significant responsibilities throughout the concept, assessment, design, manufacture, in-service, and disposal (CADMID) cycle. Supplier responsibilities for managing specific product/service platforms, such as aircraft or ships, on behalf of the MoD are anticipated to stretch for several decades.

The concept of "through-life management" is the term now used to describe the management of the product-service lifecycle throughout the CADMID cycle. It has revolutionized the nature of the UK Ministry of Defence's relationships with its materiel and equipment suppliers.[44]

Boeing has such an arrangement with the UK Ministry of Defence covering support for 40 CH-47 Chinook helicopters. The program has exceeded all expectations, pushing the "mission capable" rating to 90 percent, 15 percent higher in each of the last three years than was anticipated.[45]

Australia also has embraced the through-life support concept as a means of controlling costs and unifying sustainment activities to produce better performance outcomes. The contracts awarded by the Australian DoD are far broader in scope than those traditionally awarded by the U.S. DoD.

For example, Boeing Defence Australia has been the prime contractor to the Royal Australian Air Force for all F-111 through-life support activities for more than 14 years. During this time, Boeing not only maintained the F-111 fleet, but also designed and developed technologies and modifications to improve the operational effectiveness of the aircraft.

Boeing Defence Australia's association with the F-111 began in 1995, when the company (then Rockwell) commenced work on the first aircraft under an avionics update program. Six years later, Boeing was awarded the F-111 weapon system business unit (WSBU) contract. At the time, it was the largest and most far-reaching contract awarded by the Commonwealth of Australia and covered all major upgrades to the fleet's airframe, avionics and weapons system including:

- Avionics Update Program—An upgrade of the fleet's avionics system from analogue to digital to improve reliability, supportability and maintainability of the weapons system.

[44] Johnsen et al., UK *Defence Change and the Impact on Supply Relationships*.
[45] Ott, *PBL 2010 Update, Overhaul and Maintenance*, April 2010.

- Fleet maintenance—All airframe maintenance from basic level through to significant maintenance.
- Block Upgrade Program—Completed in 2005, the program involved a range of significant upgrades to the F-111 fleet and included system analysis, design, modification, and testing of the fleet.
- AGM-142 Integration—The design and integration of the software and hardware to support the AGM-142 missile, the longest range air-to-ground missile currently available within the Australian Defence Force. The program was completed in December 2007.
- Radar warning modifications.

In addition to these programs, Boeing has also operated facilities in support of the F-111 fleet that performed fuel tank inspection and repairs, cold-proof load testing to identify defects or fatigue cracks within the airframe at temperatures around—42°C, aircraft safety ground testing, and installation of new wings on the entire F-111 fleet as well as ongoing maintenance and inspection for wear and tear, corrosion, delaminated bonded panels, fatigue and cracks.

Australia will retire its F-111 fleet at the end of 2010, with Boeing continuing to provide all maintenance services until that time.

Australia also established a performance-based through-life support program for the C-130J aircraft in March of 2009 with Australian Aerospace and its key subcontractor Lockheed Martin. The goal of the C-130J Project was to deliver:

- Improved delivery of sustainment services.
- A performance-based support arrangement through to C-130J planned withdrawal date of 2030.
- A long term relationship with industry to deliver improved value for money.
- Risk transfer from the Defence Materiel Organisation (DMO) to the contractor.

The company recently signed a long-term agreement, as part of a partnership consisting of Australian Aerospace, Lockheed Martin and Standard Aero, to provide total life-cycle support (TLS) for the Royal Australian Air Force C-130J fleet. The partnership, called "Team Aero," will provide broad-based maintenance of the fleet that includes:

- Supply chain management
- Technical support
- Fleet upgrades management
- Engineering systems integration
- OEM relationship management, and
- Propulsion support

Both the United Kingdom and Australia have found that a broader, integrated approach to public-private partnerships is a highly successful model for reducing government defense expenditures for system sustainment while guaranteeing better outcomes.

Part III: Public-Private Partnership Management Structure—Who Leads?

As the previous pages indicate, there are numerous studies that assess performance for PPPs and PBL, as well as reports which compare the maintenance performance of PBL/PPP arrangements with that of organic depot performance. While these studies discuss performance improvements and savings, they do not go into specifics about program costs or cost reductions. Typically, this information is not available because of activities-based costing and the depots and/or shared because of the proprietary nature of the contracts.

In our extensive literature search, we found no studies that looked specifically at the connection between a PPP's organizational/management structure and its performance. By this we mean reviewing which structure produces better results: one in

which the depot is the lead or one in which the commercial partner is the lead. For thoughts on this question, therefore, we turned to PPP veteran Gerry Tonoff, currently manager for product support business models, BAE Systems. Tonoff previously spent 28 years (on the government side) at the Naval Inventory Control Point (NAVICP), including one year as the NAVICP facilities manager and three years as Chief of Staff for the NAVICP Acquisition Executive. The Acquisition Executive Office's mission was to craft and oversee execution of the acquisition strategy for both the Philadelphia and Mechanicsburg, PA, NAVICP operating sites. This office wrote the Direct Vendor Delivery (DVD) for repairables strategy that evolved into the current PBL scenario.

Additionally, Tonoff was the Contracting Officer for the Honeywell Total Logistics Support (TLS) Contract that facilitated and incorporated the first public/private partnership for depot workload where a contractor assumed responsibility for an organic depot's work and quality. The TLS program won the 2005 Secretary of Defense PBL Award for Component-Level PBLs. Tonoff was also the Contracting Officer for the F/A-18 E/F "FIRST" PBL contract. The FIRST Program won the 2007 Secretary of Defense PBL Award for System Level PBLs.

Tonoff comments on PPP success drivers and optimal organizational structures:

> I am a PBL zealot. I remember the bad old days, so I know what support was like prior to PBL. It didn't work. In public-private partnerships, you get tremendous results when the public and private parties actually bring the best of both together. Results are much better than what's produced by a pure organic or pure commercial maintenance operation, no doubt about it.
>
> The next question is who should lead the public-private partnership? Should it be the depot, the OEM, an integrator, a logistics partner? I think generally, it works best when the OEM is the lead. The OEM knows the piece of equipment or weapon system the best, since they designed and built it. The OEM can have the holistic management view, and direct the repair work, and direct the logistics partner.
>
> Where do integrators fit in to the management equation? It depends on where you are in the product's lifecycle. If you're early in the lifecycle of a weapon system, the system is still in production, you don't have mature performance data and you have an unstable design, there's value in going through an integrator. Why? The integrator can be responsible for integrating the procurement of spare or repair parts as well as for integrating replacement part data into production.
>
> It's difficult to do a true PBL contract if you don't have good data, because early in the lifecycle, you can't project repair costs out 10 years. You just don't have the history of how the system performs in the field over time and usage. This means the major subsystems will continue to change, evolve, be adapted and reengineered based on actual performance. So you can set up PBL-like scenario where an integrator is responsible for managing those reliability related production changes with the sustainment end of the system. An integrator would have visibility into both ends of the cycle, so is best suited to managing them.

> An integrator also may be the best option in the case of a small weapon system. In such cases, it doesn't make sense to break out the components and give them to different OEMs.
>
> As a weapon system matures and becomes a legacy system, you then look at pulling some of the major systems or subsystems off and giving them to the OEM to manage. You would now have plenty of performance history data with which to forecast demand and manage repair cycles. Because the OEM built the system in the first place, it is best suited to manage its repair. However, the OEM may contract with the depot for labor, for facility space, for equipment; it may also contract with logistics service providers to manage the system's supply chain.[46]

The OEM-led scenario Tonoff describes is exactly the management construct in place at one of the oldest and most successful public-private partnerships in the military—the partnership between Honeywell, Caterpillar Logistics and the Fleet Readiness Center—East at Cherry Hill, NC. This partnership is now in its tenth year. The next section of this paper delivers a 10-year report card on the partnership's performance.

Part IV: A 10-Year PBL Success Story

A Performance Report on the Public-Private Partnership to Maintain F/A-18 APUs at the Fleet Readiness Center-East, Cherry Point, NC

In 2000, the U.S. Navy signed a contract with Honeywell International Inc. and Caterpillar Logistics Services Inc., as a subcontractor, to undertake a public-private partnership (PPP) for maintenance of the F/A-18 Fighter Auxiliary Power Unit (APU) at the Fleet Readiness Center-East (FRC-EAST), located at Cherry Point, NC (formerly known as the Naval Aviation Depot, or NADEP, Cherry Point). Today, more than 10 years later, the partnership, which involves the depot, Honeywell, and Caterpillar Logistics, is still going strong. This performance-based logistics (PBL) contract is considered a true win-win by all parties involved. It has produced a 91 percent improvement in logistics response time as compared to pre-partnership performance, and reduced average production turnaround time from 73 days in 2004 to 24 days in 2009.

[46] Tonoff, *Interview*.

This 2010 case study serves as an in-depth examination of the APU maintenance partnership at Fleet Readiness Center (FRC)-East.[47] It offers extensive new information on how the PBL arrangement has performed in the ensuing five years and over the entire 10-year life of the contract. The new quantitative data shows clearly measurable, dramatic improvements in reliability and cost management for the Cherry Point APU program.

A. Background of the APU Partnership

Naval aviation depots, such as the Fleet Readiness Center (FRC)-East, maintain responsibility for the maintenance, repair, and overhaul of major aircraft weapons systems. These depots seek to maximize aircraft operational availability, reduce the length of maintenance operations, reduce costs, and increase reliability for aircraft and inventory within established budget parameters. [48]

The FRC-East—located approximately 90 miles southwest of Cape Hatteras, NC—is charged with "supporting Naval Air Systems Command (NAVAIR) in providing the warfighter with Absolute Combat Power through technologies that deliver dominant combat effects and matchless capabilities."[49] This means that the Center is responsible for maintenance, engineering, and logistics support for numerous aircraft including: the AV-8B Harrier, the medium-lift transport H-46 Sea Knight helicopter, the H-53D Sea Stallion and H-53E Super Stallion helicopters, the AF MH-53J helicopter, and the APUs for the F/A-18, C-2, S-3, P-3, and C-130 aircraft.[50]

The public-private partnership dedicated to maintaining the F/A-18 APU is the oldest such arrangement in place at FRC-East. Because of its success, the FRC-East-Honeywell-Caterpillar Logistics program has been expanded to include other maintenance components and an additional location (FRC-Southeast in Jacksonville).

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[47] See previous report on the topic by Lucyshyn et al., *Improving Readiness with a Public-Private Partnership: NAVAIR's Auxiliary Power Unit Total Logistics Support Program.*

[48] NOTE: The SOW (2000) defines availability as: "the number of requisitions delivered within specified timeframes divided by the total number of requisitions received by the contractor, expressed as a percent". The contractor is expected to maintain at least 90 percent availability and is monetarily penalized for each percentage point below 90 percent. The penalty amount increases for availability equal to or less than 82 percent.

[49] NAVAIR web site, http://www.navair.navy.mil/index.cfm?fuseaction=visitor_info.cp.

[50] Lucyshyn et al., *Improving Readiness with a Public-Private Partnership: NAVAIR's Auxiliary Power Unit Total Logistics Support Program*, 8.

B. The Partnership at FRC-East

During the late 1990s there were significant readiness problems with the APU common to the FA-18/S-3/P-3/C-2 aircraft. Aircraft availability suffered because of backlogged APU maintenance. Depot overhaul turnaround time averaged more than 60 days and shortages of piece parts required for the overhaul were commonplace. Availability hovered at 65 percent, and on-time deliveries to the field were at 25 percent.[51]

An APU is a self-contained generator used to start aircraft engines and provide power to the aircraft while on the ground. APU availability ultimately impacts aircraft availability, making it a vital piece of equipment to maintain as "fully operational."

