

CSIS-AM-18-003

September 2017

# Use of Incentives in Performance-Based Logistics Contracting

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## Acknowledgements

This report is made possible by the generous support of the Naval Postgraduate School's Acquisition Research Program. Dr. Zach Huitink and Prof. Sean O'Keefe for their partnership in preparing us and the projects for the Human Subjects Research process. The CSIS study team would also like to thank Kaitlyn Johnson, Arwen McNierney, and Jim McNierney for their assistance on this report. Finally, the study team thanks the range of interviewees from industry and government for contributing their time, expertise, and frank opinions to this project.

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## Table of Contents

<b>1. Introduction.....</b>	<b>1</b>
1.1 Background.....	1
<b>2. Scope .....</b>	<b>6</b>
1.2 Hypotheses.....	7
<b>3. Literature Review .....</b>	<b>8</b>
3.1 Time-Based Incentives.....	10
3.2 Financial Incentives .....	14
3.3 Scope.....	16
3.4 Other Incentives .....	17
3.5 Challenges to Designing Incentives.....	18
<b>4. Methodology .....</b>	<b>21</b>
4.1 Federal Procurement Data System.....	21
4.2 Interviews.....	22
<b>5. Analysis.....</b>	<b>24</b>
5.1 Time-Based Incentives.....	24
5.2 Financial Incentives .....	29
5.3 Scope-Based Incentives .....	37
5.4 Other Incentives .....	41
5.5 Challenges to Designing Incentives.....	46
<b>6. Analysis Results.....</b>	<b>50</b>
6.1 Hypothesis 1: Larger Scope.....	50
6.2 Hypothesis 2: Flexible Incentives.....	51
6.3 Hypothesis 3: Complexity.....	52
6.4 Hypothesis 4: Federal and Commercial Vendors .....	53
<b>7. Conclusions and Recommendations .....</b>	<b>55</b>
7.1 Presently Employed Incentives and Best Practices .....	55
7.2 Recommendations for Future PBLs.....	56
<b>About the Authors.....</b>	<b>63</b>

## Table of Figures

Figure 1: Identified DoD PBL Contract Obligations by Component, 2000-2016.....	3
Figure 2: DoD PBL Contract Obligations by Initial Maximum Duration, 2000-2016.....	26
Figure 3: DoD PBL Contract Obligations by Contract Pricing Mechanism, 2000-2016 .....	29
Figure 4: DoD PBL Contract Obligations by Platform Portfolio, 2007-2016.....	38
Figure 5: Level of Competition for DoD PBL Contract Obligations, 2000-2016.....	45

## Table of Tables

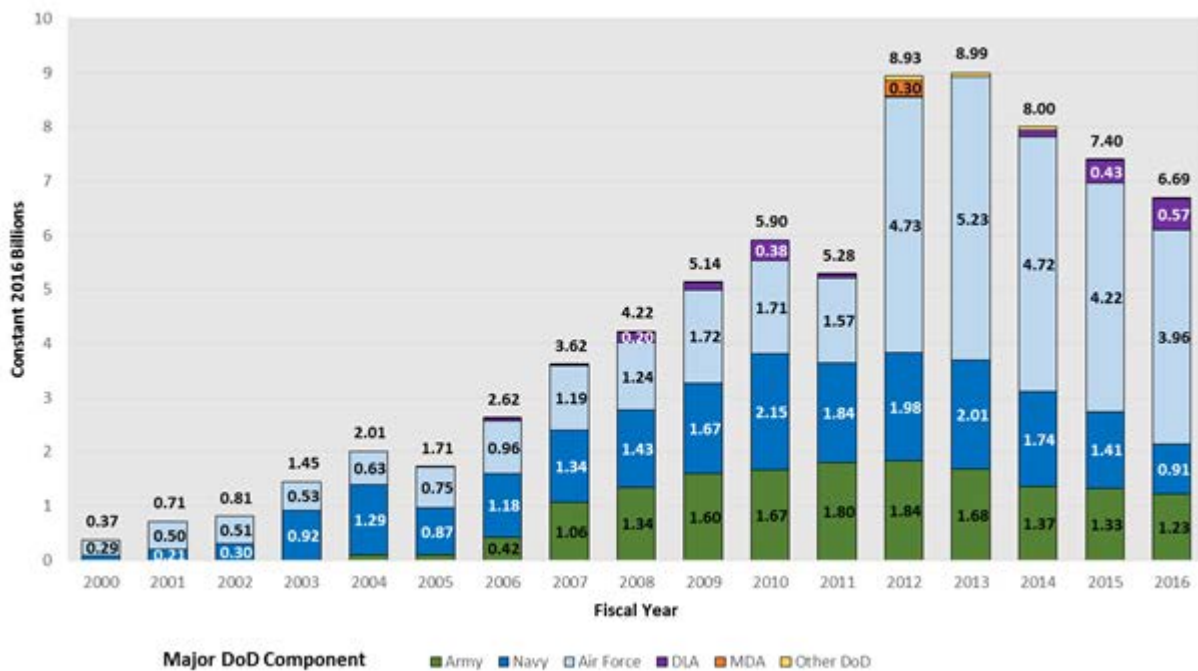
Table 1: Top 15 DoD PBL Vendors, 2009-2016.....	5
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## Executive Summary

Traditional contracting is primarily transactional, rewarding contractors when deliveries are made or certain process milestones are met. Performance-Based Logistic (PBL) contracting seeks to base contractor incentives on ongoing performance measures instead. PBL contracts are diverse and complicated, but they offer the potential to better align contractor incentives with the outcomes that the government cares about, such improving performance and reliability while controlling cost. Past research has found that these contracts can be successful at achieving these goals. This paper describes the incentives used in PBL contracts, identifies best practices, and provides recommendations for effective incentives going forward.

The use of PBL originated in the private sector, particularly in commercial aviation where companies shifted from paying for parts and labor for repairs to paying maintainers based on the percentage of their fleet that was ready to fly. This approach was employed by the U.S. Department of Defense in the late 1990s and has also been adopted by Australia and the United Kingdom under various names. To better understand the incentive structure in these contracts, the study team interviewed PBL practitioners including defense-unique contractors, defense-commercial contractors, and experts who are knowledgeable in the government perspective in the United States and abroad. The study team supplemented these interviews by analyzing a PBL dataset of DoD contracts.

Identified DoD PBL Contract Obligations by Component, 2000-2016



Source: FPDS; CSIS analysis.

The study team updated and expanded the dataset shown in the figure above. The underlying data draws from multiple sources, which were most concentrated in the years surrounding 2014. This means that the rapid growth in PBL obligations prior to 2012 may reflect the paucity of data in the early years and not a genuine increase in usage. However, evidence from the interviews corroborate the apparent decline in spending since 2013. This decline came despite encouragement to use PBL in the Better Buying Power reforms and multiple contemporaneous efforts to negotiate major new PBLs. This disconnect underlines

the ongoing challenge in designing agreements with incentives that push hard to encourage government-desired outcomes while remaining appealing to the DoD's suppliers.

## Types of Incentives:

Through a review of existing literature, the study team has identified four core categories of incentives: time-based, financial incentive, manipulation of contract scope, and finally other incentives such as reputation. The range of incentives used in this paper is intentionally broad and includes both the rewards for good performance as well as contract structures that may encourage vendors to bid on the PBL contract in the first place. The paper also identifies challenges that cut across multiple incentives. These include the breadth and number of metrics, the extent of flexibility and means of adjudicating what falls beyond the bounds of the contract, and the handling of the primes' suppliers customers.

### Time-Based

Time-based incentives can refer to both the maximum length of the contract and the mechanism for extending it. Vendors have emphasized that time-base incentives are especially relevant to the decision of how much they invest in process improvements. A large capital investment may lead to significant savings or performance improvements, but those only take effect several years down the line when the results of the investment have been deployed to the fleet in stages or otherwise had an opportunity to pay dividends. The outer bound of U.S. DoD contracts is a five-year contract with the option to extend for another five years. Yet, interviews and federal data suggest that most DoD contracts are shorter and typically rely on one-year options. The governments of Australia and the United Kingdom have been leaders in the use of duration incentives, known respectively for rolling contract extensions and contracts whose duration can run for multiple decades.

### Financial Incentives

Financial incentives measure contract performance by using predefined metrics to offer rewards or penalties. Negative incentives were widely seen as effective, so long as outcomes were reliant on factors under the control of the contractor and their chosen suppliers, as opposed to external factors outside their control. While contractors are strongly motivated to avoid negative incentives, bonuses for exceptional performance do not have a similar potency, because vendors often do not see them as a good return on their investment (although they were described by some as morale boosters). Achieving the higher standard may require both good performance and good luck, or it may involve costly investments that overshadow the possible reward. Finally, cost-sharing mechanisms, where the government and contractor split savings or overruns, were generally viewed as useful but were the subject of some controversy. Vendors, particularly those with a larger commercial clientele, expressed concerns about U.S. cost accounting standards. One defense-commercial vendor wanted to avoid any form of cost-accounting in contracts, but the other interviewees were instead concerned when these standards were applied to commercial suppliers who may offer low prices but are unwilling to open their books.

### Scope

Scope incentives refers both to what is included in the contract and, less frequently, the opportunity to expand the scope of that contract as a result of good performance. The underlying concept is straightforward; the more of the process the concessionaire controls, the more potential they have for process improvements. The possibility of expanding scope raises multiple complications and could run afoul of government depot rules or competitive procedures, even if, in theory, a more inclusive contract could save money.

### Other Incentives

The paper also discusses other incentives that relate to the government-contractor relationship and the use of competition. Relationship building is harder to directly influence via incentives as is discussed in the recommendations and conclusions section. Meanwhile, competition can prove a strong incentive (and can increase the government's leverage with other incentives), but it is often unavailable. A review of the

PBL dataset found that less than a third of obligations went to contracts open for competition over the course of the study period.

## Analysis Results

Based on the literature review and prior CSIS research, the study team identified four hypotheses to address the research question of how incentives shape PBL outcomes.

- Hypothesis 1: A larger scope in a PBL contract allows for more effective and ambitious incentives. These larger contracts make it easier to balance revenue, profit, and risk.

The study team found mixed support. Vendors' interest in more inclusive projects, such as a PBL that manages an entire weapon system, was contingent on having control of factors, such as the supply chain, that the government customer may be reticent to give up. Instead, contractors were united in support of greater durations, which made investments more rewarding.

- Hypothesis 2: Flexible incentives are generally more desired by contractors and are thus more effective.

Interviewees found that achieving the proper level of flexibility required balancing competing risks. No flexibility would make it hard to handle extraordinary challenges that were not anticipated by the contract, such as a sustained change to operational tempo or the discovery of a significant defect; however, too much flexibility undermines incentives, because profit may depend on negotiation rather than incentives. Government and defense-unique contractor aligned interviewees mentioned that when there is less certainty, particularly for a platform that has just entered operation and maintenance, cost-sharing mechanisms can provide flexibility.

- Hypothesis 3: For incentives to be effective, the platform/system must be complex enough to allow for meaningful inputs and innovations.

PBLs are complicated arrangements with fixed administrative costs to set up, so in a shallow sense this is accurate. However, complexity does not appear to be the relevant criteria for judging whether meaningful inputs and innovations are available. In particular, one interviewee noted that PBL contracts for maintaining software subsystems ran into challenges because outcomes were difficult to measure. Conversely, the international experience has found that forms of performance-based contracting, which may not strictly qualify as PBL, can be applied to even simple contracting situations.

- Hypothesis 4: Similar incentives are valued by both government and commercial vendors, but there are meaningful differences in how government customers and commercial customers evaluate incentive structures.

The study team found an exception to the first part of this hypothesis. Some more commercially oriented vendors, particularly second-tier suppliers, sought to avoid government cost accounting standards. As a result, some forms of financial incentives, such as cost-based contracts or incentive fees based on profit and loss, were unappealing to these vendors. This contrasted with other defense-unique and defense commercial vendors that preferred cost-based arrangements to some of the other cost-saving oriented

arrangements on offer. The second part of the hypothesis found greater support. Building a trusting relationship where incentives were aligned is one of the core challenges of a PBL. The differences are not always predictable in advance. In one example, a vendor was reticent about PBL terms on offer until an expert from elsewhere in the company came in and said that the government is offering what we have long been asking for.

## Conclusions and Recommendations

### Presently Employed Incentives and Best Practices

#### *Contract Length and Extensions*

Offering contracts of greater length and considering new forms of extensions like those employed in the U.K. and Australia, which offer greater confidence, emerged as the strongest incentive that the U.S. government often does not currently offer. Contractors complained about both the short duration of DoD PBLs and the use of one-year options, which in their view made large investments a risky prospect. The Australian approach to rolling contract extension does involve one year options, but the decision of whether to grant them is made further in advance, offering greater certainty. Under the U.K. approach, extensions can be granted more formulaically, allowing for more contractor confidence if they hit their targets. While there was some disagreement by interviewees, contractors were generally more willing to accept cost-saving measures, such as re-baselining at regular multi-year intervals, with a longer duration structure.

#### *Building and Maintaining Relationships*

The interpersonal relationship between customer and contractor is already acknowledged in the PBL guidebook, but it is easy to underestimate its centrality. While some experts rejected this view, emphasizing the PBL as strictly a business relationship, most experts believed a good relationship was important, particularly when handling situations not clearly anticipated in the contract. The strongest proponent of the importance of good relationships argued that they were the key determiner of outcomes. Even under this view, though, incentives have their place, as good relationships may never be achieved without a structure that aligns government and contractor interests and offers externally verifiable accountability. This recommendation implies that approaches that improve communications and esprit de corps, such as co-locating government and contractor engineering staff, are well worth the effort when possible.

### Recommendations for Future PBLs

#### *Focus where Performance Gains are Necessary*

Although the business case for potential PBLs will always be a factor, it may not always be sufficient. The DoD has multiple tools with which to seek cost savings, and some PBL contracts have moved back to more transactional arrangements over time, sometimes seeking even greater savings. However, for systems with reliability or performance issues, PBL has the potential to bring improvements that should appeal to even those skeptical of its ability to deliver cost savings. Here, the Australian model can serve as an example. While it does involve greater durations, that country's approach has lower expectations of cost savings but is also less reliant on vendors making unreimbursed upfront investments that are paid back in later years. In those cases where performance improvements are desperately needed, PBL would be well worth the effort, even with a less ambitious business case.

#### *Consider Mechanisms for Feedback from Operators*

The last recommendation complements the earlier conclusions. The PBL handbook already discusses the means to receive feedback from operators. Nonetheless, should longer durations and greater emphasis on relationship be adopted, it becomes all the more important to prevent the program from operating in "splendid isolation." Likewise, the operator's perspective is key to evaluating where reliability and performance improvements are most needed.





# 1 Introduction

PBL contracts have been used by private industries for decades, particularly in the airline industry, as a way to manage complex fleets. Since the late 1990s, this trend has manifested in the public sector as well. Past research indicates that PBL contracts can be successful in lowering costs and improving performance in both government and private contracting. In both cases, PBL contracts depend on the customer's ability to properly structure and implement contract incentives in order to promote vendor behavior that reduces costs and improves performance while also delivering the customer's desired outcomes.

In order to examine incentive use in PBL contracts, CSIS has undertaken a research effort focused around interviews with PBL experts from among Department of Defense (DoD) PBL vendors, private sector PBL vendors, and government customers (both domestic and foreign). The findings from these interviews have been supplemented with an analysis of PBL contract data from the Federal Procurement Data System. The objective of this research is to better understand how incentives are currently used in PBL contracting and then look toward how incentives can best be utilized in future PBL contracts.

The report begins with a background that introduces PBL and then reviews who in the DoD is using PBL and for what. The report then proceeds to a review of the available literature on the use of incentives in PBL contracting. This review is followed by an analysis that discusses insights from interviews with experts about their experiences with incentives in PBL contracting. Where possible, the discussion of different forms of incentives is paired with U.S. government contracting data describing how PBL contracts are structured and incentivized. The report concludes with an overview of the key findings as well as recommendations for policymakers and future work on this topic.

## 1.1 Background

### 1.1.1 What are Performance-Based Contracting and Performance-Based Logistics?

Performance-based contracting is typified by contracts structured in such a way as to enable and reward better performance on the part of the service provider or contractor. PBLs are often specifically related to DoD contracting, and they are specifically defined as agreements that are “usually long term, in which the provider...is incentivized and empowered to meet overarching customer oriented performance requirements...in order to improve product support effectiveness while reducing total operating costs.”<sup>1</sup> While definitions vary between sources, the DoD's PBL Guidebook states that PBL is “synonymous with performance-based life cycle product support, where outcomes are acquired through performance-based arrangements that deliver Warfighter requirements and incentivize product support providers to reduce cost through innovation.”<sup>2</sup> This type of performance-based contract has been used in the private sector for decades, particularly

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<sup>1</sup> Alan F. Estevez, “DoD Product Support Business Case Analysis Guidebook” (Department of Defense, 2011).