Honeywell manufactures the APUs used by the FRC-East. Prior to the FRC-East-Honeywell-Caterpillar Logistics PPP, APU maintenance—as well as data and inventory management, and parts delivery—was performed by the depot. The pre-partnership lifecycle of these APUs can be described as follows:

> Honeywell manufactured the original APUs on a NAVAIR production contract. The new APUs were then deployed to the field through the normal naval supply system, and returned to FRC-East when they were in need of depot-level repair. Such maintenance could involve repair, overhaul, or replacement of APU components and parts, with the Defense Logistics Agency (DLA) supplying FRC-East with the consumable items needed for repair work. Once an APU had been repaired to operational condition, it was returned to the field for operational use.[52]

Honeywell initially provided NAVICP with a proposal to conduct the depot overhaul of the APU, but NAVICP also wanted to fix the low readiness and parts shortages, in addition to improving availability and reliability, and reduce cost per flying hour. Honeywell's second proposal, therefore, "provided a total logistics support package including overhaul, field service engineering, technical manual maintenance and supply chain management of the APU and associated piece parts."[53] Honeywell was subsequently contracted to provide total logistics support (TLS) for the APU.[54]

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[51] Landreth, Clifford J., Richard H. Wilhelm II, and Laura L. Corporon. *Performance-Based Logistics (PBL) for the F/A-18/S-3/P-3/C-2 Auxiliary Power Unit (APU) at Honeywell: An Applied Analysis.*
[52] Ibid.
[53] Ibid, 1-2.
[54] Ibid.

TLS for the APU includes overall program execution, customer and engineering support, total asset visibility, configuration and obsolescence management, quality assurance, repair and overhaul of the APU, and continuous improvement with guaranteed increases in availability and reliability. Under this PBL contract, Honeywell provides program management, engineering expertise and process infrastructure, while subcontracting with FRC-East for the repair and overhaul "touch labor," and with Caterpillar Logistics to provide supply chain-related services that include demand forecasting, as well as inventory and transportation management.[55]

Prior to embarking on the partnership, the Navy conducted a business case analysis (BCA) to estimate the economic viability of implementing a multiple-year direct vendor delivery/total logistics support (DVD/TLS) contract with Honeywell. The BCA concluded that the Navy would save $13.98 million over 10 years by awarding the DVD/TLS contract to Honeywell—which was revised to a $34.8 million savings when additional benefits were considered.[56] In 2007, the Navy identified that the cost savings were greater than $50 million.[57]

Figure 18 outlines the chronology of the Honeywell FRC-East PBL partnership.

Figure 18: Honeywell FRC-East partnership chronology[58]

November 1999	Work begins on preparing the Honeywell FRC-East subcontract named "Commercial Service Agreement" (CSA).
June 2000	Total Logistics Support (TLS) contract awarded.
June 2000	CSA signed establishing the public-private partnership between FRC-East and Honeywell through a five-year base contract with five one-year renewal options.
July 2000	FRC-East inducts first APU under public-private partnership.
April 2001	FRC-Southeast in Jacksonville and Honeywell discuss benefits of partnering to repair F/A-18 (F404) main fuel control (MFC).
July 2001	FRC-Southwest and Honeywell discuss possibility of partnering to repair various Honeywell Avionics Products.
October 2001	Contract amended to add 36-200 E/F APU to program
December 2001	Contract amended to add KC-130 APUs
June 2003	Contract awarded for June 2005—June 2006 period

[55] Landreth, Clifford J., Richard H. Wilhelm II, and Laura L. Corporon. *Performance-Based Logistics (PBL) for the F/A-18/S-3/P-3/C-2 Auxiliary Power Unit (APU) at Honeywell: An Applied Analysis*.
[56] Ibid, 13-14.
[57] Heron, Jeff. "Performance-Based Logistics." *Presentation at 2007 SOLE/DAU/LOGSA.* Slide 28.
[58] Lucyshyn et al., *Improving Readiness with a Public-Private Partnership: NAVAIR's Auxiliary Power Unit Total Logistics Support Program*, 23. Updated via email exchange with Paul Cusack at Caterpillar Logistics (June 4, 2010 and June 10, 2010).

October 2003	Contract amended to add P-3 engine driven compressor
June 2004	Contract amended to add F/A 18 main fuel control; Contract awarded for June 2006—June 2007 time period
June 2005	Review of Honeywell FRC-East CSA for extension options.
June 2006	Contract awarded for June 2007—June 2008 time period
June 2007	Contract awarded for June 2008—June 2009 time period
June 2008	Contract awarded for June 2009—June 2010 time period

The public-private partnership between Honeywell and the FRC-East, included support not only for the F/A-18 APUs, but also the APUs on the C-2, S-3, P-3, and C-130 aircraft. As the table above indicates, the FRC-East signed a 10-year (with five base years and five one-year options), firm fixed price "power-by-the-hour" PBL contract with Honeywell, using Caterpillar Logistics as the major subcontractor.[59] Figure 19 outlines the distribution of responsibilities among the three contracting parties:

Figure 19: APU TLS program team responsibilities[60]

Honeywell	Caterpillar Logistics	FRC-East
Overall program execution	Inventory management	Repair and overhaul
Customer support	Warehousing	Engineering support
Engineering support	Packaging, handling,	Technical publications
Fleet reps	Storage, and transportation	Logistics support
Reliability engineering	Total asset visibility	Continuous improvement
Quality assurance	Customer support	
Repair and overhaul	Service delivery	
Configuration management	Continuous improvement	
Original equipment manufacturer (OEM) Parts	Electronic data interchange/electronic commerce (EDI/EC)	
Continuous improvement		

Honeywell, as the prime contractor, procures and manages all consumable items used by the FRC-East to repair the APUs. Honeywell subcontracts the repair effort back to the FRC-East on a cost-reimbursable basis. It also subcontracts with Caterpillar Logistics to provide data management, inventory management, parts delivery to the Naval Air Station Supply, and warehouse management.[61] These team responsibilities mapped directly on to the stated goals of the partnership between Honeywell and Caterpillar Logistics, which included: (1) optimizing customer service to increase availability, (2) minimizing inventory investment, (3) calculating safety stock at the

[59] Lucyshyn et al., *Improving Readiness with a Public-Private Partnership: NAVAIR's Auxiliary Power Unit Total Logistics Support Program*, 25-26.
[60] Ibid.
[61] Ibid.

individual stock keeping unit (SKU) level, (4) improving personnel productivity with technology and management, and (5) reducing and controlling inventory assets.[62]

The FRC-East APU partnership contract established specific performance parameters which Honeywell and Caterpillar Logistics were expected to meet. These included:

- Maintaining 90 percent availability of repairable items. Failure to achieve 90 percent availability would trigger incremental payment reductions.
- CONUS (continental United States) routine requisitions must be delivered within 48 hours.
- OCONUS (outside the continental United States) requisitions must be delivered within 96 hours.
- Shipping to all CONUS/OCONUS locations occurs 24 hours per day, 365 days per year.
- Increasing mean flight hours between unscheduled APU removals (MFHBUR) by the following percentages per aircraft:

Aircraft:	Reliability Increase:
F/A-18	45 percent
C-2	15 percent
S-3	25 percent
P-3	390 percent

- Participating in a gain sharing formula if reliability surpasses guarantees by more than 25 percent.
- Providing surge capability of 120 percent of annual flight hours.
- The ability to incorporate repairables from any other service, so as to reduce price per flight hour by spreading fixed costs over a larger business base. (Note: the contract is a firm fixed price, "power-by-the-hour" agreement.)

C. How the Partnership Works

Under the current "power-by-the-hour" contract arrangement, Honeywell is responsible for repairing APUs, supplying all repair parts (through Caterpillar Logistics),

[62] *Integrated System Support: An Overview Presented by the Honeywell/Cat Logistics Alliance*. PowerPoint Presentation, Slide 25.

and delivering APUs to their destinations. From the time an APU comes in to the depot for repair, Honeywell and Caterpillar Logistics, as noted above, have 48 hours in CONUS and 96 hours OCONUS in which to repair it and deliver it back to its field destination.

Using its proprietary demand-forecasting system, Caterpillar Logistics developed a 30-day forecast that projects APU spare parts demand down to the individual part-number level. This forecast is based on a monthly flight-hours projection supplied by the Navy.

Caterpillar Logistics uses this information to maintain appropriate spare parts inventory. It also utilizes the information to forecast and schedule depot labor. Although the third party logistics service provider (3PL) forecasts repair labor requirements, all repair work is performed by Navy depot personnel. Paul Cusack, Commercial Manager at Caterpillar Logistics, explains further:

> Traditionally, the government pays the original equipment manufacturers (OEMs) to do the work. In this partnership, we turned that model upside down. For example, the Navy forecasts 100,000 flight hours for the month of May, and pays Honeywell for that workload. Caterpillar Logistics forecasts what parts we'll need based on the Navy flight hours forecast, Honeywell buys the parts, Honeywell pays Caterpillar Logistics to manage the inventory and arrange delivery transportation, and Honeywell pays the depot for labor. So we have a commercial entity paying the government entity for labor, for turning the wrenches.

Accurate, state-of-the-art demand forecasting is critical in enabling Caterpillar Logistics to anticipate repair parts and labor needs at the FRC-East. The 3PL bases its 30-day forecasts on three elements: (1) projected monthly flight hours, (2) historical knowledge of repair orders in that time period, and (3) knowledge of the details of the repair type—e.g., whether the repair is a simple check-in test or a full-overhaul.[63] Forecasts also take into account historical and forward-looking flight hour data—such as knowing that the National Guard ramps up flight hours significantly in the summer.

Prior to launching the FRC-East-Honeywell-Caterpillar Logistics partnership, the Cherry Point depot did not have this forecasting capability. Today, the forecast serves as the vital underpinning for the entire APU repair operation at FRC-East. It enables Honeywell and Caterpillar Logistics to anticipate needs and provide timely delivery for the warfighter.

[63] Cusack, *Interview*, 26-May.

According to Cusack, "Before Cherry Point had this type of forecasting, it was taking the Defense Logistics Agency (DLA) 17 days, on average, to deliver a part to the repair line. We reduced that to two-hour delivery from the warehouse to the depot. But we found the repair line actually didn't need that level of speed. We were showing up with parts they weren't ready to use." Consequently, Caterpillar Logistics backed off to a four-hour (lower cost) line-side delivery schedule, which better synchronized with the repair work pace.

Today, Caterpillar Logistics provides direct line-side deliveries to 19 positions along the FRC-East repair line—bypassing base and depot receiving for the particular components involved in those deliveries. This ability to deliver directly to the line eliminated unnecessary multiple inventory storage and handling points, and thus a cost-effective accelerated inventory velocity.[64]

D. Performance of the Partnership

From the start, the Honeywell-FRC-East partnership began producing positive results. In its first two years, July 2000 to October 2002, it accomplished the following improvements:[65]

- The number of APUs awaiting depot repair because of lack of parts went from 118 to zero.
- Back orders were reduced from 125 to 26.
- Average delivery time went from 35 days to 5.4 days.
- Ninety-eight (98) percent of requisitions were filled within contractual requirements.
- Supply material availability increased from 65 percent to 95 percent.

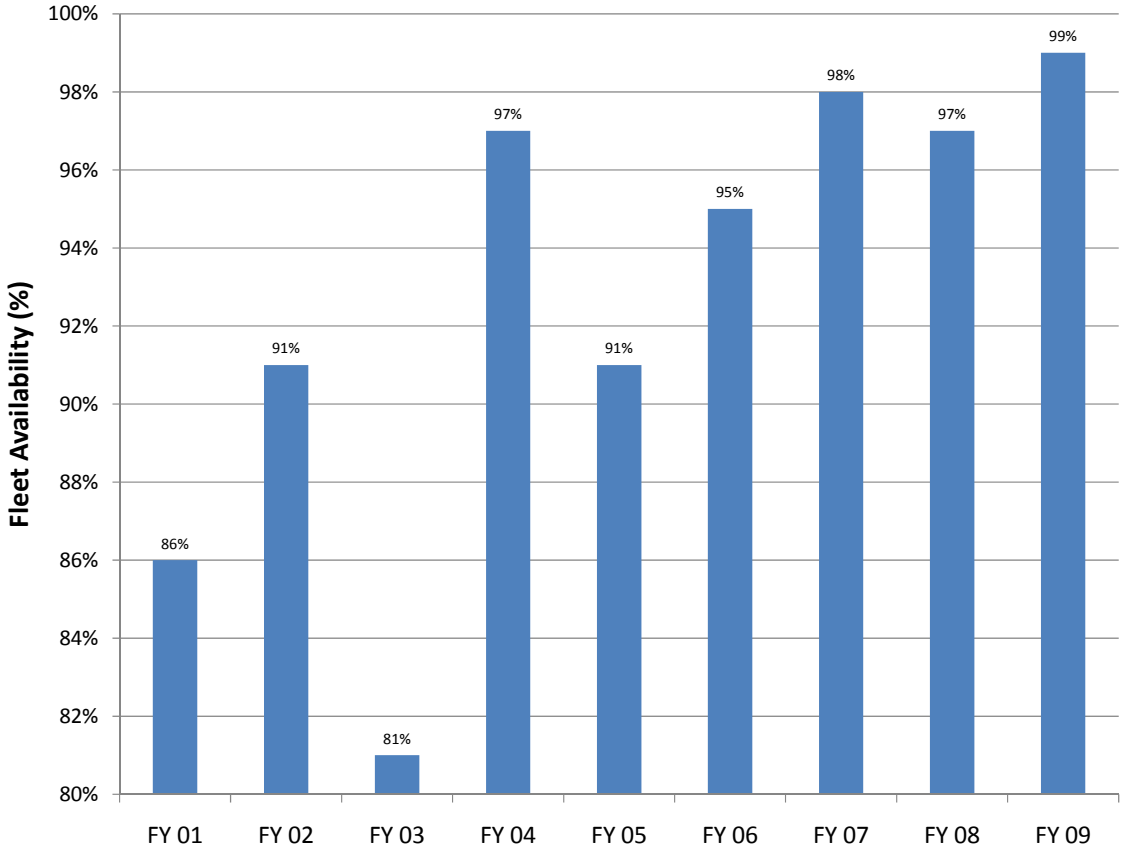
By May 2004, back orders were entirely eliminated and supply material availability increased to 97 percent for the C-2, F/A-18, S-3, C-130, and P-3. Furthermore, NAVAIR credited the TLS partnership with more than 30 reliability improvements which it estimated would produce upwards of $50 million in cost

[64] Cusack, *Interview*, 26-May.
[65] Government Accountability Office, *Depot Maintenance: Public-Private Partnerships Have Increased, but Long-Term Growth and Results Are Uncertain*, 53, and Lucyshyn et. al., *Improving Readiness with a Public-Private Partnership: NAVAIR's Auxiliary Power Unit Total Logistics Support Program*, 28.

avoidance and savings.[66] These cost avoidance/savings items included reducing inventory investment required to support the APU repair program.

By 2009, fleet availability—i.e., the percentage of APU up time—jumped from 86 percent in 2001 to 99 percent (Figure 20). The decrease in fleet availability experienced in FY03 was due to the addition of a fuel control platform to the program, and the resulting 'learning curve' experienced by the PPP in managing inventory and repairs.

Figure 20: Fleet availability by fiscal year



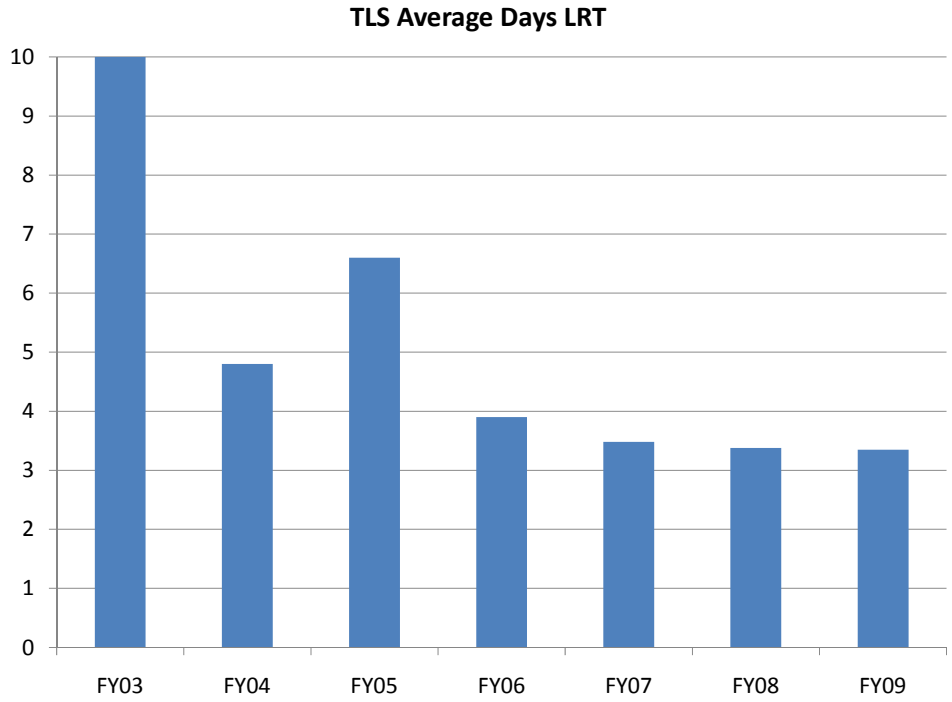
Source*:* Data provided by Honeywell.

Caterpillar Logistics' delivery performance is 99 percent on-time worldwide, meaning the right parts were delivered to the right place, on time, and in the right condition 99 percent of the time. This compares to a pre-contract on-time delivery performance of around 10 percent worldwide.

[66] Government Accountability Office, *Depot Maintenance: Public-Private Partnerships Have Increased, but Long-Term Growth and Results Are Uncertain*, 53, and Lucyshyn et. al., *Improving Readiness with a Public-Private Partnership: NAVAIR's Auxiliary Power Unit Total Logistics Support Program*, 28.

The partnership reduced the average days for logistics response time (LRT) (Figure 21) substantially over the course of the 10 years.[67] (LRT encompasses the entire repair and delivery cycle, from the time an APU is inducted into the depot, to the time it is delivered to its final field destination). In FY 2003, average LRT was approximately 10 days. By 2009, that figure dropped more than 66 percent to 3.35 days. By way of comparison, prior to the Honeywell-Caterpillar Logistics-FRC-East partnership, average delivery time for Cherry Point was 35 days.

Figure 21: Fleet logistics response time (LRT)



Key: TLS = total logistics support
LRT = logistics response time

Source: Data provided by Honeywell.

The 3.35-day LRT performance rate is the result of hard work on the part of Honeywell and Caterpillar Logistics to identify and eliminate supply chain problems that cause delays. Caterpillar Logistics monitors all shipments and, in the case of a delay, performs a root cause analysis to pinpoint the cause of the service breakdown. As Cusack explains:

[67] NOTE: Logistics Response Time (LRT) remains a somewhat ambiguous metric for measuring logistics performance as vendors continually redefine the term to include or exclude transportation time in this figure. While this does not decrease the reliability of Honeywell's measures, which remained constant over time, it does prevent comparison to other private firms or contract requirements.

> If we miss a shipment to the fleet we can easily determine what caused that to happen. We can take an end-item loss and trace it all the way back to the original order to find the root cause. We do this because, in a PBL environment, missed shipments trigger financial penalties. If it turns out the delay was caused by a vendor delivering a part late, I can trace that, go back to the vendor, and tell them that they were the cause of the late shipment. Every vendor we use must agree to participate in the PBL penalty system, and pay the penalty if they caused the service failure.[68]

Prior to the PBL partnership, no such systematized, continuous improvement effort existed at FRC-East.[69]

The 3.5-day LRT performance rate naturally impacts fleet availability. Figure 22 details fleet availability across aircraft platforms for FY 2008 and FY 2009.[70] It shows availability rates of 95 percent to 100 percent across all platforms, with the exception of the F-18EF in FY 2008, which had an availability of 88 percent. In the case of the F-18EF, this platform was added in 2008. As is the case when any new platform is added to the logistics mix, there was a learning curve for the partners on the F-18EF APU, which resulted in a temporary lower performance. However, within one year of introduction, the performance rate went up to 98 percent. The data depicted in Figure 22 outline hits (on-time deliveries) and misses (arrivals after guaranteed delivery time) for each aircraft platform.

Figure 22: Fleet availability by platform

FY08	C-2	F-18	F-18EF	FA-18A/B F404 MFC	FA-18A/B F404 MFC	KC-130	P-3	S-3	Total
Miss	0	5	14	2	1	0	19	0	41
Hit	17	208	99	228	118	0	467	12	1157
Total	17	213	113	230	119	0	486	12	1190
Avail Pct	100%	98%	88%	99%	99%	N/A	96%	100%	97%
LRT	3.91	3.5	3.8	3.07	2.73	N/A	3.48	3.51	3.5

FY09	C-2	F-18	F-18EF	FA-18A/B F404 MFC	FA-18A/B F404 MFC	KC-130	P-3	S-3	Total
Miss	1	4	2	2	4	0	5	0	18
Hit	21	221	101	251	130	0	527	0	1251
Total	22	225	103	253	134	0	532	0	1269
Avail Pct	95%	98%	98%	99%	97%	N/A	99%	N/A	99%
LRT	3.67	3.43	3.42	3.39	3.14	N/A	3.27	N/A	3.35

Source: Honeywell, *Total Logistics Support Program Management Review*, PowerPoint Presentation, Slide 11, November 3, 2009.

[68] Cusack, *Interview*, 26-May.
[69] Ibid.
[70] NOTE: The fleet availability is calculated as "hits"—i.e., on-time performance –divided by the total of both hits and misses.

From FY 2001 to today, the single time that delivery performance dropped below the 90 percent required standard was in 2003. This decline was attributable to the inclusion of a new item—fuel control platforms—in the yearly renewal of the contract.[71] Figure 23 illustrates Caterpillar Logistics' delivery performance over the course of the entire FRC-East contract—starting in 2001. These delivery performance numbers mirror Honeywell's data on fleet availability (Figure 20), demonstrating that optimum logistics performance translates directly to significant improvements in fleet availability.

Figure 23: Caterpillar Logistics' delivery performance

Source: Honeywell, *Total Logistics Support Program Management Review*, PowerPoint Presentation, Slide 23, November 3, 2009.

FRC-East recorded a number of other significant accomplishments as a result of the partnership. These include:

- A reduction in average production turnaround time (TAT)—i.e., how long it took to repair an APU at the depot—from 73 days in 2004 to 24 days in 2009.
- Backorders remain at zero.
- Honeywell developed and tested technological improvements and innovations for certain APU components, and discovered and corrected an error in the repair of the 95-10 Compressor Housing.

[71] Cusack, *Interview*, 26-May.

- Component improvements led to greater reliability and availability in the field, and fewer overall repairs.[72]
- Upgraded parts were developed, in some cases, to improve APU reliability and performance in the field.

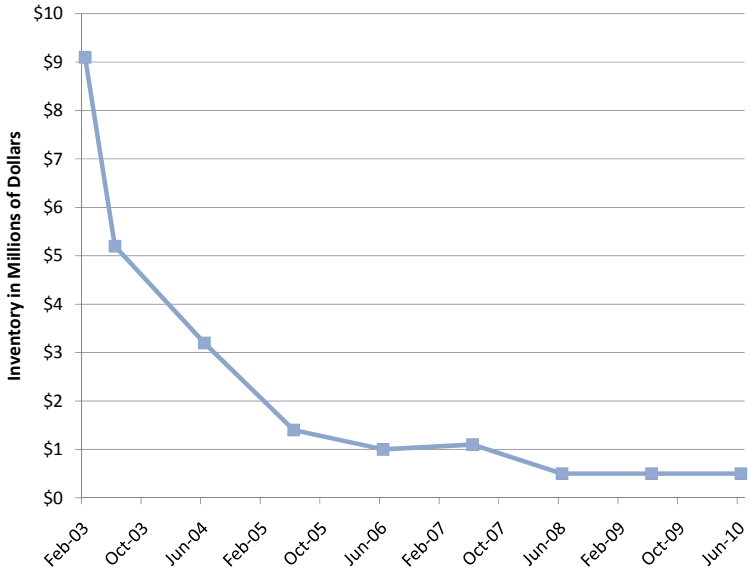
On that last point, Cusack offers the following observation:

> If the government needs a bearing, they go out for form, fit and function and buy from the lowest bidder. But we knew that if we spent a little extra and got a better quality bearing, we could increase reliability-on-wing multiple times over. So that's what we did, and APU reliability improved.
>
> We track the reliability of every component, and that information is loaded into our forecasting system. We're paid on a power-by-the-hour basis, so every time I repair an APU, it costs me money. So it's a lot more intelligent to spend a little extra on a part upgrade in order to reduce the need to repair the APU. We win, and the warfighter gets a more reliable piece of equipment.

By making engineering and parts upgrades, Honeywell improved the reliability of the APUs significantly. It enabled the Navy to redeploy 24 of the APU mechanics to other lines, thereby improving labor utilization and productivity.

Inventory reduction was not established as a performance metric in the Honeywell-Caterpillar Logistics-FRC-East partnership. However, thanks to better forecasting and the other innovations detailed above, inventory dropped from $9 million in 2003 to $450,000 in 2010, a 95 percent decrease (Figure 24).