<sup>2</sup> Assistant Secretary of Defense for Logistics and Materiel Readiness, “PBL GUIDEBOOK A Guide to Developing Performance-Based Arrangements,” 2016, [http://bbp.dau.mil/docs/PBL\\_Guidebook\\_Release\\_March\\_2016\\_final.pdf](http://bbp.dau.mil/docs/PBL_Guidebook_Release_March_2016_final.pdf).

in the aviation industry.<sup>3</sup> This is due to its design, which aligns incentives between customers and suppliers.<sup>4</sup> PBLs differ from other forms of contracts in that they must include a service component.<sup>5</sup>

Traditionally, product acquisition and sustainment have been treated as separate considerations, with the government granting a greater priority to acquisition. However, sustainment represents the lion's share of spending, and the drive to put more emphasis on gaining value from already purchased systems led to the emergence of PBL. The DoD began using PBLs in 1999, when the Air Force reached an agreement with Lockheed Martin to provide support for the F-117 Nighthawk. While initially intended as a way to improve readiness, the DoD has since begun using PBLs to “deliver needed reliability and availability, reduce total cost, and encourage and reward innovative cost reduction initiatives.”<sup>6</sup>

The DoD's PBL Guidebook does not specify the difference between “reduce total cost” and “innovative cost reduction initiatives.” However, for the purposes of this report, the former is interpreted as taking known steps to reduce costs, and the latter is finding new ways to reduce costs. Currently, the DoD describes PBLs as “the Department of Defense's preferred product support strategy to deliver improved weapons systems readiness at the same or lower total cost.”<sup>7</sup> Since PBLs came into use, they have helped the DoD achieve both cost reductions and higher availability rates for systems.<sup>8</sup>

Notably, some recent examples of DoD programs that include PBL contracts are: the C-17 Globemaster III Sustainment Partnership, the T-45 Goshawk Contractor Logistics Support, the High Mobility Artillery Rocket System Life Cycle Contract Support I/II, the E-8 Joint Surveillance & Target Attack Radar System Total System Support Responsibility, the F/A-18 Hornet F/A-18 Integrated Readiness Support Teaming, and the aforementioned F-117 Nighthawk Total System Performance Responsibility & Total System Support Partnership.<sup>9</sup>

### 1.1.2 What is the State of PBL Contracting by DoD Component?

In order to provide context for the analysis that follows, this section of the report examines how PBL contracts are currently used within the DoD. Data for this analysis is drawn from the

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<sup>3</sup> Hunter et al., “Performance-Based Logistics: A Process Analysis for the Defence Logistics Agency”; Assistant Secretary of Defense for Logistics and Materiel Readiness, “PBL GUIDEBOOK A Guide to Developing Performance-Based Arrangements.”

<sup>4</sup> Guajardo et al., “Impact of Performance-Based Contracting on Product Reliability: An Empirical Analysis.”

<sup>5</sup> Hunter et al., “Performance-Based Logistics: A Process Analysis for the Defence Logistics Agency.”

<sup>6</sup> Assistant Secretary of Defense for Logistics and Materiel Readiness, “PBL GUIDEBOOK A Guide to Developing Performance-Based Arrangements.”

<sup>7</sup> Center for Executive Education. (2012). *The Tenets of PBL Second Edition: A Guidebook to the Best Practices Elements in Performance-Based Life Cycle Product Support Management*.

<sup>8</sup> Hunter et al., “Performance-Based Logistics: A Process Analysis for the Defence Logistics Agency.”

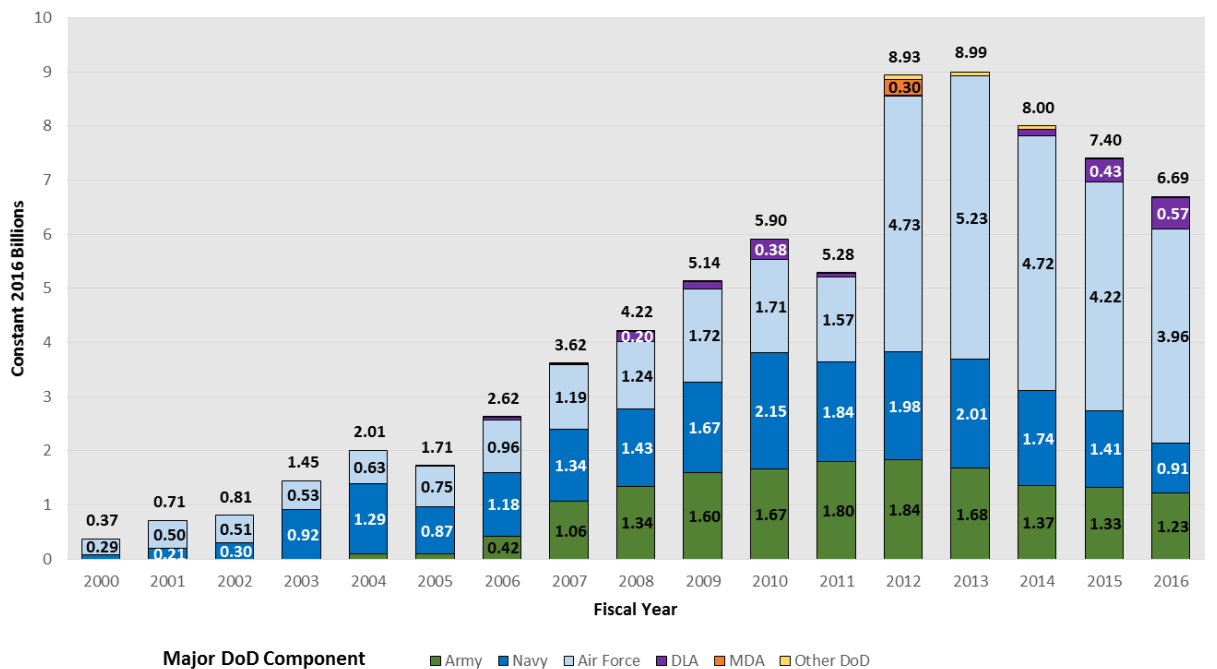
<sup>9</sup> Christopher P. Gardner et al., “Balancing Incentives and Risks in Performance-Based Contracts,” *Defense Acquisition Review Journal* 22, no. 4 (2015): 472–506,

<http://www.dau.mil/publications/DefenseARJ/ARJ/ARJ75/ARJ75-Gardner.pdf>.

publicly-accessible Federal Procurement Data System (FPDS).<sup>10</sup> The greatest challenge of using FPDS in this context is that the database does not reliably track PBL contracts.<sup>11</sup> As part of a previous research effort for the Defense Logistics Agency, CSIS created a dataset of PBL contracts through 2014. The study team’s approach to labeling PBL contracts is discussed in methodology section 4.1.1, and it involves drawing from official lists where available as well as searching within FPDS, DoD contract announcements, and govini.com. This study extends that look through 2016, refines the categorization, and takes a closer look at their incentives.

One limitation of this approach is that not all years are equally represented. Our most complete list was provided by the office of the Assistant Secretary of Defense for Logistics & Material Readiness (ASD (L&MR)). That census captured PBL contracts that were active in 2014, but did not include contracts that had concluded before that year or that were begun after. As a result, with the exception of those years surrounding 2014, changes in spending level do not necessarily reflect the true usage rate of PBL contracts. Nonetheless, CSIS is confident that the dataset of over a hundred contracts is a sufficient sample to examine trends in how PBL contracts are employed. Figure 1 shows total DoD contract obligations under identified PBL contracts. The chart is broken down by major DoD component:

Figure 1: Identified DoD PBL Contract Obligations by Component, 2000-2016



Source: FPDS; CSIS analysis.

<sup>10</sup> See section 4.1 for details on CSIS’s use of FPDS contracting data.

<sup>11</sup> The *SystemEquipmentCode* field does have a category “ZBL” which this report treats as a reliable identifier of PBL contracts. However, this field is also used to identify which project a contract belongs to, for example Major-Defense Acquisition Projects like the F-35. This choice mixes and matches the what and the how of acquisition. Likewise, it cannot reliably tell us what projects are not PBLs, for example a C-17 Globemaster III Sustainment Partnership contract could correctly report either ZBL or the code for the C-17.

Of the three military departments, the Army has made the least use of PBL peaking under \$1.9 billion in 2012. The Army's PBL spending was primarily driven by large contracts related to the UH-72A light utility helicopter and the RQ-7 Shadow tactical UAV.

The Navy, meanwhile, was at the forefront of adopting PBL contract structures in the early-to-mid-2000s, with nearly \$1.3 billion in PBL contract obligations in 2004. This spending was spread among several PBL programs that are not readily identifiable in FPDS. Data reliability improved in the early 2010s, which allowed CSIS the ability to more accurately identify contract trends. That data shows that obligations peaked in 2010 at nearly \$2.2 billion and remained near that level through 2013.

The Air Force saw significant obligations for PBL contracts as early as 2000, when work began on the B-2 bomber platform. The increases between 2003 and 2010 reflect increasing obligations related to that same platform, rather than the labeling of additional contracts during that underreported period. As the data grows more reliable, the Air Force emerged as the preeminent user of PBL contracts with obligations exceeding \$4.7 billion in 2012, an amount primarily driven by the \$2.2 billion in obligations from a PBL contract related to the C-17A transport aircraft in 2012.

Since DoD PBL contract obligations peaked in 2013, total obligations have declined by 26 percent (over three times as steeply as the decline in overall DoD contract obligations between 2013 and 2016). Both the Army (-27 percent) and the Air Force (-24 percent) have seen declines that are roughly in line with the overall rate of decline for DoD PBL contract obligations, but the Navy has seen a decline of more than double that rate (-55 percent), with significant declines across the range of platforms and systems that the Navy maintains under PBL contract structures.

Despite what seems to be the end of a period of decline for overall DoD contracts, which rose by 7 percent in 2016 after sustained declines between 2009 and 2015, DoD PBL contract obligations fell by 10 percent in 2016. A comparative analysis of these two trends shows that the share of overall DoD contract obligations going to PBL contracts was steady at nearly 3 percent between 2013 and 2015, before declining slightly to 2.3 percent in 2016. These declining numbers may be the result of incomplete reporting, rather than actual usage, as CSIS's most complete list covered PBLs active in 2014. Interviews with private industry revealed that there has been some new PBL activity not captured on the study team's list. However, multiple interviewees from multiple companies have said that negotiations for new PBL contracts have slowed down in the past few years. The data shown in Figure 1 reinforces these claims from the interviews.

### 1.1.3 Which Vendors Receive DoD PBL Contract Obligations?

The industrial base that performs PBL contracts for the DoD is heavily concentrated, which is not surprising given that many of the large PBL contracts are tied to major platforms and systems, which are in turn produced by a small number of the largest defense vendors. Table 1 shows the top 15 DoD PBL vendors between 2009 and 2016, with both their respective contract obligations and their shares of overall DoD PBL contract obligations for that period.

Table 1: Top 15 DoD PBL Vendors, 2009-2016

Rank	Vendor	Total DoD PBL Contract Obligations 2009-2016	Share of Total DoD PBL Contract Obligations 2009-2016
1	Boeing	14.5	26%
2	L3 Communications	7.4	13%
3	Northrop Grumman	6.5	12%
4	Lockheed Martin	4.4	8%
5	General Electric	3.3	6%
	<b>Top 5 Total</b>	<b>36.1</b>	<b>64%</b>
6	Airbus	3.0	5%
7	General Dynamics	2.2	4%
8	Rolls Royce	2.2	4%
9	Maritime Helicopter Support [Lockheed Martin/Sikorsky Joint Venture]	1.8	3%
10	Bell-Boeing Joint Program Office	1.5	3%
11	Textron	1.5	3%
12	Raytheon	1.3	2%
13	General Atomics	1.2	2%
14	Honeywell	0.9	2%
15	Dyncorp International	0.5	1%
	<b>Top 15 Total</b>	<b>52.2</b>	<b>93%</b>
	<b>Overall DoD PBL</b>	<b>56.3</b>	

Source: FPDS; CSIS analysis.

The top 5 DoD PBL vendors accounted for 64 percent of total DoD PBL contract obligations between 2009 and 2016, and the top 15 accounted for 93 percent. Both of those figures have increased significantly over the 2009-2016 period. The share going to the top 5 PBL vendors has increased from 55 percent in 2009 to a high of 71 percent in 2015, before falling back to 66 percent in 2016. Meanwhile, the share going to the top 15 has risen from 87 percent in 2010 to 95 percent in 2016.

Northrop Grumman accounted for the largest shares of DoD PBL contract obligations in 2009 and 2011. However, since 2012, Boeing has received nearly 75 percent more obligations than the second-ranked vendor: L3 Communications. These changes in company rankings may be less significant than they appear, as a small number of high value contracts can quickly alter those rankings. The magnitude of these shifts suggests that a small number of significant contracting opportunities drive these rankings, not just company policy towards PBL.

## 2 Scope

The four main goals of this project are:

- 1) Identify common incentives that the DoD currently uses in PBL contracts.
- 2) Analyze those incentives.
- 3) Compare those incentives in order to identify best practices.
- 4) Provide a recommendation for future government PBL contracts.

To achieve these goals, CSIS has spoken with experts from industry, including defense-unique contractors, commercial vendors, and both U.S. and international government officials. This interview pool was intended to capture a range of views on the use of incentives in PBL contracts. As a result of such a wide pool, the conclusion's relevance will extend beyond merely the U.S. government.

In addition to expert interviews, CSIS also focused on obtaining quantitative data from industry. However, during the initial stages of inquiry, the research team was unsuccessful in obtaining a sufficient amount of data due to proprietary concerns. This is not a new challenge. In 2004, Rebecca Kirk and Thomas DePalma observed “[t]here is a complete lack of feedback in the current PBL process, and the measurement of the performance of these contracts lacks visibility. Performance data, though required, are only reported on a case-by-case basis—a centralized repository needs to be established to collect and maintain these data.”<sup>12</sup> Past studies, such as Kirk and DePalma's and Lt. Shane Openshaw's<sup>13</sup> have taken a case study that captured metrics used in individual projects. In addition, the PBL Guidebook has gathered a comprehensive list of metrics that spans 13 pages.<sup>14</sup> CSIS's focus is at a higher level that includes inherent incentives, such as contract scope and length. This level had the advantage of being most pertinent to the concepts raised during the interviews and also allowed the team to compare a range of projects by using centralized contract data collected in FPDS.

Moreover, the research team benefitted from past CSIS work focused on PBL contracting. In a previous research agreement with the Defense Logistics Agency, CSIS developed a dataset for PBL.<sup>15</sup> This report utilizes and builds upon that research. It examines contracts from 2000 to 2016 but has the most complete data for contracts in the years surrounding 2014.

Lastly, it must be noted that even though corporate interviewees did not provide proprietary data, they did provide the context required for the study team to analyze FPDS data. All interviewees, their employers, and the projects they worked on are confidential. To give the reader context on

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<sup>12</sup> Rebecca L Kirk and Thomas J DePalma, “Performance-Based Logistics Contracts: A Basic Overview” (Alexandria, VA, 2005), 43.

<sup>13</sup> Shane Openshaw and Robert Riffle, “Performance Based Logistics: A Path to Reduced Reliance on Contractor Technical Support for Weapon Systems in the Field?,” *Institute for Advanced Technology*, 2006, <http://www.dtic.mil/dtic/tr/fulltext/u2/a461434.pdf>.

<sup>14</sup> Assistant Secretary of Defense for Logistics and Materiel Readiness, “PBL GUIDEBOOK A Guide to Developing Performance-Based Arrangements,” 165–77.

<sup>15</sup> Andrew Hunter et al., “Performance-Based Logistics: A Process Analysis for the Defence Logistics Agency” (Washington, D.C., 2015)

their perspective, quotes are attributed based on affiliation with government, defense-unique firms, or defense/commercial firms. Most quotes in the document are reproduced from notes, not transcripts, and any disjointedness in them reflect the limitations of the authors' notes and not the word choices of the experts.

## 2.1 Hypotheses

The research team identified four hypotheses, all based on prior study of these issues and the literature covered in section 3:

1. A larger scope in a PBL contract allows for more effective and ambitious incentives. These larger contracts make it easier to balance revenue, profit, and risk.
2. Flexible incentives are generally more desired by contractors and are thus more effective.
3. For incentives to be effective, the platform/system must be complex enough to allow for meaningful inputs and innovations.
4. Similar incentives are valued by both government and commercial vendors, but there are meaningful differences in how government customers and commercial customers evaluate incentive structures.



### 3 Literature Review

Due to the current resource environment, the DoD has become increasingly interested in PBL contracts because of their potential to save on costs and improve outcomes. However, PBLs are a form of performance-based contracting that the DoD has had an interest in since the 1960s.<sup>16</sup> Incentives are key to PBL contracting, and this report uses the broader economics definition of the term incentives, which is not limited to fee structure. This definition includes approaches like longer contract periods which incentivizes upfront investments. It also increases the scope of work of the contract which reduces risk for the contractor. While PBLs are currently in use in the private sector—and to a more limited extent by the DoD—the effects of the incentives built into PBLs need to be better understood. This review will examine incentives based on time, cost, and scope, as well as discuss other potential incentives and challenges to designing incentives.

This paper focuses on the key to achieving good performance outcomes as defined above: incentives. Every business arrangement involves incentives. An incentive can be defined as a “stimulus to a desired action” or “anything that encourages or motivates somebody to do something.”<sup>17</sup> In the context of PBLs, an incentive is a “term or condition that encourages the desired product support integrator and/or provider behavior to deliver the relevant Warfighter outcome.”<sup>18</sup> While incentives can be a part of any type of contract, they are particularly integral to PBLs. In fact, the DoD considers the “key to a successful PBL arrangement [to be] the use of incentives to elicit desired behaviors and outcomes.”<sup>19</sup>

In a guide to best practices concerning PBL, the University of Tennessee’s Center for Executive Education identified three success factors that define good PBL contracts.<sup>20</sup> The first success factor identified in their report is referred to as “alignment.”<sup>21</sup> This factor is best understood as the acknowledgement by all parties – government and contractor – that PBL involves a different provider-client relationship.<sup>22</sup> The second success factor that the report identified is “contract structure.”<sup>23</sup> Having a good contract structure from the beginning is paramount. The report describes a good contract structure as one that appropriately balances risk and asset management, establishes an environment that allows for creativity and shared success, and uses a pricing model that takes incentives types into account.<sup>24</sup> These incentive types can take many forms (which will be discussed in detail below). The report’s final success factor is performance management, which involves establishing and aligning desired outcomes and establishing

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<sup>16</sup> Gregory G Hildebrandt, “The Use of Performance Incentives in DoD Contracting,” *Acquisition Review Quarterly*, 1998, 217–34.

<sup>17</sup> Office of the Under Secretary of Defense, “Guidance on Using Incentive and Other Contract Types” (Washington, D.C.: Office of the Undersecretary of Defense: Acquisition, Technology and Logistics, 2016), <http://www.acq.osd.mil/dpap/policy/policyvault/USA001270-16-DPAP.pdf>.

<sup>18</sup> Assistant Secretary of Defense for Logistics and Materiel Readiness. (2016a).

<sup>19</sup> Ibid.

<sup>20</sup> Center for Executive Education, “The Tenets of PBL Second Edition: A Guidebook to the Best Practices Elements in Performanc-Based Life Cycle Product Support Management,” 2012.

<sup>21</sup> Ibid.

<sup>22</sup> Ibid.

<sup>23</sup> Ibid.

<sup>24</sup> Ibid.

metrics for reporting and improving.<sup>25</sup> Furthermore, these points are all echoed in the DoD's PBL Guidebook.<sup>26</sup>

Similar to the Center for Executive Education, Kleemann, Glas, and Essig included incentive payments as one of the three key components of the compensation part of the PBL business model.<sup>27</sup> After reviewing the literature on the experiences of organizations that implemented PBLs, Sols and Johannesen found a broad consensus in the existing literature that aligning incentives with performance achievements is one of the main enablers of PBL success.<sup>28</sup> Therefore, while incentives are not required for a PBL, they are integral components of a contract structure and often yield better results.<sup>29</sup> Their importance was highlighted by the Proof Point study, which found that incentives “drive the behavior, actions, and investment decisions” of product support providers.<sup>30</sup> Therefore, it follows that the appropriate use of incentives can lead to preferable outcomes for the government.

Yet, effective incentives are not as simple as just offering money in exchange for desired behavior. As recently as the early 2000s, the DoD gave award fees to firms without seeing a return on that investment in terms of outcomes.<sup>31</sup> This potentially calls into question the efficacy of incentives. In other words, if a firm knows it will be paid its award fee regardless of whether it achieves its performance targets, the award fee is no longer an incentive. A more recent report from the Government Accountability Office (GAO) found that “many of DOD's PBL arrangements do not contain cost metrics or offer specific incentives to encourage reduced costs.”<sup>32</sup> For example, of the twenty-nine PBL arrangements GAO reviewed, only four contained incentives intended to control or reduce costs.<sup>33</sup> This finding by the GAO suggests both that some of these arrangements may not be true PBLs, and that a better understanding of the effects of incentives could improve the outcomes and oversight of PBLs.

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<sup>25</sup> Ibid.

<sup>26</sup> Assistant Secretary of Defense for Logistics and Materiel Readiness, “PBL GUIDEBOOK A Guide to Developing Performance-Based Arrangements.”

<sup>27</sup> Florian C. Kleemann, Andreas Glas, and Michael Essig, “Public Procurement Through Performance-Based Logistics: Conceptual Underpinnings and Empirical Insights,” *Journal of Public Procurement* 12, no. 2 (2012): 151–88.

<sup>28</sup> Alberto Sols and Line Holm Johannesen, “The Role of Transition Contracts in Performance-Based Logistics Initiatives,” *Systems Engineering* 16, no. 4 (2013): 453–63, doi:10.1002/sys.21242.

<sup>29</sup> Ronald L. Straight, “Performance-Based Contracting: Results, Performance Standards, Incentives” (91st Annual International Supply Management Conference, 2006); Kleemann, Glas, and Essig, “Public Procurement Through Performance-Based Logistics: Conceptual Underpinnings and Empirical Insights.”

<sup>30</sup> Assistant Secretary of Defense for Logistics and Materiel Readiness, “PBL GUIDEBOOK A Guide to Developing Performance-Based Arrangements.”

<sup>31</sup> GAO, “Defense Acquisitions: DOD Has Paid Billions in Award and Incentive Fees Regardless of Acquisition Outcomes” (Washington, D.C., 2005).

<sup>32</sup> GAO, “Defense Logistics: Improved Analysis and Cost Data Needed to Evaluate the Cost-Effectiveness of Performance Based Logistics” (Washington, D.C., 2008): 434 .

<sup>33</sup> Ibid: 44.

When included in contracts, incentives “encourage contractors to meet specified objective and subjective outcome metrics, resulting in explicit...or implicit...financial benefits to industry.”<sup>34</sup> With traditional contracts, a contractor profits from selling increased numbers of its given product or service, and they have little direct incentive to improve that product beyond staying ahead of a competing contractor—and even less incentive if they have a monopoly on the product or service. With PBLs, the focus is on performance, not quantity produced, meaning that contractors are incentivized to provide products and services that perform well, regardless of potential competition. If done well, PBLs can increase profits for the contractor, but they do shift more risk from the government to the contractor than more traditional contracts. In a traditional contract, the government purchases a number of components and thus risks having to pay more in the event of equipment becoming obsolete or a higher than anticipated failure rate. With PBLs, the government is purchasing a performance output, meaning that these risks are shared between the government and the firm.<sup>35</sup> This is part of PBL’s appeal to the government. However, while firms are certainly willing to enter into PBL contracts, this shift in responsibility creates the need for a greater reward that will encourage firms to accept the increased risk. In the case of PBLs, this encouragement comes from incentives, with the caveat that those incentives must promote behaviors and outcomes that benefit both the DoD and the firm.<sup>36</sup> Incentives can take multiple forms, each of which is discussed below.

When considering incentives, it must be remembered that contractors and the government have different priorities when it comes to risk. Vendors care primarily about financial risk, meaning concern about their return on investment. In contrast, the DoD is primarily concerned with operational risk, meaning its ability to meet mission objectives. In the face of these competing interests, PBLs strike a balance between risk to the vendor and risk to the government, with vendors accepting higher risks (i.e., having to make expenditures to react to the DoD’s use of equipment, which is outside the control of the vendor) in return for higher potential profitability.<sup>37</sup> A further complication is that incentives sometimes must be aligned with parties beyond just the government and the contractor, such as the contractor’s suppliers or the subcontractors that will be working on the project.<sup>38</sup>

### 3.1 Time-Based Incentives

Time-based incentives involve either the maximum length of a contract, the means for extending the life of existing contracts, or a combination of the two. After conducting a series of

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<sup>34</sup> Assistant Secretary of Defense for Logistics and Materiel Readiness, “Product Support Manager Guidebook,” 2016, [https://acc.dau.mil/adl/en-US/440507/file/82239/PSM Guidebook Update 2016 \(6-24-16\).pdf](https://acc.dau.mil/adl/en-US/440507/file/82239/PSM%20Guidebook%20Update%202016%20(6-24-16).pdf).

<sup>35</sup> Gupta et al., “Contractor Incentives for Success in Implementing Performance-Based Logistics: A Progress Report”; Gardner et al., “Balancing Incentives and Risks in Performance-Based Contracts.”

<sup>36</sup> Assistant Secretary of Defense for Logistics and Materiel Readiness, “PBL GUIDEBOOK A Guide to Developing Performance-Based Arrangements.”

<sup>37</sup> Kenneth Doerr, Ira Lewis, and Donald R. Eaton, “Measurement Issues in Performance-Based Logistics,” *Journal of Public Procurement* 5, no. 2 (2005): 164–86; Gardner et al., “Balancing Incentives and Risks in Performance-Based Contracts.”

<sup>38</sup> Sandor Boyson et al., “Building Dual-Use Supply Chain Management Capabilities: Experiences to Date of System Integrators, Original Equipment Manufacturers & Third Party Logistics Firms By : P U B L I C P O L I C Y N O V E M B E R 2 0 0 8 Nove This Research,” 2008.

interviews, Gupta et al. found that the main incentive for contractors is the continuation of their contracts.<sup>39</sup> The authors recommend that initial contracts should last at least five years, which allows contractors to recover their initial investment in a project and solidifies expectations for needed employees and equipment.<sup>40</sup> For example, the contract for support of the F-117 was for five years with the option to extend it for an additional three, a feature that was considered a key to the success of the program.<sup>41</sup> However, it should be noted that contracts for relatively simple subsystems or arrangements can be shorter, as they require less investment.<sup>42</sup>

In practice, the U.S. Navy specifies that its PBL contracts are long term, as is the case with the Consolidated Automatic Support System.<sup>43</sup> In comparison, the U.K.'s Ministry of Defense negotiates through-life capability management contracts that are similar to PBLs, but can be much longer. These lengthier contracts incentivize more long-term investments than shorter contracts and have been credited with saving the U.K. government billions of pounds.<sup>44</sup>

It is also valuable to consider the Australian approach, which involves using contract duration as the primary incentive. While a contract may initially be for a period of five years, the government can begin a review process in the second year that can extend the contract if the vendors can demonstrate that they have met performance benchmarks. For the contract to be continued and obtain the benefits, the contractor must meet specific requirements related to cost, quality, and delivery. Therefore, if a contractor cannot meet the requirements specified in the contract, the contractor runs the risk losing the extension. Past CSIS research has found that "[t]he Australian approach presents challenges for DoD given its different legal and regulatory environments, but may be applicable for performance-based contracts executed through indefinite contract vehicles."<sup>45</sup>

However, both approaches run into challenges, perceived and real, under the current Federal Acquisition Regulation (FAR) and various related statutes. First, "Paragraph 17.204(e) of the [FAR] establishes a maximum of five years, which includes the basic and all option periods, for contracts for services as well as for supplies."<sup>46</sup> This provision has multiple exceptions, including an allowance for contrary agency procedures. The DoD has one such procedure that covers the above mentioned indefinite contract vehicles, but even this Title 10 policy only allows contracts of over a decade if permission is obtained at the highest levels:

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<sup>39</sup> Gupta et al., "Contractor Incentives for Success in Implementing Performance-Based Logistics: A Progress Report."

<sup>40</sup> Ibid.

<sup>41</sup> John Hunter, "F-117 Performance Based Logistics" (U.S. Air Force, n.d.).

<sup>42</sup> Assistant Secretary of Defense for Logistics and Materiel Readiness, "PBL GUIDEBOOK A Guide to Developing Performance-Based Arrangements."

<sup>43</sup> Paul Klevan, "Navy Success with PBL" (Naval Supply Systems Command, 2008).

<sup>44</sup> Jacques S Gansler, William Lucyshyn, and Lisa H Harrington, "An Analysis of Through-Life Support - Capability Management at the UK's Ministry of Defence," 2012.

<sup>45</sup> Hunter et al., "Performance-Based Logistics: A Process Analysis for the Defence Logistics Agency," 66.

<sup>46</sup> Ronald C. Flom, "Contracting Policy No. 17.204: Contract Length" (Washington, DC, 2007), 1, <https://www.opm.gov/about-us/doing-business-with-opm/contracting-opportunities/policies-regulations/17204contractlength.pdf>. This memo covers Office of Personnel Management policies specifically, but starts with an analysis of the overall federal regulatory environment.

“The head of an agency entering into a task or delivery order contract under this section may provide for the contract to cover any period up to five years and may extend the contract period for one or more successive periods pursuant to an option provided in the contract or a modification of the contract. The total contract period as extended may not exceed 10 years unless such head of an agency determines in writing that exceptional circumstances necessitate a longer contract period.”<sup>47</sup>

In practice, acquisition officials and contractors often perceive restrictions in policy, statute, or regulations that prevent the use of longer contract maximum durations. It is true that operations and maintenance (O&M) spending is limited to annual authorization; however, this still allows for contracts with a maximum duration of well over a year.<sup>48</sup> As the PBL Guidebook notes “the use of option years,” e.g. one base year with four one-year options, “is a method to retain flexibility.”<sup>49</sup> Likewise, the Center for Executive Education found that DoD Better Buying Power guidance from September 2010 was regularly cited as restricting the length of “PBL Strategy at 3 years.”<sup>50</sup> However, as those researchers noted, the restriction of single-award indefinite delivery vehicles has a critical exception:

“Contract length should be appropriate for the activity performed. Knowledge-based services readily meet the three-year limit. Other services such as Performance Based Logistics (PBL), LOGCAP, and environmental remediation, as examples, may not. The intent is that each service requirement will be reviewed by the appropriate official and only those with a sound business rationale will contain longer contract performance provisions.”<sup>51</sup>

Regarding the longer contracts under operations and maintenance spending, one other possible source of reluctance by acquisition officials is the application of transactional standards that apply when the government bears the risks to PBL arrangements in which the contractor is making their own investments. One such example is a 2014 Inspector General’s report raising concerns over possible violations of the Anti-Deficiency Act (ADA) restrictions.<sup>52</sup> The report focused on vendor purchases of spare parts that led to inventory overages. The report states:

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<sup>47</sup> *Task and Delivery Order Contracts: General Authority*, accessed September 21, 2017, <http://uscode.house.gov/view.xhtml?hl=false&edition=prelim&req=granuleid%3AUSC-prelim-title10-section2304a>.

<sup>48</sup> “One-Year (Annual) Authority. Budget authority that is available for obligation only during a specified fiscal year and expires at the end of that period. For example, operations and maintenance (O&M) and personnel appropriations.” Ibid.

<sup>49</sup> Assistant Secretary of Defense for Logistics and Materiel Readiness, “PBL GUIDEBOOK A Guide to Developing Performance-Based Arrangements,” 90.

<sup>50</sup> Center for Executive Education, “The Tenets of PBL Second Edition: A Guidebook to the Best Practices Elements in Performance-Based Life Cycle Product Support Management,” 24.

<sup>51</sup> Ashton B. Carter, “Better Buying Power: Guidance for Obtaining Greater Efficiency and Productivity in Defense Spending” (Washington, DC, 2010), 12, [https://www.acq.osd.mil/fo/docs/USD\\_ATL\\_Guidance\\_Memo\\_September\\_14\\_2010\\_FINAL.PDF](https://www.acq.osd.mil/fo/docs/USD_ATL_Guidance_Memo_September_14_2010_FINAL.PDF).

<sup>52</sup> Under the ADA, federal employees are prohibited from obligating the government to paying funds before those funds are legally appropriated. “TITLE 31—MONEY AND FINANCE 1341,” n.d. CSIS investigation found no confirmed ADA violation by the Air Force was reported by the Government Accountability Office’s regarding this case.

“The Chief, Tactical Airlift Division used O&M funds to satisfy C-130J inventory requirements for sustainment that may not have been a bona fide need for the 12-month statutory period of availability, potentially violating the ADA... Furthermore, the Tactical Airlift Division potentially committed Anti-Deficiency Act (ADA) violations (section 1502(a), title 31 United States Code) by failing to identify a bona fide need for the periods in which O&M funds were appropriated.”<sup>53</sup>

This interpretation could be challenging for O&M funded PBLs, as many PBLs have the stated goal of encouraging vendor investments in early years that will pay back over the lifetime of the contract. While the OIG and Air Force found common ground on some of the report’s findings, the Air Force makes an important point about a larger principle, which is that O&M funding does not prevent the establishment of multiple year contracts that give flexibility on the vendor side:

“Under both contracts, the contractor bears all cost risk for spare parts provided under a FFP line item for a service priced on a per flying hour basis. Accordingly, the Contractors are not paid the actual cost for the parts replenished. PBL inventory oversight is not weak, nor was inventory purchased with O & M appropriated funds. Overage items were not purchased, and will not be purchased, until stock levels are within recommended levels based on spares model.”

Taking a step beyond specific cases and statutory regulation, Gardner, Ogden, Kahler, and Brady sought to illuminate the larger state of opinion on PBL contracting in ways that illuminate contract duration issues. They did this by conducting a survey of six existing PBL programs and interviewing PBL experts from both the DoD and industry.<sup>54</sup> Like Gupta et al., they found that there was a “high level of satisfaction” with contracts that lasted five years with the option for continuation.<sup>55</sup> Those interviewed stated that longer durations in contracts ensured that risks were shared in an acceptable manner. The authors found that the ability to continue the contract past its initial period strengthened the relationship between a contractor and the government because it allowed for the flexibility to make changes to the contract.