Figure 24: Inventory owned by Honeywell at FRC-East



Source: Caterpillar Logistics, 2010.

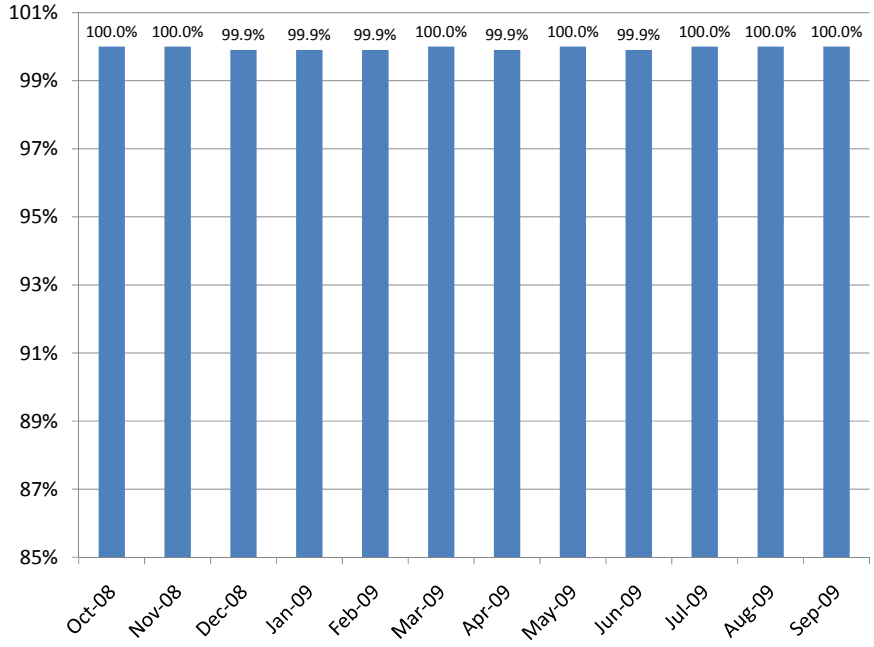
[72] Honeywell, *Total Logistics Support Program Management Review*.

One of the alternative practices Caterpillar Logistics used to reduce new inventory investment was to cannibalize scrapped APUs for parts. Traditionally, when an APU is retired, many of its parts and components are still usable either as is, or remanufactured. So Caterpillar Logistics set up a disassembly operation to capture those usable parts, remanufacture them if necessary, and place them in available inventory. This reduced the need for the Navy to buy new inventory of these components and parts, as Cusack notes,

> Prior to instituting this practices at Cherry Hill if we had 500 broken engines and needed 500 starters, the DLA would have gone out and bought 500 new starters. Today, we take them from the broken engines, test them and use them. That saves buying 500 new starters when we have 500 perfectly good starters already available.

At the same time that it reduced inventory by millions of dollars, the partnership improved inventory availability to 99 percent and inventory accuracy to a sustained level of between 99 percent and 100 percent (Figure 25).

Figure 25: Inventory accuracy



	Oct-08	Nov-08	Dec-08	Jan-09	Feb-09	Mar-09	Apr-09	May-09	Jun-09	Jul-09	Aug-09	Sept-09
% Accuracy	100.0%	100.0%	99.9%	99.9%	99.9%	100.0%	99.9%	100.0%	99.9%	100.0%	100.0%	100.0%
Location Audits	1393	1603	1137	870	1901	1333	1090	1203	1738	968	1706	1732
Errors	0	0	1	1	1	0	1	0	2	0	0	0

Source: Honeywell, *Total Logistics Support Program Management Review*, PowerPoint Presentation, Slide 26, November 3, 2009.

One of the biggest reasons the Honeywell-Caterpillar Logistics partnership succeeded in reducing inventory so significantly is Caterpillar Logistics' proprietary inventory forecasting system. Caterpillar's forecasting solution analyzes individual part failure rates and combines this information with data on APU age, usage history, and upcoming monthly usage forecasts supplied by the Navy. Each month, the Navy feeds Honeywell-Caterpillar Logistics a forecast of flying hours. Caterpillar Logistics loads this information into its forecasting engine. The system analyzes the data and develops a forecast as to repair demand. This forecast is broken down to the piece-part level. It serves as the basis for determining exactly what parts to hold in inventory, in what quantity.

E. Summary of Accomplishments

The public-private partnership at FRC-East offers a clear example of what can be accomplished under a well-managed PBL program. All three parties—the FRC-East, Honeywell and Caterpillar Logistics—benefit from the 10-year relationship by all measures.

- The FRC-East APU public-private partnership has captured a total of $35 million in benefits for the Navy to date.
- The depot repair production lines operate far more efficiently, thanks to having synchronized availability of parts.
- Backorders are non-existent and have been that way for years.
- Inventory availability is 99 percent.
- On-time delivery is at 99 percent.
- Fleet availability across all platforms is at 95 percent to 100 percent.
- Mean flight hours between unscheduled APU removals (MFHBUR) improved significantly as a result of both the PBL activities as well as a complete revamping of maintenance plans.
- The depot can handle surge capacity without problems.
- Inventory costs were slashed dramatically—from $9 million to $450,000 a year.

Most importantly, these improvements ensure that the warfighter—at least when it comes to APUs—has the equipment needed to fly.

The Navy team approached this challenge with no preconceived notions, and developed a strategy that leveraged the strengths of the team members. Honeywell provided its management and scheduling strength, Caterpillar, its supply chain forecasting and management, and the Navy its experienced labor force.

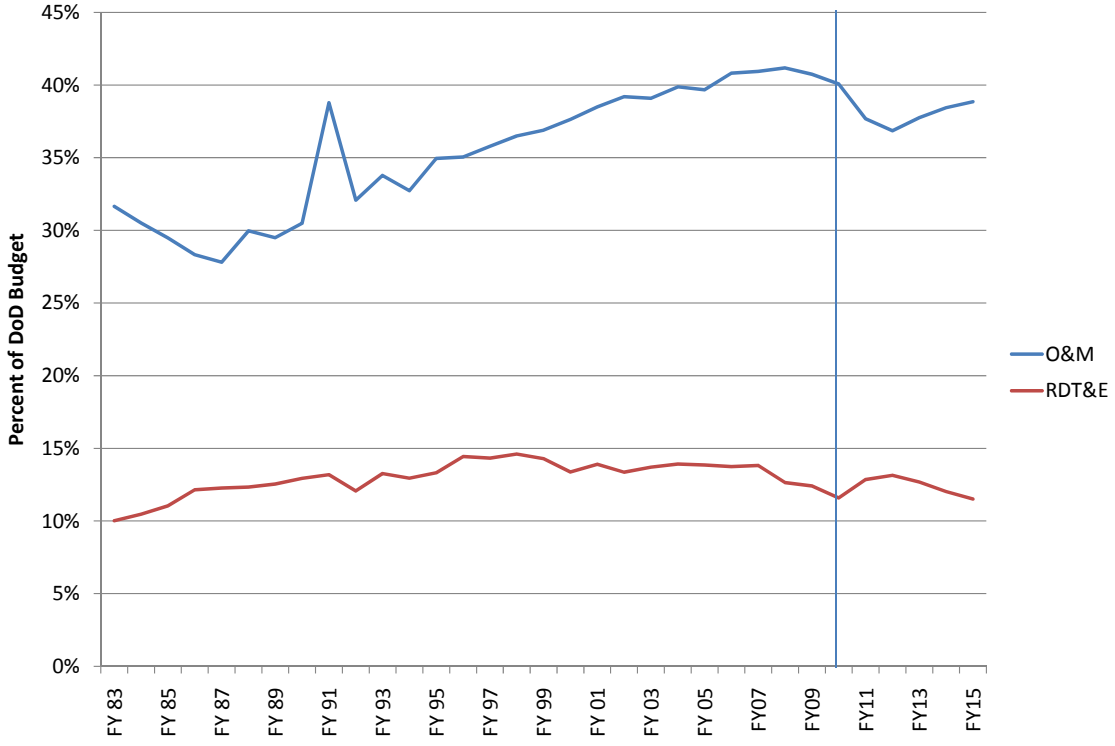
Part V: Opportunities for Improving PBL and PPPs

A. Overall Findings

DoD today faces intersecting challenges posed by the likelihood of reduced defense spending and continuing increases in O&M spending. Operations and support spending now accounts for more about 40 percent of the DoD budget. Acquisition, research and development have shrunk to roughly 12 percent.[73] Moreover, the trends of increasing expenditures in O&M are reducing the budget available for RDT&E, limiting the ability of DoD to invest in systems necessary to transform the military forces.

[73] Goure, *Performance-Based Logistics: A Primer for the New Administration,* 1.

Figure 26: DoD Spending on O&M and RDT&E – FY 1983 to FY 2015



NOTE: Data for FY 2010 to FY 2015 reflect current DoD projections.

Source: Office of the Under Secretary of Defense (Comptroller), *National Defense Budget Estimates for FY 2011*, March 2010, 131-133.

These cost increases arise from the fact that much of the military's hardware is relatively old, requiring more and more maintenance. At the same time, new systems are more complex, so the cost of necessary maintenance on new platforms is extremely high. "In effect," notes Dr. Daniel Goure of the Lexington Institute, "current costs are crowding out spending on modernization."[74] He adds:

> It is likely that changes to national security policy and budgetary strictures will result in a smaller overall force. This will increase the value of every platform and weapons system that is available to the warfighter. It will be imperative to maintain high readiness levels and to ensure that systems in need of repair are moved rapidly through the maintenance process. Future forces will not be able to afford the costs of an inefficient logistics system. More important, high levels of availability for platforms and weapons systems will be absolutely essential.[75]

[74] Goure, *Performance-Based Logistics: A Primer for the New Administration*.
[75] Ibid.

Baker Spring of the Heritage Foundation, along with Goure and others, believes that improvements in military logistics, particularly in the weapons support arena, offer an opportunity for large-scale savings.

> DoD inventory increased by $30 billion over the past five years… [there is] some $93 billion worth of parts and materials is sitting in warehouses….
>
> The Department of Defense would be able to plow the savings [from improved logistics] into its strapped modernization accounts and build the next generation of weapons and equipment for the soldiers, sailors, airmen, and Marines that will fight the nation's wars in the future. A report from the Aerospace Industries Association estimates that the savings could amount to as much as $32 billion a year.[76]

B. Industry Perspectives

In the Aerospace Industries Association (AIA) study cited by Spring, the AIA argues that DoD needs to rapidly expand its reliance on commercial supply chains for key commodities such as weapon system consumable parts, batteries, construction material, and depot shop materials. These efforts should include a clear emphasis on full asset visibility from the source, through testing and acceptance, to delivery to the ultimate customer. The most effective approach, AIA says, "would be for DoD to partner with commercial industry to rapidly infuse best-in-class supply chain practices across all DLA items, saving $2.8 billion to $3.7 billion per year."[77]

In its May 2009 report, AIA identified five areas in which the concept of PBL is being applied. Each area represents a broad swath of the DoD's total logistical enterprise, but the current scope of performance-based logistic activities within each one is modest. As a result, potential program improvements and cost savings would be quite large if performance-based logistics was applied more widely.[78]

The five areas identified by the Aerospace Industries Association are as follows:[79]

Area 1: Life cycle product support. Life cycle product support covers logistical activities related to maintaining the weapons and equipment already in operation. These include repairs, refurbishments, and modifications and upgrades.

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[76] Spring, *Performance-Based Logistics: Making the Military More Efficient.*
[77] Aerospace Industries Association, Inc., *Modernizing Defense Logistics*.
[78] Baker, *Performance-Based Logistics: Making the Military More Efficient.*
[79] Ibid.

The AIA report identifies 18 military systems in this area where the necessary support work is being performed through public–private partnerships.

Estimated potential savings—$16 billion to $21 billion annually if PBL were applied across all applicable DoD weapon systems and equipment in the support area.

Area 2: Management of commodities. The military's logistical system is responsible for maintaining access to an enormous list of commodities that are used to perform maintenance and upgrades to weapons and equipment. PBL improves the efficiency of the commodities supply network. Expanding the use and scope of PBL to manage commodities should reduce storage and inventory costs while ensuring timely and reliable delivery.

Estimated annual savings—$2.8 billion to $3.7 billion.