In addition, among those interviewed by Gardner, those who were party to a contract with multiple guaranteed years felt the most satisfied with their incentive to invest.<sup>56</sup> One interviewee also told the authors that long-term contracts are one of the most important factors to accomplish weapon systems affordability improvements.<sup>57</sup> In determining the optimal length of contract, the

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<sup>53</sup> DoD Office of the Inspector General, “Excess Inventory Acquired on Performance-Based Logistics Contracts to Sustain the Air Force’s C-130J Aircraft,” 18, accessed September 18, 2017, <http://www.dodig.mil/pubs/documents/DODIG-2014-119.pdf>.

<sup>54</sup> Gardner et al., “Balancing Incentives and Risks in Performance-Based Contracts.”

<sup>55</sup> Ibid.

<sup>56</sup> Gardner, et al. (2015). Balancing Incentives and Risks in Performance-Based Contracts.

<sup>57</sup> Ibid.

report from the Center for Executive Education found that the best practice was to have the contract last for the length of the payback period for the contractor's investments.<sup>58</sup>

Another question Gardner et al. sought to answer was whether the limits on contract length set by the FAR and related statutes limited the desired contract length for projects. The FAR regulates the acquisition of supplies and services by all Federal Executive agencies.<sup>59</sup> Generally, the individuals interviewed did not think the limits set by the FAR were a major problem, and the issue was secondary to other concerns. Although, some did express the desire to potentially negotiate longer contracts. The authors did find that one of the main concerns among those they interviewed was that funding was not guaranteed over the years of a contract due to the nature of the congressional appropriations process.<sup>60</sup> As noted previously, one way to mitigate these challenges is to use indefinite contract vehicles such as IDVs, which do not make future work automatic but do ensure that a mechanism is already in place to allow for it.<sup>61</sup>

### 3.2 Financial Incentives

Cost-based incentives are those that are focused on contractor profits. When thinking about cost incentives, the most important considerations are the type of contract and types of fee structures the government will offer the contractor.<sup>62</sup> The FAR identifies a spectrum of contract types that fit into these categories based on the fee-type of the contract. The fees include fixed fees, incentive fees, and award fees. The primary difference between these different contract and fee types is what criteria are used to adjudicate the contractor fee and the resulting profits or losses.<sup>63</sup>

One important factor when considering contract types is profit sharing. Typically, if there was an increase in efficiency in a cost-plus contract, the government would use that as an opportunity to lower costs. This means that the DoD would enjoy all of the return, and the contractor would not be incentivized to improve performance. In firm fixed-price contracts, the contractor receives the financial benefit of any gains in efficiency without the DoD receiving any cost reductions beyond those incorporated in the initial contract price. The area of the spectrum between these two ends is filled by various types of contracts with incentive fees.

PBLs have typically been either firm-fixed-price or fixed-price incentive firm, but they can also take the form of other types of fixed-price contracts.<sup>64</sup> While fixed-price is not required, it is the DoD's preferred type of contract.<sup>65</sup> Other forms of PBLs (such as fixed-price incentive fee) allow for profit sharing, so that both DoD and the contractor benefit from cost reductions and

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<sup>58</sup> Center for Executive Education, "The Tenets of PBL Second Edition: A Guidebook to the Best Practices Elements in Performanc-Based Life Cycle Product Support Management."

<sup>59</sup> GSA, DoD, and NASA, "Federal Acquisition Regulation," 2005.

<sup>60</sup> Gardner et al., "Balancing Incentives and Risks in Performance-Based Contracts."

<sup>61</sup> Hunter et al., "Performance-Based Logistics: A Process Analysis for the Defence Logistics Agency."

<sup>62</sup> Gupta et al., "Contractor Incentives for Success in Implementing Performance-Based Logistics: A Progress Report."

<sup>63</sup> GSA, DoD, and NASA, "Federal Acquisition Regulation."

<sup>64</sup> Assistant Secretary of Defense for Logistics and Materiel Readiness, "PBL GUIDEBOOK A Guide to Developing Performance-Based Arrangements."

<sup>65</sup> Ibid.

increases in efficiency.<sup>66</sup> However, a firm-fixed-price contract may be picked deliberately to further strengthen the firm's incentive to save money and come in below budget.<sup>67</sup>

Another approach is to use financial incentives pegged to performance metrics. And just as there are different types of PBL contracts for various circumstances, different types of performance-related incentives make sense in different contexts. For example, the DoD's PBL Guidebook says that "shorter-term cost-type incentive arrangements are appropriate" until sufficient information has been collected on the program.<sup>68</sup> In an instance where there is a single metric for defining success, the government and firm can adopt a model described by Sols, Nowick, and Dinesh. The authors described a model with a "dead zone" at its center, which they define as normal system performance but with the bottom and top edges of the dead zone representing the lower and upper limits of normal system performance respectively.<sup>69</sup> If performance remains in this zone, the contractor will receive no performance incentive and will not be assessed a penalty. If performance falls below the dead zone, then a penalty should be incurred by the contractor. If performance rises above the dead zone, the contractor should be awarded a bonus for exceeding normal performance. According to the authors, the key consideration is that the contractor and government must agree on linking awards and penalties to given performance parameters.<sup>70</sup> Examples of performance metrics that could be used are average number of backorders and average total downtime of a system. Mirzahosseini and Piplani found that a compensation model based on the average delay from backorders leads to lower amounts of both backorders and downtime.<sup>71</sup> Sols et al. also note that this could be harder if several metrics are needed, a scenario that they consider more likely than having a single parameter.<sup>72</sup> Their model for a single metric is represented in a two-dimensional space. Two metrics would require a three-dimensional space. The DoD has five parameters for assessing logistic performance (operational availability, mission reliability, logistics response time, logistics footprint, and cost per unit usage), which would require a six-dimensional representation. This presents challenges when designing metrics for a contract.

Financial incentives appear to have a positive effect when used. In one analysis, the DoD found that performance increased for twelve out of fourteen PBL projects that had cost reduction incentives.<sup>73</sup> A commonly cited example of this is the set of F-117 sustainment contracts. These

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<sup>66</sup> Gardner et al., "Balancing Incentives and Risks in Performance-Based Contracts."

<sup>67</sup> Gupta et al., "Contractor Incentives for Success in Implementing Performance-Based Logistics: A Progress Report."

<sup>68</sup> Assistant Secretary of Defense for Logistics and Materiel Readiness, "PBL GUIDEBOOK A Guide to Developing Performance-Based Arrangements."

<sup>69</sup> Alberto Sols, David Nowick, and Dinesh Verma, "Defining the Fundamental Framework of an Effective Performance-Based Logistics (PBL) Contract," *Engineering Management Journal* 19, no. 2 (2007): 40–50.

<sup>70</sup> Ibid.

<sup>71</sup> H Mirzahosseini and R Piplani, "Compensation and Incentive Modeling in Performance-Based Contracts for After-Market Service," in *The 41st International Conference on Computers & Industrial Engineering* (Singapore, 2011), 739–44.

<sup>72</sup> Sols and Johannesen, "The Role of Transition Contracts in Performance-Based Logistics Initiatives."

<sup>73</sup> Office of the Deputy Assistant Secretary of Defense (Materiel Readiness), "Proof Point Project A Study to Determine the Impact of Performance Based Logistics ( PBL ) on Life Cycle Costs," 2011.



were cost plus incentive fee/award fee contracts. The performance incentive fee was awarded based on seven objectively measured metrics. The award fee was awarded based on four subjectively evaluated categories. This number of metrics is mostly in keeping with the PBL Guidebook's suggestion that three to five is the "effective number" of metrics.<sup>74</sup> In total, eighty percent of the contract dollars were incentivized.<sup>75</sup> The contracts are also Total System Performance Responsibility (TSPR) contracts, which raises financial concerns because they are must-pay obligations. TSPR contracts entail the government obligating the agreed upon funds at the start of each year, which ensures that funding is stabilized. This means that the funds must be paid, even if operations requirements were to change.<sup>76</sup> Despite these concerns, the operating cost for the F-117 increased minimally. In other words, the contracts largely controlled the costs for the government.<sup>77</sup>

### 3.3 Scope

Scope-based incentives take advantage of the inherent profit structure of PBL contracts. Whether there is a firm-fixed-price contract or a fixed-price incentive contract, the target price will be based on the government estimates of cost plus an allowance for contractor profits. The contractor generates additional profits by providing the agreed upon outcome for a lower cost than was achieved in the past. A contractor's ability to wring out further efficiencies is theoretically proportional to the portion of the process it controls. Because of this, a greater scope means greater revenue, greater chance for profits for the contractor, and increased efficiency for the DoD.<sup>78</sup> Gupta et al. argued that another way to approach scope-based incentives is to use them as a mechanism to change a contract and give a contractor both more responsibility and larger incentives based on performance.<sup>79</sup> In other words, an increase in scope can be a reward for good performance.

However, Gupta et al. noted that, because of the government's requirement for a competitive procurement process, it is challenging to employ scope-based incentives.<sup>80</sup> An increase in scope that has a single contractor performing multiple responsibilities may make sense and save money for the overall project. However, if another contractor can perform some of those functions for a lower price, then it can protest the change and ask for a chance to compete. Even without this concern, it can be challenging to determine the appropriate scope of a project. For example, A. Hunter et al. examined the Industrial Product-Support Vendor contract, which provides support for several Air Force Air Logistics Centers.<sup>81</sup> They found that the scope of the contract was very narrow, creating the potential for duplicative efforts on the part of the contractor, the Defense

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<sup>74</sup> Assistant Secretary of Defense for Logistics and Materiel Readiness, "PBL GUIDEBOOK A Guide to Developing Performance-Based Arrangements."

<sup>75</sup> Hunter, "F-117 Performance Based Logistics."

<sup>76</sup> GAO, "DEFENSE LOGISTICS: Air Force Report on Contractor Support Is Narrowly Focused" (Washington, D.C., 2000); Gardner et al., "Balancing Incentives and Risks in Performance-Based Contracts."

<sup>77</sup> Hunter, "F-117 Performance Based Logistics."

<sup>78</sup> Hunter et al., "Performance-Based Logistics: A Process Analysis for the Defence Logistics Agency."

<sup>79</sup> Gupta et al., "Contractor Incentives for Success in Implementing Performance-Based Logistics: A Progress Report."

<sup>80</sup> Ibid.

<sup>81</sup> A. Hunter et al., 2015.

Logistics Agency, and the Air Logistics Center.<sup>82</sup> Narrow contracts also limit the contractor's ability to provide improved support by restricting their ability to leverage usage information to achieve efficiencies. Because increased scope for the contractor means reduced scope for government organizations, there are inherent limits on how easily scope can be shifted between the two.<sup>83</sup> Although this situation has been improved over time, it does illustrate the difficulty in determining the appropriate scope for a contract that includes scope-based incentives.

Determining the appropriate scope for a contract, and thus the distribution of risk between the government and the contractor, is one of the key challenges of PBL design. Without the correct metrics in place, there is potential for creating perverse incentives that result in unreasonable outcomes. If too many metrics are in place, or if their focus is poorly chosen, the PBL contract may not deliver the desired outcomes. A 2014 DoD Inspector General (IG) report, illustrates a dispute within the government about where to draw this line. The focus of the report revolved around the quantity of C-130J parts being accumulated by two contractors. The contract was fixed-price, so amount paid by the government did not depend on the quantity number of parts accumulated, although cost figures do feature in price negotiations. In the report, the IG issued a recommendation to the Chief of the Tactical Airlift Division to “[e]stablish and monitor C-130J-unique, performance-based, logistics inventory control metrics on the performance-based logistics contracts” with the two vendors.<sup>84</sup> Responding to the IG's recommendation, the Program Executive Officer for Mobility disagreed and stated:

“The PEO non-concurs with the establishment of a specific inventory control metric based upon the following rationale. Establishing an inventory control metric goes against one of the basic tenants of a PBL contract, which is to share the risk between the contractor and the Government. The Air Force does not take possession/ownership of a consumable part until it is issued to the field, therefore, the use of an inventory control metric is not required.”<sup>85</sup>

Some PBLs can, and do, include inventory control metrics, but the choice of which metrics are most important. This dispute between the IG and Air Force primarily illustrates differing views on the correct balance of risks and the pressure to adopt a more transactional approach that may come over a project's lifetime.

### 3.4 Other Incentives

The literature on other types of incentives for PBLs is limited. Other types of incentives that could be considered are those based on the flexibility of the contract and those that increase the prestige accrued by the contractor. Perhaps the most important aspect that does not fit into a clear

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<sup>82</sup> Ibid.

<sup>83</sup> Requirements for DoD to have core maintenance capabilities within the government and to ensure that contracted support constitutes no more than 50% of the maintenance function, known as the 50/50 rule, serve as constraints on increasing the scope of work assigned to a contractor. For a detailed examination of the implementation of these policies, see Avedellas, et al, “Future Capability of DoD Maintenance Depots” (Washington, DC, 2011).

<sup>84</sup> Department of Defense Inspector General, “Excess Inventory Acquired on Performance-Based Logistics Contracts to Sustain the Air Force's C-130J Aircraft,” 2014.

<sup>85</sup> Ibid, 57.

incentive category is the relationship between the customer and the vendor. The PBL Guidebook outlines the importance of trust and transparency to a government product service manager:

**“Question:** What’s the best way for me as a product service manager to manage my program support integrator and program support providers?

**Answer:** Establish a collaborative business arrangement with trust between you and your product support integrator and/or product support provider. Best practices for instilling trust in the business arrangement are close communication between the product support manager and the industry counterpart and resolving issues at a working level where possible. While contract requirements should be clear, relying on legal and contract language to resolve every issue your program may encounter may undermine the business relationship. The Government project management officer and the product support integrator/product support provider share the same requirements and the best way to achieve these requirements is maintaining a business environment of collaboration, transparency, and trust. Note that communication, collaboration, transparency, and trust should be mutual, limited only by legal and FAR/DFARS requirements.”<sup>86</sup>

### 3.5 Challenges to Designing Incentives

One of the main challenges to adopting any form of performance-based contracting (the more generic term for what the DoD calls PBL) is achieving what Selviaridis and Norrman call a “joint intent” between the two parties involved in the contract.<sup>87</sup> Their research found that providers were concerned about agreeing to performance-based incentives, which they perceived as risky, and customers were reluctant to offer extra rewards. While the authors were not examining defense contractors, the same challenges apply to PBLs.

A foundational challenge towards achieving that “joint intent” is to choose the right metrics to capture that goal. The question of which metrics to use is a case specific one and beyond the scope of this document, but the larger debate about how many metrics to include and how they are chosen is relevant to incentive design. In 2004, Acting USD(AT&L) defined five objectives for PBL contracts.<sup>88</sup> These can be read prescriptively, and Openshaw and Riffle summarize the memo as follows:

“[Program Managers, (PMs)] will develop program specific metrics that will support these overarching DoD metric areas:

1. Operational Availability (OA): a measure of overall system readiness.
2. Operational Reliability (OR): a measure of a system meeting defined mission success

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<sup>86</sup> Assistant Secretary of Defense for Logistics and Materiel Readiness, “PBL GUIDEBOOK A Guide to Developing Performance-Based Arrangements,” 117.

<sup>87</sup> Kostas Selviaridis and Andreas Norrman, “Performance-Based Contracting for Advanced Logistics Services Challenges in Its Adoption, Design and Management,” *International Journal of Physical Distribution & Logistics Management* 45, no. 6 (2015): 592–617, doi:10.1108/IJPDLM-11-2014-0267.

<sup>88</sup> Michael W. Wynne, “Performance Based Logistics: Purchasing Using Performance Based Criteria” (Washington, DC, 2004), [https://www.dau.mil/cop/pbl/DAU\\_Sponsored\\_Documents/Wynne\\_Memo\\_Re\\_Purchasing\\_Using\\_Performance\\_Criteria\\_16Aug2004.pdf](https://www.dau.mil/cop/pbl/DAU_Sponsored_Documents/Wynne_Memo_Re_Purchasing_Using_Performance_Criteria_16Aug2004.pdf).

objectives.

3. Cost per Unit Usage: i.e. cost per flight hour, driving mile, steaming hour, etc.
4. Logistics Footprint: a measure of the total logistics support required to deploy, sustain, and move a system. Support elements include inventory, personnel, equipment, transportation assets, facilities, real estate.
5. Logistics Response Time. A measure of the time from identification of the need to its satisfaction.”<sup>89</sup>

Later PBL guidance begins to emphasize that a more selective approach to metrics may be necessary. The 2012 Tenets of PBL Guidebook encourages using fewer metrics:

“Rule of 5 When determining top-level desired outcomes, we recommend what we call ‘the rule of 5,’ a general guideline to keep the number of top-level metrics to 5 or fewer. The reason? Focus. Having too many metrics makes it hard for the support provider to focus on what is truly important.”<sup>90</sup>

“Unfortunately, our research has discovered that many programs neither support the OSD recommended metrics nor the rule of 5. Our research also revealed that programs that have had multiple ‘phases’ or contracts have learned this lesson. A classic example is the C-17 program that reduced the number of metrics in their contract during each of the three contract renewal periods. Other programs, like the F22, had a strategy to baseline their program’s performance with several metrics—but then migrated to fewer than 5 key performance metrics.”<sup>91</sup>

The 2016 PBL Guidebook continued to reinforce this message. While the Guidebook does set a lower recommended bound, the text emphasizes the risk of setting “too many metrics” at four different points without ever using the term “too few,” which suggests that officials tended to err consistently in one direction.<sup>92</sup> The Guidebook provides useful detail on the risks of too many metrics:

**“Question:** How is the right number of key performance metrics tied to incentives/disincentives? What (if any) are the detrimental effects of having too many KPI’s [key performance indicators]?