Area 3: Mobility assets and infrastructure. Regarding managing the transportation system that assures commodity delivery to point of need, PBL arrangement could do more to incorporate commercial sector best practices into transportation and logistics support. By optimizing the transportation/distribution process according to commercial best practices, DoD could realize considerable savings.

Estimated annual cost savings—$1.1 billion to $1.5 billion.

Area 4: Theater services. Theater services are logistical capabilities to support combat and humanitarian missions that are located in the theater of operation. Their purpose is to provide the necessary nodes in theater to assure the flow of weapons and materiel to support an operation.

The activities covered under this area include the construction and manning of in-theater facilities, such as storage and delivery depots; the operation of these facilities; and the distribution of the weapons and materiel to an intermediate station. Efficiencies are achieved in this area by pursuing pre-planning steps with host countries and contractors, most importantly regarding the use of airfields and ports, and increasing reliance on contractors under pre-negotiated contracts.

Estimated savings—$2.4 billion to $3.2 billion annually.

Area 5: Logistics information systems. Any system as far-flung and complex as the military's logistical system will operate better and more efficiently when it is supported by state-of-the-art information technology. PBL demands that the information technology infrastructure to support the logistical system be thoroughly modernized.

Modernizing logistics information systems must be tied to an effective administration and management structure. This can be achieved by giving contractors the authority to develop necessary information systems, with the government contracting for the use of these systems (i.e. buying the service, versus the equipment). The government gains efficiencies by paying only for the information technology systems and services it uses.

Estimated savings—$1.9 billion to $2.5 billion annually.

In addition, Spring of the Heritage Foundation believes that accomplishing such savings would require changes in practice around PBL and public-private partnerships that include:

- Broadening the application of performance-based logistics at all levels of the logistical system, specifically the component level, the subsystem level, and the system level.
- Expanding DoD's use of commercial supply chains.
- Using outcome-based partnerships in order to transfer best practices for distribution from the commercial sector to the public component of the logistical system.
- Expanding access to commercial managed services to provide information technology to the logistical system.[80]

The bulk of these savings would occur in the operations and maintenance accounts of the Department of Defense budget. Reducing these costs will permit DoD to break the "death spiral" in the weapons acquisition system.

[80] Baker, *Performance-Based Logistics: Making the Military More Efficient.*

"If the maintenance costs incurred for the support of existing weapons can be reduced, the savings can be channeled into the acquisition of new weapons that will be less expensive to maintain," Spring concludes.

Part VI: Current Challenges to PBL and PPPs

Despite a 10-year record of accomplishments, PBL and PPPs are still controversial. PBL and PPPs continue to face a number of challenges, which we discuss in this section of the paper. We offer recommendations for addressing not only the challenges, but also ways in which the overall outcomes of the practices of PBL and PPPs can be significantly improved.

A. Political Challenges

The Push toward In-Sourcing

Across the federal government, the Obama Administration is pushing to bring many "contractor augmented" support services back in-house—i.e., to use federal employees to assume these jobs and provide these services through so-called "in-sourcing."[81] This initiative began in 2006, when Congress passed a statute that required the DoD to establish procedures for in-sourcing (10 U.S.C§ 2463). However, this statute did not detail the content of the implementing regulations. In 2008, the Bush Administration promulgated procedures that required the DoD to meet certain requirements when in-sourcing, among these was the requirement to perform a cost analysis that would determine and account for the "full cost of manpower."[82]

In 2009, the Obama administration came into office, and it too believed, that there were too many contractors supporting federal agencies. As candidates, Obama and Biden pledged to **"**reform federal contracting and reduce the number of contractors, saving $40

[81] For the FY 2011 budget, Defense Secretary Robert Gates is seeking a $79 million hike in civilian pay and benefits for the Office of the Secretary of Defense, including "$42.6 million from internal in-sourcing actions that generate projected savings of $26 million" (Inside Defense 2010).
[82] Burton and Locaria, *Contractors Can Challenge the Government's In-Sourcing Efforts*, March 2010, 1-2.

billion a year."[83] As the in-sourcing initiative gained momentum, the Secretary of Defense, Robert M. Gates, provided greater detail for DOD in a statement explaining the Department's budget:

> *Under this budget request, we will reduce the number of support service contractors from our current 39 percent of the workforce to the pre-2001 level of 26 percent and replace them with full-time government employees. Our goal is to hire as many as 13,000 new civil servants in FY10 to replace contractors and up to 30,000 new civil servants in place of contractors over the next five years.*[84]

The rationale for in-sourcing was based on two arguments. First, there was a real concern, particularly in regard to the understaffed acquisition workforce, that contractors were in fact performing "inherently governmental" functions. Second, even in the face of evidence to the contrary, there was a strong, intuitive belief that government employees could perform many of the contracted-out functions at a lower cost. This issue is discussed in more detail below.

In-sourcing proponents argue that reducing the dependence on contractors to perform acquisition related functions would have government employees performing "inherently governmental" functions, and reduce conflicts of interest. The impact of in-sourcing on the acquisition workforce could be positive and significant, if in-sourcing were undertaken to reduce the recognized shortages within the acquisition workforce, thereby ensuring that contractors were not performing "inherently governmental" functions.

Since taking office, the Obama Administration, in fact, has made in-sourcing a major cornerstone of its acquisition reform agenda. For instance, the Administrator for Federal Procurement Policy at the Office of Management and Budget (OMB), Daniel Gordon, stated that the Obama Administration's 2011 budget proposal will "rebalance" the relationship between the government and its contractors through more oversight and in-sourcing. The public interest, as far as OMB is concerned, is to increase the size of the workforce managing contracts to provide better oversight; to decrease contract costs; and to ensure that the government is not abdicating its decision-making role when it decides what to buy and who to buy it from.[85]

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[83] Obama and Biden, *Blueprint for Change*, 2008.
[84] Gates, *Defense Budget Recommendation Statement*, 2009.
[85] Burton and Locaria, *Contractors Can Challenge the Government's In-Sourcing Efforts*, March 2010, 1-2.

We believe the rationale behind expanding the workforce to ensure that there are enough government employees to perform all of "inherently governmental" functions is sound. This should be undertaken in a strategic manner (hiring personnel with the appropriate education, training, and experience), to reduce the recognized shortages within the contracting workforce. For those positions that must be performed by federal employees, cost is not the determining factor because these functions can and should only be performed by the federal government.

However, as of March 2010, of the positions DoD identified for in-sourcing, only one third fell into the "inherently governmental" or "critical skills" categories.[86] It appears that the other positions were identified for in-sourcing based on cost assessments and other considerations, as outlined by the Deputy Secretary of Defense memorandum.[87]

We believe, that for these positions, anticipated cost savings resulting from in-sourcing were the primary motivation, based on the guidance provided by the DoD Comptroller to the effect that subordinate organizations were to assume a 40 percent savings for each in-sourced position. In fact, the guidance indicated that "for every contract dollar decreased, 60% was returned for civilian pay for the conversion and 40% was retained by OSD."[88] For example, in FY 2009, the Air Force claimed a $970 million saving across the Service's future year defense program (FYDP) for in-sourcing 2500 largely logistics-related jobs.[89] However, in our estimation, these projected savings were based on the faulty logic of comparing the fully burdened contract cost with only the direct cost of the in-sourced civilian employees, and without the contract-based incentives for further cost reductions (as offered by PBL). In all likelihood, therefore, these projected Air Force savings will never occur.

The OMB has directed agencies to conduct meaningful cost analyses before in-sourcing positions that are not inherently governmental. However, according to Stan Soloway, president and CEO of the Professional Services Council, "internal documents suggest that the Defense Department is often significantly underestimating the costs of performing work with federal employees because their analyses are limited primarily to

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[86] Chvotkin, *Balancing Act: Efforts To Right-Size The Federal Employee-To-Contractor Mix*, 2010.
[87] Lynn, *In-Sourcing Contracted Services--Implementation Guidance*, 2009.
[88] Butler, *Air Force Materiel Command Resource Management Decision 802 In-Sourcing Implementation Guidance*, 2010.
[89] Donley, *The State of the Air Force – 2009*, 2010.

immediate wages and benefits, plus a small amount of overhead expense, rather than the entire set of identifiable costs being assumed by the taxpayer."[90]

On January 29, 2010, DoD expanded on its in-sourcing guidance and issued "Directive-Type Memorandum" that again asserted the need for all components to estimate and compare the full costs of manpower and contract support. The Directive also established the "business rules" that should be used to estimate the full costs of the defense workforce in support of strategic planning, defense acquisition and workforce structure decisions. These business rules, outlined in Attachment 2 to the Directive, provide that the direct and indirect costs must be assessed when estimating workforce costs. But, this directive had significant shortcomings. For overhead costs, for example, the memorandum provides alternatives to consider, but there is no specific structure designed to be followed.[91] Further, because of the inadequacy of DoD's internal cost accounting system, government overhead costs are difficult to adequately capture and allocate. As a result, these cost comparisons do not fully capture the full cost of the in-sourced employee to the government. And, in at least one case, a recent court ruling found that the cost analysis the Air Force used to justify in-sourcing a contractor-conducted function, was not properly performed.[92]

When making the case for in-sourcing non-inherently governmental positions, the decisions must be based on sound analysis, examination of differential performance and applicable costs, and availability of skilled workforce. Additionally, it is critical that, when making cost comparisons between in-sourced and contracted-out activities and functions, the analysis compare true equivalent costs. Rarely is it appropriate to compare government hourly labor rates with the fully-burdened, billed contractor labor rates, or the cost of procuring a comparable service from a contractor. To develop an accurate "apples-to-apples" government-to-contractor cost comparison, the assessment must factor in—or "burden"—the government cost equation with all of the associated indirect and overhead governmental costs.

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[90] Soloway, *Commentary: Defense Department's Approach to In-sourcing has Unintended Consequences,* 2010.
[91] Fox, *Decison Type Memorandum 09-007 "Estimating and Comparing the Full Costs of Civilian and Military Manpower and Contract Support,*" 2010.
[92] Brodsky, "Pentagon abandons insourcing effort," 2010.

Several authoritative studies have concluded that the full cost of government employees or military personnel is at least equivalent to, if not significantly more than, the cost of contracted support. The Congressional Budget Office, for example, when analyzing logistics support for deployed military forces, concluded that "over a 20 year period, using army military units would cost roughly 90% more than using contractors."[93] Additionally, the Congressional Research Service wrote that "using contractors can save DoD money," and "hiring contractors only as needed can be cheaper in the long run than maintaining a permanent in-house capability."[94] Two other studies reached similar conclusions.[95, 96]

With regard to PBL specifically as relates to the questions of costs and in-sourcing, Goure comments on some of the current criticisms against the contracting practice:

> Critics of PBL have argued that it is more expensive than traditional approaches to sustainment which focus largely on the price of goods and services, and that increases in contractor profits are evidence of an unfair arrangement. This critique fails to consider the needs of the warfighter. In addition, it does not include the cost of maintaining fleets of platforms and inventories of parts larger than absolutely necessary in order to meet availability and readiness requirements. Finally, such criticisms fail to recognize that contractor profits depend on delivering a mix of improved availability and lowered costs. In a properly structured PBL contract, improving contractor profits are not evidence of increased customer costs, but rather of improved performance and decreased customer costs.[97]

This trend toward questioning the cost-effectiveness of contractor support has led to new reviews of existing support for weapon systems, to include PBL contracts, particularly as they come up for renewal. PBL/PPP proponents on all sides of the equation are deeply concerned about this trend. In the Aviation Week article cited earlier in this report, Randy Fowler, Assistant Deputy Undersecretary of Defense for Materiel Readiness, expressed concern over this trend:

> Recently, some of the really advanced PBL practitioners are surprised to be undergoing the third-degree inquiry into exercising their PBL options. In a couple of instances, these delays have cost money and exacerbated force and fleet support. Ten years ago, it was taking 30 months-plus to

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[93] CBO, *Logistics Support for Deployed Forces*, 2005.
[94] CRS, *Department of Defense Contractors in Iraq and Afghanistan: Background Analysis*, 2009.
[95] CBO, *Contractors Support for U.S. Operations in Iraq*, 2008
[96] GAO, *Warfighter Support: A Cost Comparison of Using State Department Employees vs. Contractors for Security Services in Iraq*, 2010.
[97] CBO, *Logistics Support for Deployed Military Forces*, 2005, 3.

> put together a comprehensive PBL-partnering strategy; unfortunately it is not much easier or faster today, and that's a shame.[98]

One year into DoD's in-sourcing initiative, the Department was not realizing the level of savings it anticipated, so Secretary Gates cancelled the in-sourcing initiative. Instead, Secretary Gates developed a new approach to reduce spending on service support contractors. The approach directs all agencies to reduce their spending on service support contractors by 10 percent, in each of the next three years.[99]

The current proposals to roll back the use of contractors that support DoD operations are based on the notion that contracting for private sector skills and expertise is inefficient. There also is an assumption that government managers lose an element of control over their workforce by utilizing contractors.

Both assumptions are false. Rolling back contractor usage ignores the demographic and budgetary realities of why contractors increasingly were employed in the first place—to improve performance and reduce costs. All of the historic data and trends support the approach of greater public-private partnering.

Congressional Interest

Congressional interest in how the DoD manages its maintenance depots is high, playing a significant role in determining depot maintenance workload. Congressional guidance regarding depot maintenance activities generally is provided annually, as part of the Defense appropriation and authorization acts. Because this issue impacts a variety of jurisdictions and states, both the House and Senate have formed organizations that focus upon depot maintenance issues.

The Congressional Depot Caucus (formally known as the House Military Depot and Industrial Facilities Caucus) expanded during the last decade, to include members that represent all types of military industrial facilities, such as ammunition plants and arsenals. This expansion has increased the membership of the House caucus to approximately 70 members, representing both parties. In addition, the 30 senators who represent the 20 major military depot maintenance activities located in 15 states also

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[98] Ott, *PBL 2010 Update, Overhaul & Maintenance*, 2010.
[99] Brodsky, "Pentagon abandons insourcing effort," 2010.

demonstrate a high level of interest in depot activities, although these members do not operate as a formal caucus.[100]

As a result, both houses of Congress remain actively involved in issues that affect the approximately 75,000 employees that make up the current depot workforce. In fact, their efforts dovetail with the Obama Administration's support for in-sourcing and re-evaluation of PBL and PPPs as a sustainment policy.

Historically, the depot caucus (broadly defined) drove the effort to pass statutory restrictions in the Title 10 regulations (see Appendix A for a detailed description of Title 10 regulations) that impose the requirement of maintaining an organic "core" logistics capability to support maintenance. As discussed earlier in this study, as part of these regulations, DoD is restricted from spending more than 50 percent of funds allocated for depot-level maintenance and repair with contractors. Finally, DoD must use either public-private competitions or merit-based selection before shifting any depot-level maintenance work valued at more than $3 million to the private sector.[101]

These legislative constraints often create barriers to making best-value decisions and taking advantage of industry's current capabilities. They can prevent DoD from accessing and deploying commercial best practices. They also restrict DoD from undertaking more integrated, holistic sustainment arrangements along the lines of those adopted by such countries as the United Kingdom and Australia. As noted in Part II, Section E of this report, those broader-based sustainment contracts have resulted in significant savings for those countries' respective defense budgets, while improving weapons system performance and overall military readiness.

The combination of the traditional Congressional support for organic depot capacity and employees, and the Obama Administration's in-sourcing focus creates powerful challenges for PBL and PPP weapons sustainment programs for the foreseeable future.

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[100] Avdellas, *The Public-Private Dilemma: A Strategic Improvement Agenda for U.S. Department of Defense Depot Maintenance*, 2005.
[101] Gansler and Lucyshyn. *Evaluation of Performance-Based Logistics*, 2006, 38.

B. Cultural Challenges

Changing Job Roles

Another challenge facing PBL and PPPs relates to the culture of the DoD acquisition community, both within the government and the private sector. Most of the personnel and organizations have years of experience developing requirements-driven, specification-constrained, custom-designed and built, components and systems. For many of the DoD's logistics and acquisitions employees, implementing PPPs changes the nature of their work. In many cases, they shift from being the "the doers" to becoming "the managers of doers." Contractors become the "doers", performing myriad jobs that range from transportation management and inventory control, to product re-engineering for better and low-cost maintainability.

This shift is particularly pronounced for those DoD employees involved in PBL contract management. We discuss this trend in detail in our section on Performance-Based Services Acquisition (PBSA).

Suffice to say that institutionalized cultural inertia can cause resistance to the changes in the nature of work wrought by PBL and PPPs, especially in the area of contracting and contract management. For example, legacy sustainment processes generally involve writing lengthy, detailed design specifications and statements of work, which reference many military specifications, as well as contract terms and conditions. The intent in crafting these specifications and statements of work is to be so comprehensive as to cover every possible contingency.

With PBL contracts, defense organizations no longer write these detailed specifications. Instead, they have had to learn how to write performance requirements and develop appropriate metrics—a much more difficult task.[102]

Buying a performance outcome is significantly different from buying specific items, and often requires changes in organizational processes and manpower requirements (and of course, there is a natural desire to protect jobs—government, civilian and military). Additionally, legacy processes often keep government personnel, such as the contract administrator, and the supporting contractor in an arms-length relationship, with little trust. With a PBL, on the other hand, the two contracting parties

[102] Gansler and Lucyshyn. *Evaluation of Performance-Based Logistics*, 2006, 37.

become active partners. In some cases, the government may in fact be selling services to the contractor.

This culture as to what constitutes "the proper role of government" can be deeply rooted and resistant to change, especially as most government employees prefer to think of themselves as "core."

In essence, PBL shifts the focus of sustainment practice from acquiring, tracking and using physical materials to managing a service. The implied cultural change necessitated by this shift cannot be underestimated. Long-term success in PBL, therefore, will depend on a sustained and successful educational process. DoD has made considerable progress on designing and implementing appropriate educational and training programs, but there is still much more progress needed.

C. Human Capital Challenges inside the Depots

With regard to the maintenance depots, while public-private partnerships change who performs what tasks and how—to varying degrees—they also should help address the many challenges facing military depots. These include facilities and equipment that have become degraded because of limitations in funds for recapitalization, an aging maintenance workforce, and the difficulty in maintaining necessary maintenance skill sets within the ranks of military personnel.

The 10-year global war on terror has placed enormous burdens on DoD with regard to human and financial capital. The need for troops on the ground and the funds to support them competes with the need for trained depot maintenance personnel and funds to set up state-of-the-art maintenance operations. These conflicting demands add to the difficulty of ensuring a healthy and cost effective weapons sustainment program.

Partnership arrangements can and have helped ameliorate some of these issues. They bring effective resources—human, capital and technological—to bear in depot maintenance operations which augment depot capabilities and resources in these areas. But with the growing pressure to consider in-sourcing, it remains to be seen how this will affect depot workforces and the use of public-private partnerships. The concern is that pressure to in-source may arbitrarily reduce partners' sustainment support, resulting in degradation in performance, cost, and quality of weapons system support.

D. Process Challenges—Performance-Based Services Acquisition (PBSA)

For more than two decades, the federal government has been shifting its approach to purchasing services to the performance-based services acquisition (PBSA) model. PBSA involves acquisition strategies, methods, and techniques that describe and communicate measurable outcomes rather than direct performance processes. It is structured around defining a service requirement in terms of performance objectives and providing contractors the latitude to determine how to meet those objectives. Simply put, PBSA is a method for acquiring *what is required* and placing the responsibility for *how it is accomplished* on the contractor.[103]

PBSA gives contractors the flexibility to complete required tasks in the manner the firm deems most appropriate. This method runs counter to traditional government contracts that explicitly state the processes a contractor must complete in order to perform the task in accordance with the contractual agreement. PPPs fall under the category of PBSA-type contracts.

In private industry, performance-based acquisition arrangements (sometimes referred to as Service-Level Agreements) are a longstanding business best practice that has vastly improved purchasing cost structures, dramatically raised service and performance levels, and significantly streamlined and unburdened the purchasing process. Effective PBSA is considered a business best practice in the commercial world.

DoD faces several challenges to implementing PBSA, and these challenges are very similar in nature to those experienced in implementing PBL contracts and PPPs. On a high level, there is concern that PBSA—because it lacks the specific instructions and details of traditional purchasing contracts—reduces the amount of control DoD has over the contractor and the contracting process. There also is a concern that PBSA risks failing to include sufficient accountability metrics to guarantee that the government obtains the best value and performance for its money.

On a more specific level, PBSA faces a number of other challenges:

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[103] Gansler, J.S., *Guidebook for Performance-Based Services Acquisition in the Department of Defense*, December 2000, 1.

- It changes the responsibilities, work processes and practices of acquisition professionals. Acquisition staffs must be up-trained in implementing PBSA practices effectively. Consistency and thoroughness of training is essential to ensure greater PBSA success.
- There are regulatory restrictions that must be understood, observed and integrated into the contracts, including those that govern PPPs.
- PBSA, as is also the case with PBL contracts, has been implemented unevenly throughout DoD. Results, therefore, have been uneven in certain cases, opening the practice up to criticism.
- Establishing appropriate metrics within PBSA contracts is critical to the success of these arrangements. In some cases, such metrics have been inadequately or inconsistently developed and implemented. This makes it more difficult to adequately measure contractor performance. Inherent in successful PBSA, therefore, is the challenge of creating appropriate, effective performance metrics.

Part VII: Recommendations for Improvements

Clearly, in the current political and economic climate, the practice of performance-based logistics, and the partnerships used to implement it, face appreciable challenges. Some have been around for the lifespan of PBL—since the early 2000s, while others are new and rapidly evolving.

In this context then, we offer the following set of recommendations.

Promote Competition

Government employees are necessary for those narrowly-defined "inherently governmental" functions. For non-inherently-governmental functions, however, government should continue to shift from being "the provider of goods and services" to becoming "manager of the provider of goods and services"—unless it can be clearly demonstrated through public-private competitions that government employees can perform these functions more efficiently and effectively than their private sector

counterparts. Thirty years of DoD data demonstrates that when non-inherently governmental work is competed for between the current government workforce and the private sector (known as "competitive sourcing"), cost savings are significant (on average, over 30 percent), even when the public sector wins. The key is leveraging competitive pressure to obtain better performance at a lower cost.

Change the Culture to Make Effective Public-Private Partnering a Top Management Priority

Ensuring that PPPs are effective must be a top management priority. Achieving the desired results from partnering will, however, require a major cultural change within DoD. Public-private relationships often become adversarial contractual relationships rather than partnerships. To realize the full potential benefit of PPPs, both the public and private sector must adopt a "win-win" approach and focus on shared, broad outcomes, not narrow organizational ones. Rather than being compliance-driven (rules-driven), partners should look at the "art of the possible" and find ways to make partnerships beneficial for both parties. The Navy successfully demonstrated this "win-win" approach with its PPP to provide logistics support for Auxiliary Power Units.

Furthermore, government employees must have the necessary authority to achieve the required cooperation and integration needed for a program's execution. For example, personnel assigned to integrated product teams (IPTs) should be empowered to make decisions within their areas of expertise.

Employees tasked with managing PPPs must have the appropriate training and tools needed to do their jobs. Demographic trends, specifically the aging national workforce, are creating the need for government agencies to expand training and education programs. Agencies should establish a professional development program based on an "open systems" approach, which includes access to corporate universities, web-based training, and other cutting-edge programs, to assist employees in developing critical business thinking and decision-making skills.

To better prepare the DoD workforce to participate in PPPs, professional development programs should focus on the flexibilities of the Federal Acquisition Regulation (FAR), as opposed to its limitations. Additionally, based on the pace of development and change, government agencies should create cross-fertilization training

and education opportunities between the government and industry. Using techniques such as rotational assignments between government and industry not only would offer valuable experience for government personnel in the private sector, but also supply valuable insight for private industry into the unique challenges faced by government officials.

Finally, Congress will have to change the definition of the 50/50 rule to include public-private partnerships in the 50 percent public portion.

Improve the Implementation of Public-Private Partnerships

To improve implementation of PPPs, we offer these recommendations:

A. **Expand the allowable scope of PPPs to encompass sustainment of entire weapons systems and sub-systems.** This practice is well underway in other countries, and is highly successful. Such an expansion in partnership roles enables a more integrated, holistic sustainment operation and enables integrated maintenance and supply chain optimization. Expanding the scope of PPPs also spreads risk, thereby decreasing the financial load on the federal government. Commercial partners assume broader risk for maintenance and supply chain activities, personnel, technology, and execution.

   By broadening the scope of engagement for contractors, and writing sufficiently long-term contracts, commercial firms are incented to invest more substantially in people, process, technology and infrastructure to support the weapons systems or subsystems.

   As noted above, this recommendation would require a reassessment of the 50-50 rule.