**Answer:** Typically, three to five metrics is the effective number of metrics. The inclusion of “too many metrics” typically indicates that the arrangement is focusing on activities and not outcomes, thus limiting the flexibility of the product support integrator or product

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<sup>89</sup> Shane T. Openshaw and Robert Riffle, “Performance Based Logistics: A Path to Reduced Reliance on Contractor Technical Support for Weapon Systems in the Field?”

<sup>90</sup> Center for Executive Education, “The Tenets of PBL Second Edition: A Guidebook to the Best Practices Elements in Performanc-Based Life Cycle Product Support Management,” 32.

<sup>91</sup> Ibid.

<sup>92</sup> Assistant Secretary of Defense for Logistics and Materiel Readiness, “PBL GUIDEBOOK A Guide to Developing Performance-Based Arrangements,” 110, 115, 141, 165.

The discussions on page 165 also clarifies that there are multiple tiers of metrics, the concern about count appears to apply most strongly to the top-level tier 1 metrics, rather than necessarily the number of supporting metrics used.

support provider to apply resources where needed to be successful. Additionally, a large number of metrics can potentially dilute the impact of incentives, since metrics may offset each other.”<sup>93</sup>

A related concern is that it is possible for a system to exceed expectations based on one parameter, while also underperforming based on another.<sup>94</sup> This creates a challenge when designing incentives, because the benefits of the incentives are based on measurable metrics. The above scenario creates some complexity in determining whether the award should be given and underlines the importance of complementary metrics.

Another potential issue arises when more than one contractor is involved in fulfilling the contract, such as when a contractor uses subcontractors.<sup>95</sup> As noted previously, each contractor may react to incentives differently, or incentives designed for the main contractor may not incentivize changes in behavior by the subcontractors. Yet another issue is that if incentives are ill designed and poorly overseen, they can also lead to unintended behavior that is beneficial for the contractor but detrimental to their client.<sup>96</sup> The authors of this study found that in some contexts, such as when the risk of failing to meet contract expectations is greater, contractors can exhibit gaming behavior to avoid losing out on funding. However, it should be noted that the authors found this behavior to have little impact on outcomes.

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<sup>93</sup> Ibid., 115.

<sup>94</sup> Sols, Nowick, and Verma, “Defining the Fundamental Framework of an Effective Performance-Based Logistics (PBL) Contract.”

<sup>95</sup> Kostas Selviaridis and Andreas Norrman, “Performance-Based Contracting in Service Supply Chains: A Service Provider Risk Perspective,” *Supply Chain Management: An International Journal* 19, no. 2 (2014): 153–72.

<sup>96</sup> Pierre Koning and Carolyn J. Heinrich, “Cream Skimming, Parking, and Other Intended and Unintended Effects of High-Powered, Performance-Based Contracts,” *Journal of Policy Analysis and Management* 0, no. 0 (2013): 1–23, doi:10.1002/pam.

## 4 Methodology

### 4.1 Federal Procurement Data System

For nearly a decade, the Defense-Industrial Initiatives Group (DIIG) has issued a series of analytical reports on federal contract spending across the government.<sup>97</sup> These reports are built on FPDS data, presently downloaded in bulk from [USAspending.gov](http://USAspending.gov). DIIG now maintains its own database of federal spending, including years 2000–2016.

#### *Inherent Restrictions of FPDS*

Since the analysis presented in this report relies almost exclusively on FPDS data, it incurs four notable restrictions.

First, contracts awarded as part of overseas contingency operations are not separately classified in FPDS. As a result, we do not distinguish between contracts funded by base budgets and those funded by supplemental appropriations.

Second, FPDS includes only prime contracts, and the separate subcontract database (Federal Subaward Reporting System, FSRS) has historically been radically incomplete; only in the last few years have the subcontract data started to approach required levels of quality and comprehensiveness.<sup>98</sup> Therefore, only prime contract data are included in this report.

Third, reporting regulations require that only unclassified contracts be included in FPDS. We interpret this to mean that few, if any, classified contracts are in the database. For the DoD, this omits a substantial amount of total contract spending – perhaps as much as 10 percent. Such omissions are probably most noticeable in research and development (R&D) contracts.

Finally, classifications of contracts differ between FPDS and individual vendors. For example, some contracts that a vendor may consider as services are labeled as products in FPDS and vice versa. This may cause some discrepancies between vendors' reports and those of the federal government.

#### *Constant Dollars and Fiscal Years*

All dollar amounts in this data analysis section are reported as constant FY 2016 dollars unless specifically noted otherwise. Dollar amounts for all years are deflated by the implicit GDP deflator calculated by the U.S. Bureau of Economic Analysis (with FY 2016 as the base year) allowing the CSIS team to more accurately compare and analyze changes in spending across time. Similarly, percentage growth comparisons are based on constant dollars and are thus adjusted for inflation.

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<sup>97</sup> This appendix draws from numerous past Defense Contracting and Federal Services Contracting Reports. See <http://csis.org/program/methodology> for the latest version of this methodology. When the methods are drawn from new research within this past year, the specific source is noted in the footnotes.

<sup>98</sup> For more on the current quality and comprehensiveness of FSRS, see Nancy Y. Moore, Clifford Grammich, and Judith Mele, "Findings from Existing Data on the Department of Defense Industrial Base," RAND Corporation, 2014.

Due to the native format of FPDS and the ease of comparison with government databases, all references to years conform to the federal fiscal year. FY 2016, the most recent complete year in the database, spans from October 1, 2015 to September 30, 2016.

#### 4.1.1 Identifying PBL contracting<sup>99</sup>

This study builds on the work of a prior CSIS report that created a dataset of PBL contracts. The first round of independently generating these PBL lists relied on the description section of each contract transaction; thus, the study team's ability to identify PBL contracts depended on whether or not contracting officers included a detailed description or, in some cases, any description at all. As the direct text search proved incomplete, the study team pursued other avenues to find contracts for DoD components, such as requesting data from government and corporate sources, searching through all DoD Contract announcements on [www.defense.gov/contracts](http://www.defense.gov/contracts), searching PBL contracts as listed on the web service [govini.com](http://govini.com), and searching all contracts described as PBL in FPDS. Each method produced a list of PBL contracts with varying degrees of overlap. The results found through [govini.com](http://govini.com) contained 22 unique contract IDs, and searching through FPDS contract descriptions resulted in roughly 100 contract IDs for non-DLA components. The most successful government outreach effort resulted in an official PBL list for all of the DoD. The PBL Office at the Assistant Secretary of Defense for Logistics and Materiel Readiness (ASD (LM&R)) provided a DoD-wide list of active PBL contracts for the other components. Searching through DoD Contract announcements provided a list of over 100 PBL contract actions.

With these data, the study team is confident in its ability to analyze a dataset that is – or very closely matches – the universe of active PBL contracts. The greatest limitation of this approach is that the robust official government list exclusively contains PBL contracts that were still active in 2014. As a result, obligations to contracts within the study population are highest in recent years and notably lower during the middle of last decade, which is a period that vendor interviews identified as a prior high-water mark for PBL contracting. The study team acknowledges this gap but believes that it primarily affects a study of changes over time in PBL contracting, particularly in absolute dollar terms. Instead, this analysis compares the different characteristics and spending of DoD PBL contracts over the same sample time period.

## 4.2 Interviews

The core of this research effort is a series of interviews with experts on PBL contracting within vendors who perform PBLs for the DoD, vendors who perform PBLs for the private sector, and government entities (both foreign and domestic) that contract for PBLs.

The CSIS study team conducted interviews with multiple experts who manage PBLs for DoD. These interviews cover a range of PBL projects, from component-level PBLs to system-level PBLs to full platform PBLs. The interview process included two question variants. The first asks people to speak about their general experience with the incentive structures of PBL contracts.

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<sup>99</sup> This section is adapted from Hunter et al., "Performance-Based Logistics: A Process Analysis for the Defence Logistics Agency," 21.

That second set dives deeper into specific cases. The interview questions can be read in their entirety in Appendix A: Interview Questions.

For each interview, the study team aimed for between an hour and an hour-and-a-half with either set of questions. Typically, interviewers focused on the first set of questions for the first interview, with the specific case questions coming up depending on the attendees. Subsequent conversations with company experts regarding specific programs/contracts naturally focused more on the second set of questions. All of the discussions were done on a not-for-attribution basis by default, both for the general questions and the specific case questions. The majority of interviews were oral, with a small number of written responses. Block quotes from interviewees may be from notes or from written response. The disjointedness in quotes reflects the limitation of notetaking and not the ineloquence of the interviewees.



## 5 Analysis

### 5.1 Time-Based Incentives

Most of the experts CSIS interviewed emphasized contract length as a critical incentive in PBLs. According to many of these experts, longer contracts were the most underused incentive for DoD PBLs. While some interviewees did not directly raise a contract's length as the most critical incentive – focusing instead on monetary incentives – they were eager to also emphasize the importance of contract length when asked. Even the few exceptions, such as one expert with a defense-unique contractor who believed flexibility (discussed below in Section 5.5.2) was most important, all agreed that length was a powerful incentive.

This consistency is likely the result how vendors operate in a PBL environment. As discussed briefly in the literature review section, PBLs improve savings and performance because vendors are incentivized to invest up-front in the equipment and process improvements needed to meet performance targets and, over time, reduce costs. In theory, these up-front investments will be offset by profits in later years. Without a longer-term contract, there is no incentive to make these upfront investments in efficiency.

Regardless of the theoretical maximum duration of a contract, some vendors performing PBLs for the DoD have found themselves on year-to-year contracts, and those experts cited the uncertainty in those structures as a powerful disincentive to invest in equipment and process improvements. After all, if the basic business model for PBLs is that up-front costs are justified by long-term profits, and there is no guarantee that the contract will still be active long-term, it is difficult for vendors to financially justify those up-front investments.

#### 5.1.1 Contract Maximum Duration

Experts that CSIS spoke to at both defense-unique and defense/commercial federal contractors cited five years plus a five-year optional extension as the ideal PBL contract duration achievable under U.S. federal contracting regulations and related statutes. Interviewees from other countries, such as the U.K. and Australia, have had positive experiences with even longer-term PBL contracts, which are allowed under their legal system. In particular, U.K. PBL contracts are repeatedly cited as an excellent example by U.S. industry.

##### 5.1.1.1 *Changing Practices*

Despite the advantages of longer-term PBL contracts, the U.S. government is often hesitant to employ longer time frames. Two defense/commercial contractors noted the increasing use of two-year contracts with one-year extensions. One defense-unique vendor lamented on the contrast between procurement, where longer contracts are regularly employed, and operations and maintenance, where they are eschewed. Another industrial expert theorized that the government's hesitation is driven by the view that more opportunities for contract negotiations, particularly for those under FAR Part 15 regulations, leads to more opportunities to save. These regular renegotiations allow the government to employ steadily accumulating cost data over the lifetime of a contract. Yet, it may also undercut the incentives to make longer term investments, due to a higher perceived uncertainty for the contractor.

One expert CSIS interviewed suspected changes in practice started five or six years ago. It's possible the Better Buying Power policy, which recommends limiting single-award contracts to three years, could be a driver, even though it explicitly states that PBL contracts are likely exceptions.<sup>100</sup>

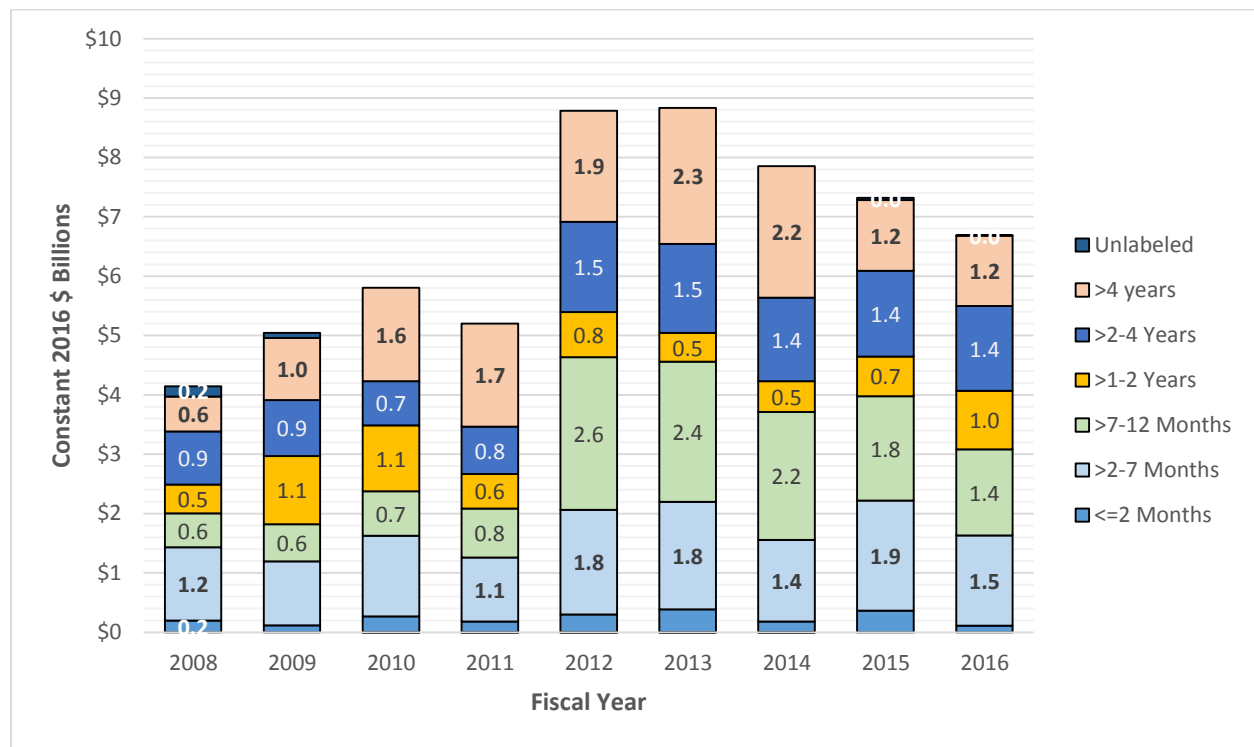
In two separate interviews, experts employed by one defense firm described experiences with arrangements that approached the above mentioned ideal length: a ten-year contract and a five-year contract. However, the follow-on to the ten-year contract reduced the use of incentives, and the follow-on to the five-year contract transitioned purely into penalties for missed metrics. As an important caveat, in both cases, the industry experts emphasized the loss of incentives, not the loss of contract length.

In another case, a defense contractor had a "ten-year business arrangement" sourced exclusively with two companies. The contract was intended to begin with a base duration of two years with a one-year extension. From his perspective, the annual funding process turned the arrangement into an annually reviewable contract. The expert believes that, in practice, the difference between a business arrangement and a contract is that the contractor will limit costs incurred "unless there is a contract that sits behind it to back it up." An examination of the PBL contract data set finds some support for the idea that longer PBLs have not been renewed in recent years, as the market share for the longest contracts has decline since 2014.

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<sup>100</sup> Carter, "Better Buying Power: Guidance for Obtaining Greater Efficiency and Productivity in Defense Spending." Statue, regulation, and policy regarding PBL length is discussed at greater detail in the literature review on time-based incentives in section 3.1.

Figure 2: DoD PBL Contract Obligations by Initial Maximum Duration, 2000-2016



Source: FPDS; CSIS analysis

### 5.1.1.2 Arguments for Longer Term Contracts

In opposition to this trend, and in keeping with the findings of the literature review in section 3.1, experts from multiple companies cited five years as the minimum contract length to justify upfront investments with long-term rewards. Two commercial/defense contractors went even further. One stated, “our historical data shows that, with rare exception, reliability improvements don’t begin to take effect until years four or five,” and thus argued that even a five-year contract does not allow the contractor to “make the best judgments.” The other defense/commercial contractor specified that this holds for material changes, which they described as “a huge saving driver.”

One defense-unique vendor laid out why they believe longer time frames are necessary. They stated that even a relatively easy change to make (such as one where you knew the part number in question) requires a whole series of steps. Fixing a major problem requires identifying it, testing a solution, and distributing it the end-user. This process may take up to three years to complete. Furthermore, the fix would only affect a minority portion of the respective fleet at one time. The savings from such changes only arrive when the solution is in place and improving reliability. Therefore, the longer a change takes to implement, the longer it will be before the contractor sees a return on investment. One defense/commercial expert expressed a similar timeline by stating, “on a ten-year contract: invest years [are] two-three, returns [are years] four-seven, [and] big returns [are years] eight-ten.”