B. **Retain the savings generated by PBL and PPPs in the defense budget**. When effectively executed, PBL and PPPs generate millions of dollars in savings. The extensive research presented in this report supports this assertion. Retaining the savings in the DoD budget would provide much needed funds for acquisition of new weapons systems, which in turn would help put the brakes on the vicious

cycle DoD currently finds itself in—the so-called "death spiral" of attempting to maintain aged weapons systems.

C. Retain the use of longer term PBL contracts for depot-level maintenance. Current Obama Administration efforts to shorten PBL contracts from multi-year to one-year renewal schedules carry significant risk. In many PBL contracts, the commercial partners must make major up-front investments in people, systems, equipment, facilities and processes during the first few years of the contract. This means that the commercial firms do not begin to realize a return on investment for several years after the start of contract. It is not uncommon for that ROI period to be five years or more. When commercial partners are forced to amortize these investments over just one year, this changes the economic structure of these contracts, making them appear more costly to execute from the commercial partners' vantage point.

Thus, shortening the contracting cycle to one year acts as a disincentive for private industry to make significant investments in depot maintenance partnerships. In a worst-case scenario, a shift to one-year contracting terms could drive some commercial firms out of the military weapons system sustainment business entirely, resulting in a loss of invaluable product and service expertise, innovation and capability.

A more desirable approach would be a three to five year contract, with the contractor being offered the extension of the contract (through options) if they demonstrated continuous performance improvements at continuously reduced costs; and with the contract being re-competed otherwise. (Clearly a significant incentive.)

D. Embrace commercial supply chain management best practices more fully. Private sector supply chain best practices in forecasting, inventory management, transportation and logistics regularly save corporations billions of dollars while at the same time delivering unmatched service, reliability, timeliness, product

support and overall better performance. In the FRC-East-Honeywell-Caterpillar Logistics case study, as shown n Part III of this report, state-of-the-art demand forecasting enabled a 95 percent reduction in repair parts inventory, for an annual savings of $8.5 million on the F/A-18 APU parts inventory alone. Overall, better management of the APU supply chain delivered $35 million in both savings and cost avoidance management. At the same time, service improved by orders of magnitude.

By adopting and tapping commercial supply chain management best practices, the entire DoD weapons system sustainment process could benefit. It could begin to realize potentially enormous savings and performance improvements.

E. **Apply more standardized and consistent contract management practices, metrics and performance analysis in administering PBL and PPPs.** One of the biggest criticisms of PBL and PPPs is that the contracts and the contract management processes vary widely across and within the military branches. This lack of consistency of initial project analysis, justification and ongoing performance measurement not only makes the PPP difficult to manage, but also opens the practice up to criticism from vocal opponents of PBL contracting. Standardizing the contracting process, contract documentation and ongoing contract management would help address these issues.

A 2009 DoD Inspector General evaluation of the Air Force[104] management of public-private partnership arrangements, for instance, found that the Air Force did not adequately document its partnership decisions for product support and did not satisfactorily monitor the partnerships once they were established. Specifically, the study found that:

- 35 of the 40 partnerships and 49 of 61 implementation agreements reviewed were not supported by business case analyses.
- 51 of 61 implementation agreements reviewed had not established baselines.

[104] Inspector General, U.S. DoD, *Public-Private Partnerships at Air Force Maintenance Depots,* June 10, 2010.

- 40 of 61 had not established metrics.

"As a result, there is not sufficient assurance that the Air Force's use of partnerships is obtaining best value for its maintenance support decisions and recovering all its expenses," the study said.

This situation could be remedied by requiring a consistent structured approach to PPP contracting and contract management. Such an approach would include preparation of a BCA prior to approval of a public-private partnership, and as early in the acquisition cycle as possible. The BCA establishes the baseline of the expected objectives and benefits resulting from the agreement and should help generate metrics for assessing whether the PPP remains the best value solution. The BCA should provide sufficient detail, including an analysis of costs/benefits and core workload requirements, as well as address a 50/50 analysis, in order to demonstrate the agreement is in the federal government's best interest.

Additionally, to facilitate the cost/benefit analysis, the government should adopt activity-based-costing (or other system to capture and allocate all of the indirect costs) for the organic depot labor. This will enable better analysis of organizational functions, as well as better identification of the total costs for performing them.

The approach would require establishing baselines and metrics so as to gauge contractor performance over time. A baseline serves as the starting point for measuring progress in the quality or quantity of work or performance related to either a product or a service. The baseline indicates a condition at a certain point in time; the result of work or performance from that point onward shows if conditions are improving, staying the same, or getting worse. Metrics measure the efficacy of the PPP over time. They serve as the basis for contract renewals, non-performance penalties and performance incentives.

Part VIII: Conclusion—Leveraging the Benefits

While performance-based logistics and public-private partnerships are no longer a new practice vis-à-vis weapons systems sustainment, they are by no means a mature contracting and operating practice. PBL has demonstrated a 10-year track record of

savings, reliability and availability improvements, and myriad other benefits—resulting in better support for the warfighter.

PBL and PPPs have not reached best-practice status, however. There is considerable room for improvement in terms of how contracts are designed, written and executed, and how the relationship between DoD and its commercial partners is managed. Because they are still in their early stages of practice, public-private partnerships offer tremendous opportunity to leverage the best of the public and private sectors to bear on entire processes of weapons systems logistics and sustainment.

Attaining the full benefits of public-private partnerships can only be accomplished by continuing to work to change the culture within DoD—and in Congress—to view PPPs as collaborations that can bring the best of the public and private sector knowledge and resources to bear on the issue of sustaining weapons systems. This is an education process that must address several perspectives.

On a macro level, constituencies need to better understand the big picture of why and how PPPs can provide effective solutions for maintaining weapons systems and platforms in a cost-efficient manner that also delivers the reliability and availability the warfighter requires. On a micro level, within the DoD, the acquisitions and contract management communities must be educated more effectively as to how PPPs can be structured and managed for best results.

Ultimately, the use of PPPs going forward depends on a continually updated evaluation of core requirements for maintenance depot operations. This evaluation must factor in current and future defense budgetary constraints, military human capital resources and deployment, and national defense priorities vis-à-vis what should be retained and maintained as core depot capabilities. PPPs have performed an important function in support of core requirements, and can continue to do so under an updated evaluation of core requirements.

The time has come not to abandon the accomplishments of the last 10 years in public-private partnerships and go back to “the bad old days” of depot maintenance practice. Rather, the opportunity today lies in fine-tuning and advancing the science of performance-based logistics and public-private partnerships by applying best management practices and processes to meet the needs of the warfighter effectively and efficiently going forward.

Observes Randy Fowler of DoD:

> Ten years of implementation attest to the fact that PBL has been institutionalized. It is time to evolve and refine its application. There are issues to be worked out and PBL methods to make more repeatable and better integrated with Defense logistics enterprise strategies. The future path is not to move away from PBL, but to recognize its value and work diligently to improve and spread its application.[105]

Ultimately, advancing the science of public-private partnership contracting in the depot maintenance arena can help relieve long-term cost growth pressures within the defense logistical system, and move DoD closer to true logistics transformation.

[105] Inspector General, U.S. DoD, *Public-Private Partnerships at Air Force Maintenance Depots,* June 10, 2010.

Appendix A: Legislation in Title 10 of the U.S. Code

This section briefly summarizes the sections of Title 10 (listed in numerical order) related to depot-level maintenance and repair. The major themes of these laws are defining what depot maintenance activities are; ensuring that a wartime depot maintenance capability under the control of DoD will be available; maintaining a robust organic capability (called a "core logistics capability") that could expand to meet wartime requirements; and providing depot maintenance services efficiently to military customers through the use of competition, when appropriate. These sections of U.S. Code provide complete details. This section is excerpted from *Contractor Logistics in the U.S. Air Force* by Boito, Cook and Graser.[106]

10 USC 2208(j), Working Capital Funds
This section permits DoD industrial facilities funded by a working capital fund to manufacture or remanufacture articles, as well as to provide manufacturing and engineering services and sell them to customers outside DoD.

10 USC 2320, Rights in Technical Data (as amended by the National Defense Authorization Act for Fiscal Year 2007)
This section addresses the government's rights to technical data for items and processes. The 2007 amendment requires program managers for major weapon systems and subsystems of major weapon systems to assess the long-term technical data needs of such systems and subsystems and establish corresponding acquisition strategies that provide for technical data rights needed to sustain such systems and subsystems over their life cycle. The assessment is to be done before contract award and is to consider priced contract options for the future delivery of technical data.

10 USC 2460, Definition of Depot-Level Maintenance and Repair
This section defines depot-level maintenance and repair as activities requiring the overhaul, upgrading, or rebuilding of parts, assemblies, or subassemblies, and the testing and reclamation of equipment as necessary, regardless of the source of funds for the maintenance or repair or the location at which the maintenance or repair is performed. The term includes (1) all aspects of software maintenance classified by DoD as of July 1, 1995, as depot-level maintenance and repair, and (2) ICS or CLS (or any similar contractor support), to the extent that such support is for the performance of services described in the preceding sentence.

Depot-level maintenance and repair does not include major modifications or upgrades of weapon systems that improve program performance or the nuclear refueling of an aircraft carrier. Private or public sector activities would continue to perform major upgrade programs covered by this exception. The term also excludes the procurement of parts for safety modifications but does include their installation.

10 USC 2462, Contracting for Certain Supplies and Services Required When Cost Is Lower

[106] Boito et al., *Contractor Logistics in the U.S. Air Force*, 99.

This section directs the Secretary of Defense to procure each supply or service necessary to accomplish the authorized functions from a source Laws, Directives, Regulations, Instructions, and Reports That Affect CLS Use 101 in the private sector if it can provide the supply or service at a lower cost than DoD can provide it, unless the Secretary of Defense determines the function must be performed by military or government personnel.

10 USC 2464, Core Logistics Capabilities

This section, originally enacted in 1984, includes a number of relevant provisions. It discusses the necessity for core, government:

1. Owned and –operated logistics capabilities (employing government personnel and equipment)
2. Directs the Secretary of Defense to identify core logistics capabilities
3. Defines core logistics capabilities as those necessary to maintain and repair weapon systems and other military equipment (including mission-essential weapon systems or materiel, no later than four years after achieving IOC, but excluding systems and equipment under special access programs, nuclear aircraft carriers, and certain commercial items)
4. Requires the secretary to ensure that the core logistics workloads necessary to maintain core logistics capabilities are performed at government-owned and—operated DoD facilities of DoD (including those belonging to a military department)
5. Requires the secretary to assign such facilities sufficient workload to ensure cost efficiency and technical competence in peacetime while preserving the surge capacity and reconstitution capabilities necessary to support strategic and contingency plans
6. Precludes this workload from being competed with nongovernment personnel under Office of Management and Budget (OMB) Circular A-76 procedures
7. Gives the secretary waiver authority and procedures for implementing it for certain workloads not required for national defense reasons
8. Contains restrictions on DoD entering into a prime vendor contract for depot-level maintenance and repair.

10 USC 2466, Limitations on the Performance of Depot-Level Maintenance of Materiel

This section discusses limitations on the amount of depot-level maintenance and repair workload that contractors, as opposed to government facilities, can perform. The current limit is 50 percent of the funds for depot-level maintenance and repair workload per military department or defense agency. This workload restriction was originally established in 1988. The Secretary of Defense is allowed to waive this limitation for a fiscal year if he or she determines that the waiver is necessary for reasons of national security and if he or she submits to Congress a notification of the waiver together with the reasons for it. This section also requires an annual report that identifies the total amount expended for depot-level maintenance and repair, as well as how much is spent or is planned to be spent on public as opposed to private-sector activities in the prior, current, and ensuing fiscal years. In addition, it requires the Comptroller General to complete a review of this report within 90 days of its submission.

10 USC 2469, Contracts to Perform Workloads Previously Performed by Depot-Level Activities of the Department of Defense: Requirement of Competition
This section requires the Secretary of Defense to ensure that depot-level maintenance and repair workload is not transferred to a contractor or another depot-level DoD activity unless the change is made using (1) merit-based selection procedures for competitions among all DoD depot-level activities or (2) procedures for competitions among private and public-sector entities. This restriction applies to any workload greater than $3 million that is being performed by a DoD activity. A waiver provision addresses public-private depot partnerships.