Longer-term contracts allow vendors to fund their suppliers over the long-term term as well. This can help generate significant cost savings. In a year-to-year contract environment, or any environment with particularly short contract terms, the risk to vendors is likely to be too high for them to tolerate making the investments necessary for a successful PBL.

The most compelling example from CSIS's interviews of the potential benefits of a longer-term contract was provided by an expert who was employed by a defense-unique contractor. They proposed a five-year service contract for the same price that would cover only four years using the existing one-year contract arrangements. The U.S. government rejected that offer, as it tied up funding and limited flexibility. One key factor in this argument is that the administrative cost of putting together an annual contract is millions of dollars each year, with tens of millions in potential administrative savings by skipping that process.

In a surprising contrast to the industrial experts' emphasis on investment, one international interviewee outlined their model for not encouraging the contractor to take a one-year loss to be repaid with future profits. This approach emphasizes the positive incentives provided by longer-term contracts but also places greater emphasis on collaborative changes, rather than focusing on contractor expenditures. This distinction is wrapped up in a larger discussion about fixed-price and cost-based contracting, which is discussed in section 5.2.1.

### 5.1.2 Contract Extensions

Even in cases where the contract length is at least five years, the experts that CSIS spoke with cited other factors that undermine incentives, such as budget fluctuations and single-year options. Even with five-year contracts, which many contracting entities within the DoD are hesitant to award, the single-year nature of federal budgeting means that a contract is no guarantee of future work. When payment is based on customer demand, budgeting changes may also lead to cutbacks, even if the contract term is long duration and not formally adjusted.<sup>101</sup> If a vendor has a five-year contract to ensure the availability of a platform, invests money up-front to improve that availability and drive down costs, and then, two years into the contract, Congress decides not to appropriate the funds necessary to conduct work on the platform at the previously understood levels, the vendor can find themselves in a bad situation.

This challenge is particularly acute for contractors with multi-year contracts that are broken into single year options. For example, vendors cited a common example of a contract with a maximum length of five years actually being a single year of execution followed by four years of options. Then, according to another industry expert, "what traditionally happens in the option years is they lose funding." This also adds to the administrative complexity because it requires a contract that can function at 75% funding, 85% funding, and full funding. These two experts from one commercial/defense firm both agreed that this approach undercuts the incentives to invest that are common in international PBLs, with one expert commenting that a contract without a base or options of greater than a single year "is not a commitment." That same expert

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<sup>101</sup> This phenomenon is discussed in section 5.

also elaborated that “option years normally become more of a problem because of funding constraints, not execution constraints.”

Mitigating the risk of one-year options, one defense-unique expert cited a counter argument from academic experts at the University of Tennessee’s Center for Executive Education: “if you’re the prime, you have a long-term contract, even if it’s an option year, because [the government] always will come back to you.” The Center’s report stated that single option year contracts fall in the category of “some elements of PBL” and “with some confidence in exercising option years; allows supplier to make rational commitment to performance- improving investments with expectation of earning back investment.”<sup>102</sup>

One possible middle ground solution is options that last two to three years. One defense/commercial contractor cited a positive experience with a seven-year contract with a three-year base and two two-year options. Likewise, another defense-unique contractor was recently able to convince their customer to go from a one-year option to a two-year option after making multimillion dollar investments that lead to longer-term arrangements that could minimize system down time. That said, as was covered in section 5.1.1, many vendors were skeptical of periods under five years, and many of their arguments might also be made against any options that were less than five years.

Different officials, even at the same company, had different answers as to whether the DoD’s resistance to longer maximum contract durations or extension periods originated from acquisition decisions seeking control or from statutes limiting O&M spending. However, as is covered in section 3.1, past research by CSIS has not found a statutory basis for duration restrictions on O&M options.

#### *5.1.2.1 International Approaches*

In the case of the U.K., they have also used triggered option years, in which a contract is awarded for the base length, and then future years are activated as long as performance metrics are continually met. Australia also uses a rolling contract extension approach. A contractor performing well may receive a sixth year of performance as a reward during year three of the contract. A contractor not performing to the government’s satisfaction may receive a warning in year three but have a chance to turn around their performance and still earn the extension in year four. This approach means that during most years of the contract, the end is guaranteed to be three to five years out. One expert who was interviewed about this approach has never seen the ramp out happen. This expert credited the lack of ramp out to the Australian government’s desire to see year-to-year success, as discussed in section 5.2.13.

Experts among DoD PBL vendors had little experience with these arrangements, but when asked, they indicated that these sorts of arrangements could help mitigate risk and uncertainty in the contract extension process. One expert with a commercial/defense firm had recently discovered this model on their own and thought that they would use it if they were on the

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<sup>102</sup> Center for Executive Education, “The Tenets of PBL Second Edition: A Guidebook to the Best Practices Elements in Performanc-Based Life Cycle Product Support Management,” 19.

government side. Specifically, the interviewee proposed “a five-year PBL, first three years guaranteed, then you renew every two years, rolling waves. Every three years another five years go into place.” The contract would renew automatically if everyone was happy, and “every five years, contract resets, new performance targets and cost goals.” The expert thought that this approach might have contained the rising costs that were the sole aspect, in their view, that was unsuccessful in their prior contract.

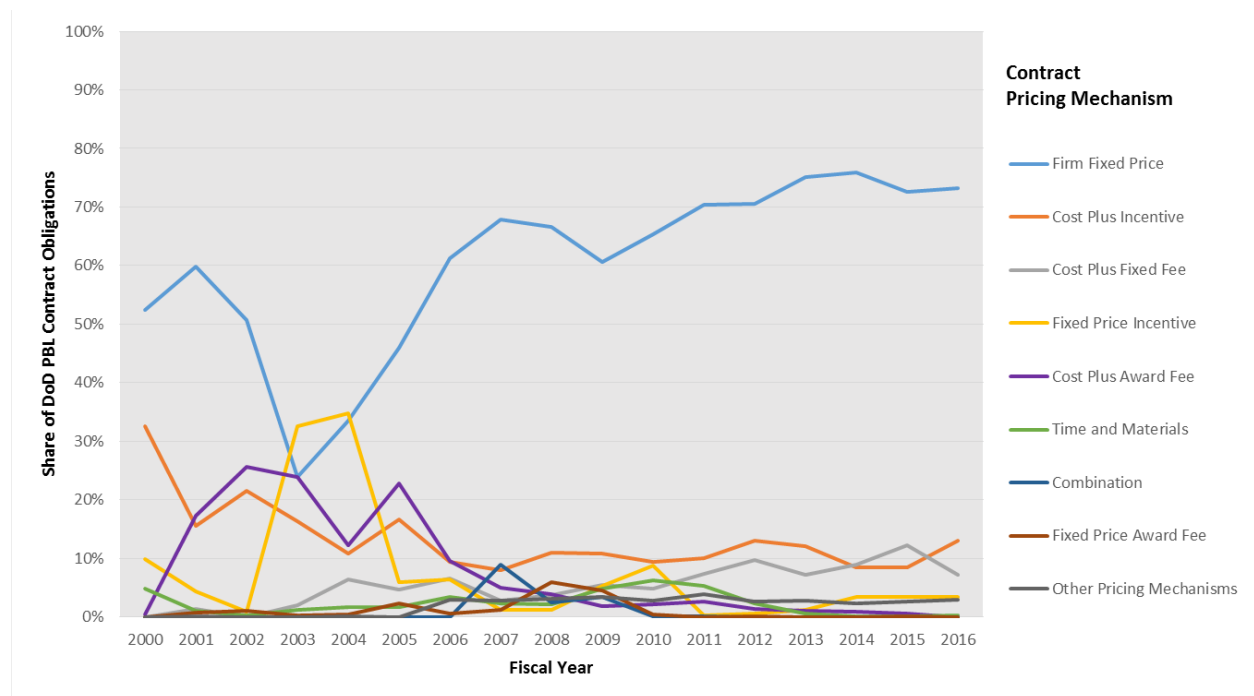
A minority of interviewees feared that these triggered option year arrangements have notable limitations. Most significantly, according to industry experts, they are most effective in competitive environments, which are a distinct minority of the PBL market in the United States. In a sole-source environment, where there is no threat of losing the contract to another vendor, the option years don’t alleviate the fundamental concerns about future-year funding and workloads. This skepticism with regards to length as a useful incentive in a sole-source environment has also been expressed by a U.S. government expert in discussion of earlier CSIS work on this topic. For more discussion of competition in PBL, see section 5.4.2.

## 5.2 Financial Incentives

### 5.2.1 Fixed Price Versus Cost-Based

A majority of DoD PBL contracts are structured as fixed-price during every single year of the study period. The vast majority of DoD PBL contracts are specifically structured as firm-fixed-price contracts, which follows generally accepted best practices for PBL contracting. Since 2000, 68 percent of DoD PBL contract obligations have been awarded under firm-fixed-price contracts, as seen in Figure 3:

Figure 3: DoD PBL Contract Obligations by Contract Pricing Mechanism, 2000-2016



Source: FPDS; CSIS analysis

The study team was surprised by the prevalence of cost-based contracting during an earlier iteration of this report. Subsequent consultation with experts explained this phenomenon. One government expert explained that setting up PBL arrangements is hard and involves costs that are not found in a comparable transactional arrangement, as the vendor must find ways to manage the increased risk they have taken on. An effective PBL can lead to significant cost savings, but the start-up costs of setting up the relationship and making process improvements mean that most PBLs are focused on high-expense support arrangements. The interviewee observed that “in those arrangements, they generally have acquired a capability, but do not have a lot of data, just modeling.” Therefore, determining price at the start of a project can be a high-risk endeavor, and the government may prefer a cost-based contract as a means of avoiding a higher risk premium. As a further advantage, the government has not encountered much underbidding in a cost environment; and for those instances that did exist the government interviewee found that, “prior to contract signing, the organization has come clean.” This approach also often includes cost sharing, which is discussed below in the sub-section on Fee Structure and Cost Sharing. In one international case in question, the contractor convinced the government to stay in the cost-based arrangement – as they believed uncertainty remained high even after the initial costs became clear – using a “target cost” approach meant to protect government interests.<sup>103</sup>

That international perspective was seconded by a defense-unique contractor describing U.S. work:

“It’s partly driven by contract construct; with FFP the expectation is that the majority of risk is built in, with CP, the goal is to obtain a fixed fee... PBL101 says that a first iteration PBL should begin with a [Cost-plus Fixed Fee] so that true cost can be collected in a non-adverse environment, making the follow-on proposals 100% relevant to the government and risk better understood by the [original equipment manufacturer]. Overall the [original equipment manufacturer] can lean forward and offer a price that does not need to build in a risk-adverse view, and the [government] will benefit from fair and reasonable costs.”

A defense/commercial vendor reinforced this view. They dealt with a system that was well understood, but when dealing with new technology, they saw a conversion from cost-plus incentive fee to fixed-price with award fee. In that case, they would recommend cost-based because you “can’t do a proper PBL without some usage [data] to work with” and for a fixed-price contract the “risk is so high that the cost will be through the roof.”

On the other hand, one defense/commercial contractor was skeptical as to whether cost plus measures really qualified as PBL, because they had “zero risk.” This expert allowed that cost plus incentive contracts could be an alternative way to control costs, an approach discussed in greater detail later in this section.

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<sup>103</sup> The interviewee described an approach they believed followed commercial contracting: “If the vendor exceeded the cost, the government would pay but no fee. If they underran, they would receive the full fee rather than one lowered to reflect the actual costs.

Surprising the study team yet again, an international expert went further in their cost reimbursement and said that “generally speaking, they do not seek major investments from their suppliers.” In cases where it is not fixed-price, efficiency increases are paid for. In cases where it is fixed-price, the government customer wants to make sure that the contractor is not losing too much money in the short term.

Nonetheless, as Figure 3 and the literature review in section 3.2 showed, fixed-price contracting remains the overwhelming preference of the U.S. government and was also favored by multiple industry experts on both the defense-unique and commercial/defense side. One defense-unique contractor clearly highlighted why firm-fixed-price contracts can be an incentive, even when fee-style incentives are absent.

“Since the contract is [firm-fixed price], the program can gain additional profit through continuous process improvement and reliability improvements. To that end, the program is constantly executing process and reliability improvements during the contract execution phase.”

The government can then benefit from the improved efficiencies in subsequent rounds of contract negotiations. For longer contracts, this may occur at explicit intervals during the life of contract as part of the extension process. Regardless of the potential benefit, the government is often wary of these underruns, especially in a firm-fixed-price environment. One defense/commercial contractor argued that a challenge here is that the government focuses on profits in any given year, but profits in one year “[fund] future investments” and do not guarantee that similar profits will be maintained in future years. Other experts from industry regularly argue that those profits are the recouping of investments made in leaner, earlier years. Pushing back on this view, one government interviewee laid out why the customer may be leery of the appearance of large savings:

“[The Defense Department is] not in the business of saving money, but in effectively fighting wars. Don’t allow the system to be degraded [by choices] that hollow out the support system, [make] weapons systems unresponsive, [and] can’t meet readiness requirement. Fixed-price, someone is making a windfall gain and wearing some pain.”

A defense-unique interviewee described an experience of converting from cost-based to fixed-price that synthesized both industry desires and government concerns. However, this conversion was only possible after there was “enough history” between the government and the company. Without an existing relationship between the two, the government is often wary because they fear contractors will “cherry pick, underrun, keep extra savings.” Fixed-price contracts “don’t give the same visibility, though every year [the contractor] has to take the actuals back” to the government. The switch to fixed-price can mean greater risk and greater profit for the vendor, but the government will be watching implementation closely and will pull back the arrangement if they think the vendor “didn’t repair stuff to capture an underrun.” On the upside, in the vendors view, fixed-price contracts offer the potential for achieving performance improvements without sacrificing cost or cost savings, and they deliver the same or better level of support.



### *5.2.1.1 Fee Structure and Cost Sharing*

As was shown earlier in Figure 3, fixed-price is dominant in our PBL sample, aside from a brief dip in the early-to-mid-2000s, when the share of obligations awarded under Fixed Price Incentive, Cost-Plus Incentive, and Cost-Plus Award Free briefly surged. While both Fixed Price Incentive Fee and Cost-Plus Award Fee contract types have not been a significant factor in DoD PBL contracting since those brief spikes in usage, a surprisingly large share of PBL contracts are still structured as Cost Plus Incentive – between 8 and 13 percent every year since 2006. Cost Plus Fixed Fee, which was not used significantly for PBL contracts in the early 2000s, grew to account for between 3 and 7 percent of DoD PBL contract obligations from 2004-2011, and between 7 and 12 percent from 2012-2016.

These fee structures do not cleanly translate to PBL incentive forms. Fixed-price award fee and cost-plus award fee contracts typically have positive incentives based on performance – often using subjective measures – and have largely been replaced by incentive fee contracts. One defense/commercial vendor helpfully summarized the fixed-price fee types. In a firm-fixed-price contract “anything you do, you get to keep.” In a fixed-price incentive fee contract, there are “performance measures or cost reduction efforts.” The cost reduction approach gives “value back to the program,” with each side of the transaction keeping a portion of the savings. Cost-plus fixed fee contracts have a fee that does not change as the base price of the project changes. Cost-plus incentive fee contracts may likewise have performance measures or cost reduction efforts, and they typically give a larger fee if there are greater savings. As an example, one defense-unique contractor found “gain share” contracts to be typical in a PBL where the government and original equipment manufacturer share the cost savings. In the project the interviewee worked on, the split was 50/50. One defense-unique contractor succinctly laid out the advantages and disadvantages of fee-based cost controls for industry:

“The advantage of capturing additional fee through process improvement is that this is managed completely by the program team. The team has the incentive to over perform against defined tasks thereby reducing costs and improving margins. The disadvantage is that each successive renewal is negotiated using actual costs for the previous contract. This raises the bar each time the contract is renewed.”

While firm-fixed-price contracts had more universal support among industry, multiple defense-unique experts and multiple experts at one defense/commercial firm favorably responded to cost-sharing measures in PBL. The F-117 TISPR was cited as an early positive example with “a shared fee structure” the result of which was that the “government and contractor shared the benefits of cost reduction, performance that led to cost reduction.” Incentive fees were seen as an approach that could drive down costs or, for a platform later in its life, help control them.

For others, the exact form was important. Another vendor praised gain share contracts because “[w]ith longer time frames (5+ years) gain share incentivizes the OEM to reinvest as much as possible into cost efficiencies driving lower costs to the program overall in each follow-up PBL.” However, that defense-unique contractor negatively contrasted gain share with demand bands, which are discussed later in section 5.2.2. Another defense/commercial vendor thought that cost-plus incentive fee was the most successful because it had a savings incentive absent from cost-

plus. They found that fixed-price incentive fee contracts diluted existing incentives and introduced cost accounting standards into what could otherwise be a firm-fixed-price contract that would largely avoid this added complexity. This observation raises a possible distinction between government and commercial use of performance-based contracting and is discussed in greater detail at the end of this section.

Interestingly, both an interviewee broadly supportive of incentive fees and one with mixed feelings pointed to the U.K. Ministry of Defense as an exemplar of long-term contracts with cost sharing. In short, the U.K. has a reputation for achieving more savings and allowing more profit. A defense-unique expert summarized their technique: “Year-over-year cost reduction, year-over-year improvement and support, reset the baseline at the mid-term.” This baseline reset encourages further improvement and cost reductions.

#### *5.2.1.2 Cost Accounting*

The greatest area of contrast between commercial/defense and defense-unique vendors is the DoD cost accounting standards. The vehemence of these concerns varied greatly, with one particular expert making the strongest case. However, the point made is highly germane to this paper’s fourth hypothesis regarding the differences between defense and commercial industries and customers.

Commercial firms are hardly alone in the complaint that the government thinks it has a bad deal when profit margins are high, even if it is paying less than it did yesterday. However, defense-unique firms seem far more used to operating in an environment where the DoD demands transparency on cost and ample documentation. One defense/commercial vendor did not like the government pricing model, and they complained that while civil fleet data could be used to justify prices, over a thousand invoices were required to prove that point. Another defense/commercial vendor complained that when executing a fixed-price incentive fee contract, the Defense Contracting Audit Agency (DCAA) required that contractors track the cost of individual items by bill, rather than following the commercial “standard cost” model that uses averages. For vendors and divisions used to cost-based contracting, the necessary accounting systems are likely already in place, but for those that are not, these requirements can make firm-fixed-price contracting especially appealing. An expert with a third defense/commercial firm echoed the concerns on price tracking and argued that wanting to see “all of your data” and “all of the money” does not result in an effective PBL.

A related concern from an industry expert with experience at both a defense-unique firm and a defense/commercial firm was that demands for tracking data will prove onerous not for the primes themselves, but for their suppliers. The defense-unique program manager gave a specific example of this challenge. The interviewee’s firm was purchasing a commercially available engine for a military aircraft and was able to arrange a cheaper price than the customer paid for their direct purchasers. However, the DCAA’s requirement for an auditable trail on supplier cost stopped that deal from going forward and ultimately resulted in a higher price. A different expert with a defense/commercial firm reported that commercial-market suppliers would sometimes refuse to pass along cost data, which can be a major problem with unique suppliers.

### 5.2.2 Demand and Resulting Cost-Incentives

One of the key inputs to many PBLs is the extent of demand for the supported platform, which can vary significantly from fleets that are largely grounded to save fuel expenses to fleets that are heavily used in an ongoing conflict. As is covered in literature section 3.1, changing budget situations can cause longer term contracts to have highly variable revenue. This issue is of the greatest concern with regards to fixed-price PBL arrangements. As the Center for Executive Education summarizes: “[h]aving a fixed price agreement on a per unit or throughput basis allows for fluctuating volumes. In addition, pricing models also may have ‘volume bands’ to allow for different pricing at different levels of volume.”<sup>104</sup>

If the work level is scaled back significantly in a PBL where payment is based on the volume of work (as happened to some programs during the budget drawdown and sequestration), a vendor can find themselves without enough revenue over the course of the contract to offset the up-front investments. That same dynamic can act as a disincentive for government customers as well. Experts cited cases where firm-fixed-price PBLs that were based on assumptions of workload ended up with lower workloads than expected, which left the government customer feeling like they had significantly overpaid.

This leaves some defense-unique industrial experts skeptical of “power-by-the-hour” PBL arrangements, because the number of hours the government consumes frequently comes in below earlier projections. Defense/commercial experts also contrasted the government approach with that of the civil sector, where flight hours are higher, easier to predict, and often accompanied by minimum guarantees. Nonetheless, another defense-unique expert from the same firm as the skeptics stated that they may have been better off under a power-by-the-hour arrangement. In their contract “the rate was based on availability/mission capable rate of the fleet,” which put them in a tough situation when demand increased due to a higher operational tempo (an example discussed in greater detail in section 5.5.2). In addition, for another defense/commercial firm and for two experts at a defense-unique contractor, power-by-the-hour still compares quite favorably to the Navy’s use of demand bands.

Omer Alper and S. Craig Goodwyn explain the demand band approach:

“[Demand-band] PBLs specify a range (or band) around targeted flying hours or number of repairs for which the fixed payment is applicable. If budgets are cut and flying hours fall below these bands, the Navy has the right to renegotiate to a lower amount paid under the PBL. Similarly, if the Navy exceeds the upper limit on targeted flight hours, the contractor could ask for a larger payment. However, for small fluctuations around targeted flight hours, the PBL cost is essentially fixed.”<sup>105</sup>

This leads to two distinct but reinforcing complaints from industry. First, when the band is based on the number of repairs rather than the operational tempo of the platform, it results in a more

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<sup>104</sup>Ibid., 21.

<sup>105</sup> Omer Alper and S Craig Goodwyn, “Effects of Performance Based Logistics Contracts on Naval Aviation Costs and Requirements” (Alexandria, VA, 2011), [https://www.cna.org/CNA\\_files/PDF/D0024638.A2.pdf](https://www.cna.org/CNA_files/PDF/D0024638.A2.pdf).

transactional arrangement. The second complaint is that when the number of repairs needed is beneath the lower demand band, “any demands below the lower demand limit go straight back to the government at the full variable cost/demand. Any potential reconciliation would be limited to after the fact proving what cost was incurred to reduce the demands, not a very positive situation.” Neither of these implementations is necessarily inherent to the use of the demand bands, but the dissatisfied vendors preferred either a power-by-the-hour or, for one defense-unique contractor, a gain share arrangement, which had been used for an earlier PBL for their system.<sup>106</sup>

Per the PBL Guidebook, the choice of demand structure “will be unique to each program at different times based on access to historical data, risks, and operational tempo.” A power-by-the-hour arrangement “assumes a correlation between operational hours and demand.”<sup>107</sup> By comparison, both the Guidebook and an industry interviewee suggested that demand bands are more likely to come into play when the customer believes “demand is not indicative of operational hours.”<sup>108</sup>

### 5.2.3 Positive and Negative Metric Incentives

Across a range of interviews, negative metric incentives were widely viewed as effective, but also as a source of risk for the contractor. These sorts of incentives can take several forms, but at their core, they are fairly simple; if a vendor fails to meet a contractually-mandated performance metric over a particular period of time, the amount of money they receive under the contract is reduced by a pre-determined amount. The experts agreed that this sort of incentive was effective, primarily when it was something that they had the ability to control and plan around. Conversely, the risk level inherent in those negative incentives would be greatly increased when negative performance incentives were tied to metrics that the vendor had less control over or were harder to predict. A government interviewee seconded this point, noting the risk of perverse incentives, as when vendors were not confident, they may “overcharge to ensure [they] can’t fail to meet [a] metric.”

Vendors’ desire to reliably hit their metrics leads to another point made by a range of industrial experts about negative incentives. Namely, in statistical terms, the expected value of a contract is lower if a contract has only negative incentives, especially if there’s no way to earn back lost revenue. For example, one defense-unique contractor has “seen recent PBLs have penalties that can compound to up to 16 percent of a funded year, and with zero incentives to offset.” For contractors, the chance of receiving less than the full value of the contract is a risk. As one defense-unique vendor put it: “If too much of the risk is placed on the contractor, then the only way the contractor has to deal with up front is to price it up.” Again, here the question of control is critical, and those designing incentives must have an “[u]nderstanding of what the risk is and who shares it.” Likewise, some defense-unique vendors believe that certain negative incentives

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<sup>106</sup> See the sub-section on Fee Structure and Cost Sharing in section 5.2.1 for additional detail on gain share contracts, a form of incentive-fee contracting.

<sup>107</sup> Assistant Secretary of Defense for Logistics and Materiel Readiness, “PBL GUIDEBOOK A Guide to Developing Performance-Based Arrangements,” 98.

<sup>108</sup> *Ibid.*, 99.

present major risk for the vendor, such as hitting the lower end of a demand band, as discussed in section 5.2.2.

#### *5.2.3.1 Paradox of Positive Metric Incentives*

Most positive metric incentives take the form of additional money for meeting performance metrics targets above the contractual baselines. Given concerns with balancing negative and positive incentives, it would seem natural that positive metric incentives would enjoy broad support. Instead, one point raised by some experts in both government and industry – which the study team had not previously seen in either the literature or in prior research on PBLs – was the view that positive metric incentives are neither effective nor desirable. This has even been observed by advocates, such as a defense/commercial vendor, who resisted accepting negative penalties except in combination with positive incentives and received significant government pushback against their view.

One international government expert laid out both their approach to positive incentives and their reasons for skepticism. This country does try to award bonuses “if it’s earned by achieving a certain level of availability.” Their PBL contracts have bands with certain performance thresholds and sometimes give an incentive to go a little bit above. However, sometimes going a lot above is not seen as valuable; for example, there’s no point having more planes available than you have pilots or spares parts you do not need. For this expert “[p]ositive incentives are a way to negotiate an improvement,” but the expert sees offering a reward to achieve change in an unspecified manner as “being a dumb customer versus being a smart customer and [seeking to] understand” how the improvement is being achieved. This sentiment may be reinforced by a legal environment that allows penalties but may restrict certain positive incentives.

A possible explanation for the apparent paradox is that the range of positive incentives tied to the contract pricing and fee mechanism, discussed in section 5.2.1, has a greater influence on vendors’ bottom line than positive metric incentives. Experts from one defense-unique company made this observation explicitly for contracts that had both cost sharing structures and positive metric incentives. In these cases, the cost sharing mechanism proved more important towards driving contractor decisions than the possibility of receiving a performance reward. As one defense/commercial contractor laid out, certain combinations of pricing and fee could lead to great risk but also great reward:

“Government contracting, your fees are very fixed, not very high, high single digits to low teens. Not a lot of fees. Nowadays corporations want double digit fees. So normally you have to have a mix to get the fees that Wall Street depends on. PBL is incentive to the contractor, if you spend your own money, you can be very efficient at managing a contract, and therefore you can get a higher than usual government fee, which makes things better. [Keys to success of the project were] [g]overnment flexibility and [that the] contractor had a lot of responsibility. [As well as] Incentives where you can make more fees and penalties if you don’t execute well.”

#### *5.2.3.2 The Importance of Achievable Goals*

While positive metric incentives did face skepticism, other experts found them useful, under certain conditions. One key to both positive and negative metric incentives is that they be

achievable. For one international government expert, this imperative was particularly strong. Their “fundamental starting point” was “we don’t seek to create a regime that drives a level of performance that they don’t think can be achieved with the level [of vendor capabilities] that exists.” As was earlier mentioned, this is particularly important for negative metric incentives, as contractors will build a large risk premium into cost if they do not think they can reliably achieve the measured outcome. This is also true for positive metric incentives, although both government and industry experts seemed to think that negative metric incentives carried more weight with vendors, which meant that they would rather miss out on a positive metric incentive than trigger a negative one.

Interviewees with one defense-unique firm noted that predicting the cost of meeting the higher targets at the start of the contract was particularly difficult, which meant that properly pricing the positive metric incentive was a challenge. Additionally, both defense-unique and defense/commercial experts agreed that the government was hesitant to budget for the possibility of contractors achieving major positive metric incentives. Multiple experts at one defense-unique firm had managed or worked on PBL contracts with positive metric incentives, but they had rarely seen cases where the work to meet the higher metric target resulted in a net profit.

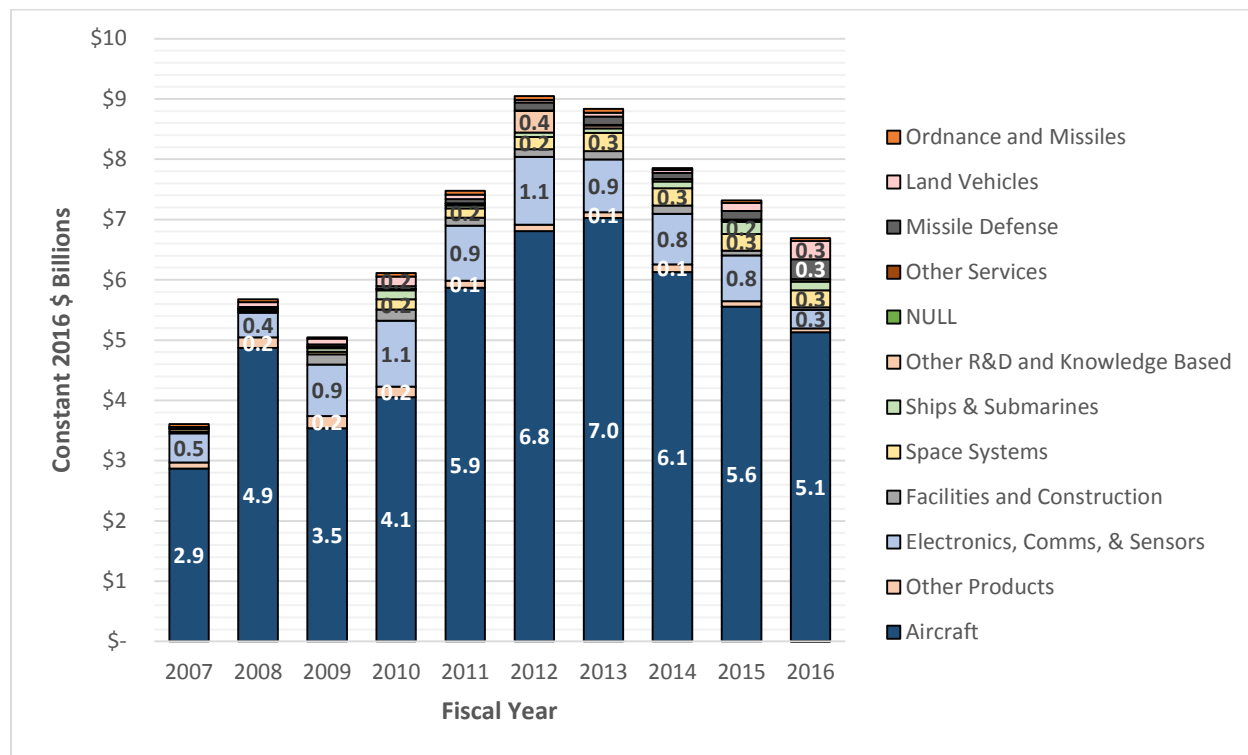
Intriguingly, the primary benefit of positive metric incentives may not be that they drive economically rational investments. Instead, as one defense/commercial interviewee suggested, “Positive metric incentives [are] generally not worth it, but it makes people feel good.” A defense-unique vendor echoed this view, saying that while their project did not include positive metric incentives, “[d]efining a contract adjustment for outstanding performance (i.e. 100 percent availability) would recognize the efforts of the team.” Another defense/commercial vendor who had worked with positive metric incentives found that vendors need not achieve goals every time to boost morale, as might be the strong inclination for avoiding negative incentives: “Really it comes down to risk, trying to say what’s obtainable, a true stretch goal. Because industry is very risk averse, hard to do it. But pretty awesome if they hit it even nine out of the ten months.”

## 5.3 Scope-Based Incentives

### 5.3.1 What Does DoD Use PBL Contracts For?

Because PBL contracts often involve purchasing a mix of multiple products and services, the usual FPDS categorization schema that CSIS uses to track what is being contracted for — Product or Service Code — is less useful here. Instead, Figure 5 below looks at platform portfolios, a categorization schema developed by CSIS, using a combination of the *SystemEquipmentCode*, *ProductorServiceCode*, and *ClaimantProgramCode* fields in FPDS, which aggregates all product, service, and R&D contracts by the type of platform the contracts are associated with.

Figure 4: DoD PBL Contract Obligations by Platform Portfolio, 2007-2016



Source: FPDS; CSIS analysis.

Unsurprisingly, the Aircraft platform portfolio has been the dominant user of PBL contracting over the 2000-2016 period. Aircraft & Drones accounted for over 89 percent of DoD PBL contract obligations from 2000-2007 and have accounted for 76 percent of DoD contracts since 2007. Within the Aircraft platform portfolio, PBL usage began to increase in FY 2011 and spiked in FY 2012 and FY 2013, which was heavily driven by the growth of the C-17A PBL program. The decline since 2013 has been broad-based, with a number of PBL programs seeing reduced contract obligations.

After Aircraft, the second largest platform portfolio source of DoD PBL contract obligations is Electronics, Comms & Sensors (EC&S), accounting for 12 percent of overall DoD PBL contract obligations since 2007. However, EC&S contract obligations declined by 60 percent in FY 2015 compared to FY 2016, leading to EC&S accounting for less than 10 percent of overall DoD PBL contract obligations in a year for the first time since 2008.

Land Vehicles, meanwhile, has only accounted for more than 2 percent of DoD PBL contract obligations in a single year during the 2000-2015 period (3 percent in 2010), but it increased to 5 percent in 2016. Space Systems never accounted for more than 1 percent until 2010, but it has accounted for 3 percent of total DoD PBL contract obligations since then.