10 USC 2470, Depot-Level Activities of the Department of Defense: Authority to Compete for Maintenance and Repair Workloads of Other Federal Agencies
This section, enacted in 1994, allows DoD depot-level activities to compete for the performance of any depot-level maintenance and repair workload of a federal agency that uses competitive procedures to select the performer.

10 USC 2472, Prohibition on Management of Depot Employees by End Strength
This section mandates that civilian employees of DoD who perform, or are involved in the performance of, depot-level maintenance and repair workloads must be managed solely on the basis of the available workload and the funds available for depot-level maintenance and repair.
These government employees cannot be managed on the basis of any constraint or limitation in terms of man-years, end strength, full-time equivalent positions, or maximum number of employees.

10 USC 2474, Centers of Industrial and Technical Excellence: Designation; Public Private Partnerships
This section directs the Secretary of Defense to designate each DoD depot-level activity (other than facilities approved for closure or major realignment under the Defense Base Closure and Realignment Act of 1990) as a Center of Industrial and Technical Excellence in its recognized core competencies. It also directs the secretary to establish a policy to encourage each military department and defense agency to reengineer industrial processes and adopt best business practices at its Centers of Industrial and Technical Excellence.

10 USC 2474 allows the military departments to conduct pilot programs to test any practices that could improve the efficiency and effectiveness of operations at the Centers of Industrial and Technical Excellence, improve the support these centers provide, and enhance readiness by reducing the time it takes to repair equipment. The section authorizes the head of each center to enter into public-private cooperative arrangements to conduct depot-level maintenance and repair activities related to its core competencies and establishes procedures for doing this. The amounts expended for nongovernment employees during fiscal years 2003–2009 do not count for 50-50 law compliance purposes if the personnel are provided by private industry or other entities outside DoD pursuant to a public-private partnership. These amounts are reported as a separate item in the annual report to Congress.

10 USC 2563, Articles and Services of Industrial Facilities: Sale to Persons Outside the Department of Defense

Under special conditions, this statute allows a working capital–funded industrial facility to sell articles that are not available commercially in the United States to a purchaser other than DoD.

Appendix B: Depot Locations and Functions by Military Branch

DEPARTMENT OF THE ARMY	
Army Depots	Location
Anniston Army Depot	Anniston, Alabama
Corpus Christi Army Depot	Corpus Christi, Texas
Letterkenny Army Depot	Chambersburg, Pennsylvania
Red River Army Depot	Texarkana, Texas
Tobyhanna Army Depot	Tobyhanna, Pennsylvania
DEPARTMENT OF THE NAVY	
Naval Shipyards	Location
Norfolk Naval Shipyard	Portsmouth, Virginia
Pearl Harbor Naval Shipyard and Intermediate Maintenance Facility	Pearl Harbor, Hawaii
Portsmouth Naval Shipyard	Kittery, Maine
Puget Sound Naval Shipyard and Intermediate Maintenance Facility	Bremerton, Washington
Fleet Readiness Centers (FRCs)	Location
FRC East	Cherry Point, North Carolina
FRC Southeast	Jacksonville, Florida
FRC Southwest	North Island, California
Other Navy Facilities	Location
Japan Regional Maintenance Center	Yokosuka, Japan
Naval Surface Warfare Center	Crane, Indiana
Naval Undersea Warfare Center	Keyport, Washington
Space and Naval Warfare Systems Center, Pacific	San Diego, California
Space and Naval Warfare Systems Center, Atlantic	Charleston, South Carolina
MARINE CORPS	
Marine Corps Logistics Bases	Location
Maintenance Center Albany	Albany, Georgia
Maintenance Center Barstow	Barstow, California
DEPARTMENT OF THE AIR FORCE	
Air Force Depots	Location
Ogden Air Logistics Center (ALC)	Hill AFB, Utah
Oklahoma City ALC	Tinker AFB, Oklahoma
Warner-Robins ALC	Robins AFB, Georgia
Other Air Force Facilities	Location
Aerospace Maintenance and Regeneration Group	Davis-Monthan AFB, Arizona
DEFENSE LOGISTICS AGENCY	Location
Defense Supply Center, Richmond Product Center	Mechanicsburg, Pennsylvania

Source: Department of Defense, *Depot Maintenance Reporting: Summary of Major Changes to DoD 7000.14-R*, March 2009, 14-12.

Appendix C: Description of Depot Maintenance Activities by Military Branch[107]

Army Depot Maintenance Activities

The Army operates five major depot maintenance activities:

- Anniston Army Depot (ANAD) is capable of performing maintenance on both heavy-and light-tracked combat vehicles and their components. The depot is designated as a Center of Excellence for the M1 Abrams Tank and is the designated candidate depot for the repair of various Army combat vehicles.
- Corpus Christi Army Depot (CCAD) overhauls, modifies, and modernizes a large range of rotary-wing aircraft (helicopters). It also provides additional depot maintenance support, including on-site maintenance teams, crash damage analysis, and various kinds of technical support. This is the Army's only aviation facility.
- Letterkenny Army Depot (LEAD) is a center of technical excellence for Air Defense and Tactical Missile Systems. It supports maintenance of the Patriot missile and its ground support and radar equipment. The organization also conducts maintenance, modification, and storage operations on tactical missiles and ammunition. Recently, the organization has been required to quickly modify certain vehicles for Army Special Forces, Army Rangers, and Navy Seals, based upon combat requirements.
- Red River Army Depot (RRAD) provides depot-level maintenance actions on combat and tactical systems, such as the Army's Bradley Fighting Vehicle. It also conducts maintenance on air defense and tactical systems.
- Tobyhanna Army Depot (TYAD) is a repair, overhaul, and fabrication facility for the Army's communication and electronics equipment. These systems include satellite terminals, radio and radar systems, telephones, electro-optics, night vision and anti- intrusion devices, airborne surveillance equipment, navigational instruments, electronic warfare, and guidance and control systems for tactical missiles.

Naval Air Depot Maintenance Activities

The Naval Air Systems Command operates three military depot maintenance organizations:

- Fleet Readiness Center East (FRC-East)—Cherry Point performs major airframe modifications and repair for a wide variety of military aircraft, including the Harrier, the vertical-takeoff- and-landing tactical attack jet flown by the Marines; the medium-lift transport Sea Knight helicopter; and the Sea Stallion and Super Stallion helicopter.
- Fleet Readiness Center Southeast (FRC-Southeast)—Jacksonville performs maintenance, repair, overhaul, and modification of aircraft, engines, and aeronautical components. The primary airframes it supports are the various surveillance planes and Navy fighter aircraft. It also performs work on selected

[107] Avdellas, *The Public-Private Dilemma: A Strategic Improvement Agenda for U.S. Department of Defense Depot Maintenance*.

helicopters. Its engine repair capability is extensive.

- Fleet Readiness Center Southwest (FRC-SW)—North Island performs depot-level repairs and modification on more than 250 aircraft per year. FRC-SW repairs helicopters, fighter planes, and surveillance planes. These systems undergo maintenance and repair actions that are performed by FRC-SW artisans and squadron personnel stationed in San Diego and at various other locations.

Air Force Depot Maintenance Activities

The Air Force operates three air logistics centers that accomplish depot maintenance activities:

- Oklahoma City Air Logistics Center (OC-ALC) provides worldwide logistics support and depot-level maintenance for a variety of weapon systems, including the B-1, the B-52, the multipurpose C-135–series aircraft, the E-3, and the E-4, and management of the B-2 bomber. It also supports the short-range attack missile and the air-launched cruise missile. The center is the public-sector source for management and repair of a large variety of aircraft engines.
- Ogden Air Logistics Center (OO-ALC) provides logistics support for the entire Air Force inventory of intercontinental ballistic missiles, as well as depot-level maintenance for F-16 and C-130 aircraft.
- Warner Robins Air Logistics Center (WR-ALC) provides worldwide logistics management and depot-level maintenance for the F-15, C-5, and C-130 aircraft, as well as for utility aircraft, helicopters, missiles, and drone and remotely piloted vehicles. It is also the main U.S. operating base for the E-8 Joint Surveillance and Target Attack Radar System aircraft.

Marine Corps Depot Maintenance Activities

The U.S. Marine Corps operates two maintenance centers:

- Maintenance Center Albany (MCA) repairs, rebuilds, and modifies all types of Marine Corps ground combat equipment and combat support and combat service support equipment. The center also works on all types of military ordnance, motor transport, engineering, general purpose, electronic, and communication equipment.
- Maintenance Center Barstow (MCB) provides support for weapon systems, such as amphibious, combat, tactical, communications, electronics, missiles, ship engines, construction, optics, and metrology. This support includes diagnostics, rebuild, engineering support services, manufacturing of small parts through the Maintenance Center's Small Mechanical Parts Manufacturing System (SMPMS), testing, radiographic services, calibration, prototype fabrication, technical assistance, and quality assurance services.

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Before joining the Clinton Administration, Dr. Gansler held a variety of positions in government and the private sector, including Deputy Assistant Secretary of Defense (Material Acquisition), assistant director of defense research and engineering (electronics), executive vice president at TASC, vice president of ITT, and engineering and management positions with Singer and Raytheon Corporations.

Throughout his career, Dr. Gansler has written, published, and taught on subjects related to his work. Gansler recently served as the Chair of the Secretary of the Army's "Commission on Contracting and Program Management for Army Expeditionary Forces." He is also a member of the National Academy of Engineering and a Fellow of the National Academy of Public Administration. Additionally, he is the Glenn L. Martin Institute Fellow of Engineering at the A. James Clarke School of Engineering, an Affiliate Faculty member at the Robert H. Smith School of Business, and a Senior Fellow at the James MacGregor Burns Academy of Leadership (all at the University of Maryland). From 2003–2004, he served as Interim Dean of the School of Public Policy. From 2004–2006, Dr. Gansler served as the Vice President for Research at the University of Maryland.

William Lucyshyn

William Lucyshyn is the Director of Research and a Senior Research Scholar at the Center for Public Policy and Private Enterprise in the School of Public Policy, University of Maryland. In this position, he directs research on critical policy issues related to the increasingly complex problems associated with improving public-sector management and operations and with how government works with private enterprise.

Current projects include modernizing government supply-chain management, identifying government sourcing and acquisition best practices, and analyzing Department of Defense business modernization and transformation. Previously, Mr. Lucyshyn served as a program manager and the principal technical advisor to the Director of the Defense Advanced Research Projects Agency (DARPA) on the identification, selection, research, development, and prototype production of advanced technology projects.

Prior to joining DARPA, Mr. Lucyshyn completed a 25-year career in the U.S. Air Force. Mr. Lucyshyn received his Bachelor degree in Engineering Science from the City University of New York and earned his Master's degree in Nuclear Engineering from the Air Force Institute of Technology. He has authored numerous reports, book chapters, and journal articles.

Lisa H. Harrington

Lisa H. Harrington holds a research appointment to the Center for Public Policy and Private Enterprise at the University of Maryland's School of Public Policy, where her research focus is on defense supply chain management. She also is an adjunct professor of supply chain management and senior research fellow at the Supply Chain Management Center, Robert H. Smith School of Business University of Maryland.

Ms. Harrington served as lead author on the recently published book, *X-SCM: The New Science of X-treme Supply Chain Management (2010)*, and co-authored two other books, *In Real Time: Managing the New Supply Chain* (2004), and *Logistics and the Extended Enterprise: Benchmarks and Best Practices for Manufacturing Professionals (1999).*

Ms. Harrington has consulted in the field of supply chain management for more than 20 years, serving clients in both the public and private sector. She is a former board member of the Council of Supply Chain Management Professionals and the Warehousing Education & Research Council. She earned her Bachelor of Arts degree in communications from Brown University, and holds an Executive Education Certificate in Logistics Management from Michigan State University.

Amelia Cotton Corl

Amelia Cotton Corl is a Faculty Research Assistant at the Center for Public Policy and Private Enterprise. She has contributed to several other reports related to defense industry transformation, indefinite-delivery indefinite-quantity contracts, and prime vendor contracting. In addition, she is pursuing a Ph.D. at the University of Minnesota in the Department of Sociology with a focus on the sociology of organizations.

The Center for Public Policy and Private Enterprise provides the strategic linkage between the public and private sector to develop and improve solutions to increasingly complex problems associated with the delivery of public services — a responsibility increasingly shared by both sectors. Operating at the nexus of public and private interests, the Center researches, develops, and promotes best practices; develops policy recommendations; and strives to influence senior decision-makers toward improved government and industry results. The Center for Public Policy and Private Enterprise is a research Center within the University of Maryland's School of Public Policy.

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