Interestingly, there have been almost no PBL contract obligations for Ships & Submarines, which has just over \$50 million in total PBL contract obligations over the entire 2000-2016 period. While the maintenance and repair needs of ships and submarines differ greatly from

those of most other platforms in DoD's inventory, it is nonetheless surprising to see that virtually no PBL work has been tried, even for smaller surface ships or shipboard systems. An interview with an international government official did reveal a performance-based ship contract success story that involved using similar approaches to those applied in other sectors. In that example, the program was a "dreadful support environment, 500 days over, maintenance dockings, etc." After the introduction of a performance-based contract, culture, and relationship, the performance "started to hum."

### 5.3.2 Platform / System / Sub-System / Component

As the literature review in section 3.3 covered, giving the vendor control over a greater portion of the process by increasing the scope of work included in the PBL gives them the chance to wring out greater efficiencies. A naïve extrapolation from this statement would be that expanding the scope of a PBL offers a significant incentive, and the more scope that a PBL includes, the more appealing it will be for the vendor. However, in practice, PBLs may include portions of a larger process that neither the government customer nor the vendor controls, and those can be vulnerable to other exogenous factors.

One defense-unique contractor described an experience that closely models the expectation that increasing scope will act as an incentive. Their company was interested in a regular review of which types of items and corresponding national stock numbers (NSN) would be included in their PBL: "Advantages are we get more NSNs on contract which is a larger market share. We see that as more opportunity for revenue. Also, [this] makes us more likely to win recompense and strengthens our past performance ratings (CPARS). Disadvantages are that if we perform poorly, work dries up." Relatedly, expansion under a FFP contract "is a risk area" that the firm "mitigate[s] by obtaining FFP from our vendors and flow downs of terms and conditions, warranty, etc."

However, these interviewees indicated that emerging scope becomes much more complicated when trying to include an entire platform.<sup>109</sup> This approach has clear theoretical advantages for both the government and the contractor. As one defense-unique vendor noted, a platform-level PBL "means all systems are accounted for, someone is ultimately responsible." In addition to the accountability factor, metrics such as availability of the entire platform are predicated on the vendor being responsible for the range of non-operational factors that go into that outcome.

Industry experts agreed on some of requirements necessary for success with a platform-level PBL or even with a major component that has sometimes stood alone, such as engines. One defense-unique expert observed, "to make that happen, you have to be the prime system integrator, you can't be a provider-among-providers." A defense/commercial manager added: "Weapon system PBL... traditionally has seven or eight suppliers, but another may only have two to three. Because you don't have the full integration issues, it's easier to do a system level PBL. Not saying that weapon system[s] can't be done, it can be done, but you have to hold all the suppliers to outcomes." However, as a government expert observed, "it does get trickier as

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<sup>109</sup> Interviewees often preferred the term weapon-system PBL.



the prime [tries] to flow [PBL measures] down,” a challenge discussed in greater detail in section 5.5.2.

One defense-unique contractor observed that the benefits of a platform-level approach were even greater for “small weapon-systems, low numbers, those are very difficult for the Air Force system or systems to support,” particularly later in their life cycle. However, this defense-unique interviewee further observed that even when there is a solid business case that has been verified by a third party, the Air Force can be very reluctant to make that leap for such a system. This will vary between acquisition communities, Special Operations Forces have the “mission imperative, be lean, mean, and ready” mindset as well as their own contracting authority, which results in different outcomes. Other factors also contribute to whether more scope is an incentive for vendors and appealing for the government, such as the extent to which sustainment is already managed by contractors or organically run in depots.<sup>110</sup>

Questions of scope do not only exist when making the decision between whether to utilize a platform, a component, or a subsystem-level PBL. As the Center for Executive Education notes, “in the case of subsystem PBL approaches, it is impossible to define the top-level outcomes as the specified metrics, because the scope does not include the weapons system. In these situations, care must be taken to align the selected metrics to the top-level outcomes.”<sup>111</sup> The importance of tailoring the PBL to the customer’s needs helps explain the fact that some metrics draw mixed feelings even from experts within the same defense-unique company. One vendor complained that “Supply Response Time” or “Required Fill Rate *incentives* really would not be good incentives unless the pre-PBL performance was absolutely horrible and the spares were not in place to support the warfighter,” preferring instead that “the incentive should be tied to how to save both the Government and the Contractor operational cost.” However, a different defense-unique interviewee found that a PBL contract based on fill rate incentive structure was “the most effective for this contract requirement.” Likewise, another defense-unique vendor had hardware and software components PBL contracts with metrics that “were really focused on really tactical measures that could or could not change outcomes at the system level.” These components, which were reliant on tactical and subjective measures, were ultimately dropped from PBL status, while other components that were more conducive to membership were maintained.

### 5.3.3 Control

Control is an incentive and a risk factor. The opportunity for vendors to take greater control of their processes, with the accountability that comes from metrics, is one of the reasons for observations that “PBL itself is an incentive”<sup>112</sup> from a commercial/defense vendor. Likewise, as a different industry expert observed that when the PBL arrangement does not offer any control to the contractor, it is not a true PBL and quickly loses its appeal. This idea was illustrated by multiple experts with examples regarding the handling of transportation in a large contract. When a contractor is incentivized to provide on time delivery, they have a strong interest in

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<sup>110</sup> Further discussed at the end of section 5.

<sup>111</sup> Center for Executive Education, “The Tenets of PBL Second Edition: A Guidebook to the Best Practices Elements in Performanc-Based Life Cycle Product Support Management,” 32.

<sup>112</sup> Observation from an industry expert’s interview.

spending internal funds to choose their own vendor rather than settling for a low-cost but potentially slower choice. In a more extreme case, the customer competed the transportation of a heavy and high precision component that is typically transported by a flatbed truck with shock absorbers and other protective measures. The winner showed up in a Ford F-350 pickup. While they may have technically been able to transport the tonnage, the interviewee was unwilling to take the risk of signing over the component and potentially go to litigation over responsibility if any damage occurred in transport.

Concerns over control and related risks are not just limited to the U.S. government or even to the customer side of the agreement. An international government expert has had occasions where they pitched an all-in model to a vendor and had the vendor balk at the model because they saw it as an extreme risk. This was not resolved until a new senior leader came in and said, “what the customer is asking you to do is exactly what we want.” On the other hand, the interviewee had also witnessed a situation where the vendor had proposed a variety of metrics that they thought were a bit more mature than the ones presently in use by that allied government. This prompted an “allergic reaction” on the government side, and the proposal was politely withdrawn by the vendor. One of that interviewees biggest concerns were not a matters of day-to-day control. Rather, they wanted to make sure that the government retained a core of people who understood the implementation of performance-based operations and did not lose them to industry.

Interviewees raised multiple features that lessen the scope of which factors of a PBL the vendor can exert influence over – government-furnished equipment, requirements to use depots (which the vendor has minimal ability to manage) as subcontractors, and mechanisms for choosing suppliers to the vendor. Organic government depots, which are required to maintain a core logistics capacity under Title 10, deserve special attention because of limitations in the government’s ability to grant control. In the case of one defense-unique platform-level PBL, this meant that 16 percent of the weapon was out of the hands of the vendor and on the organic side. As one defense/commercial vendor noted, public-private partnerships can be an effective way to incorporate depots into PBL arrangements.

However, another industry expert had caveats by saying they “only want to use a depot as a subcontractor via a public-private partnership that gave the vendor management oversight” and if they had the choice to stop using a depot if performance was inadequate. Metrics offering relief from depot non-performance were not an acceptable substitute, as the failure would still give the vendor a reputational “black eye.” A different defense-unique expert that was interviewed said that they would be comfortable with a platform-level PBL arrangement that included depot repair but would be “less interested in organic supply chain management.” The interviewee emphasized that this was not a slight on the staff, but that the supply depots can be commodity focused and restricted by their regulations and working capital authority.

## 5.4 Other Incentives

### 5.4.1 Relationship

With rare exceptions, both government and industry experts agreed on the importance of trust and transparency to the PBL relationship. As one government expert argued, even when organizations have incentives for success, individuals may be incentivized to hide the truth.

Instead, partners in a performance-based culture should work “hand in hand” to “work problems together rather than say ‘look, you’re paid to achieve, just do it.’” Likewise, one defense-unique contractor had personal experience with building a trusting relationship that enabled switching a contract from cost-plus to fixed-price. The interviewee laid out both why trust was necessary to get true PBL arrangements and the result:

“If you do it right, the government is giving up a lot of authority to the contractor to make weapon system outcomes better... that’s not traditionally in the Air Force’s DNA. There’s got to be a ton of trust,” not just because money is on the line, but because the “contractor is going to make decisions” with implications for the larger enterprise. “Not as easy as just issuing a bunch of metrics in a contract, there’s way more relationship than just the contractual arrangement. Maybe that’s why you don’t see a lot of them, for whatever reason, folks aren’t willing to invest in that relationship.”

This emphasis on trust is not universally held. One set of defense-unique industry experts pushed back on the term trust, as it is ultimately a business relationship. However, one defense/commercial contractor had witnessed a relationship with a lot of hostility between the government and a different vendor and argued that it was “not the right environment to have a good working PBL” and that a “win-win” approach was needed. Similarly, another defense/commercial contractor thought that hostility means that “a PBL will never work,” and, instead, the vendor and the customer should focus on doing right by the warfighter, which can bring some of the flexibility discussed in section 5.5.2.

Even if one believes that a trusting relationship is important, building and maintain one can be a challenge. One approach that government, defense/commercial, and defense-unique vendors agreed on was the co-location of work teams. Engineers, in particular, were mentioned, but program and logistics teams could also benefit from colocation. This can be more common with international programs, but U.S.-based vendors could also describe domestic examples. One defense-unique vendor contrasted multiple programs where the customer was a mile away with those where the vendor and customer were in different parts of the country. For a relationship to work, it can be very important to “see them every day, talk every day, have a beer every once in a while.”

Co-location may not always be possible and one defense/commercial vendor thought it made it easier but that it was not necessary for a good relationship. Instead, the interviewee had relied on a telecon every morning with a partner defense-unique firm and with the government. This was augmented by “[f]requent monthly reviews, quarterly reviews for the government at the executive level, constant, constant communications.” The only instances of physical co-location were for the engineers and program teams, but the overall arrangement worked well. The importance of joint problem solving and standing side-by-side to report failure was critical to building esprit de corps.

One government official found that the contacts that lead in to a PBL build a positive culture even before incentives kick in. They suggested that “a large part is talk[ing] about what you want in outcome terms.” One defense/commercial expert had a similar approach of getting all the

parties together to talk about long-term and short-term goals. He believed in building good communications by being upfront and talking openly about what the goal was and how all the parties could be successful. A different defense/commercial vendor with the same firm emphasized that avoiding negative communications, such as “I might want a cheaper [component] supplier, maybe I’ll replace you, I want competition,” can undermine a relationship and undercut confidence in the long-term relationship. One area where a government official stood alone in terms of relationship building was skepticism about the benefits of encouraging high risk investments, as those may generate perverse outcome. In the end, the interviewee observed that “[i]f you have [the right culture] then you may not need a [performance-based contract], but how do you get to it without one?”

#### *5.4.1.1 Preserving Cooperation*

Unfortunately, achieving a good working relationship does not guarantee lasting success. One government official noted the risk of the rest of the government enterprise saying “yeah, it’s giving great outcomes but it’s expensive/not giving the outcome [they] want” or “let’s make it better.” From the customer perspective, it can be important to both manage the politics of the PBL contract with regards to the larger enterprise and handle outside suggestions carefully without breaking the trust that has been built up. One government customer noted that sometimes even a project that is delivering to metrics can have “operators [ticked] off because they don’t get what they need.” Working closely with the system operators can result in a great deal of awkward external pressure, but no successful PBL can afford to stay “in splendid isolation from the operators, make sure they’re at the table.” The interviewee recommended specific mechanisms, such as “[j]oint management boards, [to] ensure that there’s at least 1-2 forums [with the] lead supplier, contracting agency, [and] operators.” In their opinion, it is still worth doing, even if operators may still be angry afterwards. A defense/commercial vendor seconded that idea saying that a mutually beneficial approach was more prevalent in international systems than for U.S.-based PBL contracts.

For industry experts, one of the biggest challenges faced is staff rotations on the DoD side. At its most extreme, one defense-unique contractor cited the arrival of a government program manager whose personality mismatch led to a souring that “permeated the relationship” and resulted in contract performance assessment report scores that were cut in half. This can go both ways. One defense/commercial contractor had people who they could not really work with for five years, only to have things get better after a replacement. The interviewee noted that “[f]rankly, [it’s] not just the government, there’s been people with non-technical problems, fresh eyes and new people have helped.”

Personality conflicts are hardly a PBL-specific problem, but the industry experts did point out a PBL-specific variant. Namely, most acquisition personnel haven’t worked with a PBL system. A defense-unique contractor described the situation at a pertinent military base as “less than half [of the platforms] have any sort of PBL.” As most new personnel “are coming from legacy weapon systems, [they have] no understand of PBL/PSI, direct sales. They start trying to impose good management that they’ve been used to [but, PBL-appropriate techniques are] completely foreign.”

Likewise, a defense/commercial contractor suggested a good and trusting relationship with the government's main contractor office representative "makes all the difference." The arrival of a new person "can be disruptive, sometimes takes a year, year and a half, then they'll see we're really trying to do the job." The same can be true at the end of a project. A defense-unique contractor observed that "[r]enewal of the PBL is often harder than the initial PBL handling," because the government team that negotiated the original agreement has completely turned over. This lack of familiarity does not only occur on the government side, one defense/commercial vendor noted. Many air frame contractors are not familiar with good contract fleet management and instead have a model of charging by the service. "PBL is a basket of services. A special engineering change doesn't mean going back to the government, it's part of the bucket. . . nickel and dime[ing] government, that's not going to work."

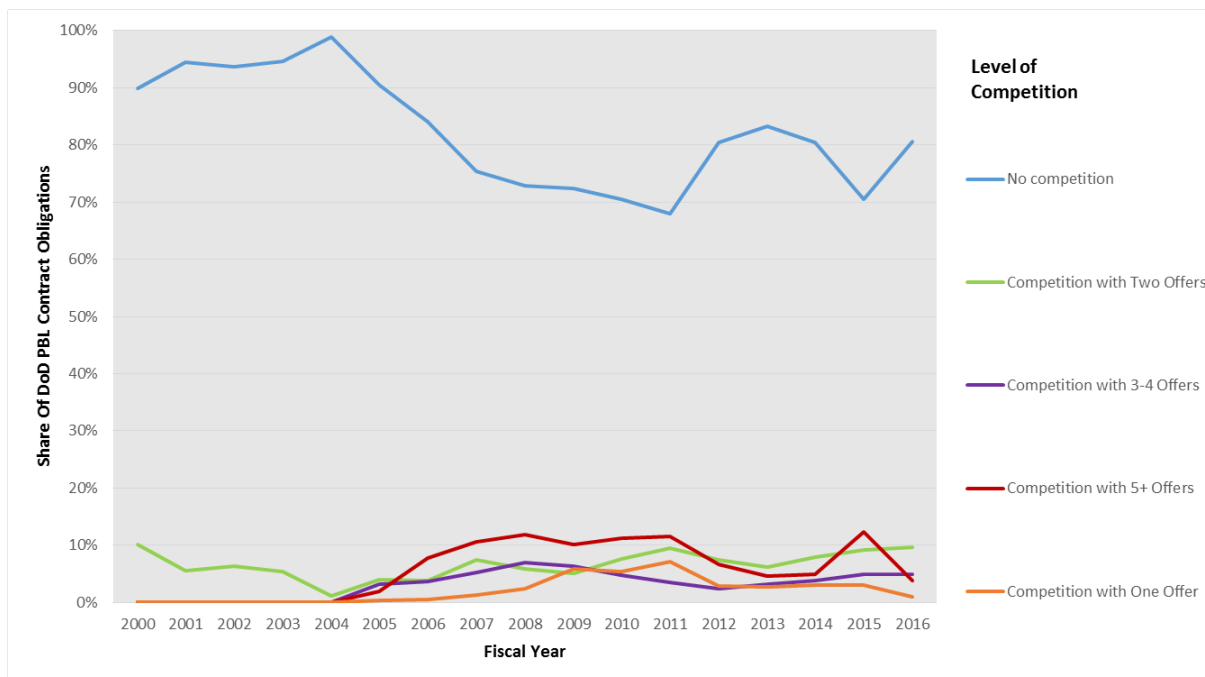
#### 5.4.2 Competition for DoD PBL Contracts

One of the inherent challenges of the market segment that is relevant to PBL contracts is that competition is often not available. One international government official noted that in the absence of competition, the government "might have to fight to get the metrics you want." Competing contractors are "likely to accept proposals," but non-competitive vendors tend to be "risk averse." This is a challenge that can be overcome, as a good PBL should be in the interest of both parties, but it may require an effective communication plan for both the acquisition strategy and the top-level vision as well as a willingness to make the effort to persuade contractors to bid. While about half of overall DoD contract dollars in recent years have been awarded after effective completion,<sup>113</sup> DoD PBL contracts are far less competitive, as can be seen in Figure 5:

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<sup>113</sup> CSIS defines "effective competition" as a competitively-sourced contract which receives at least two offers, which excludes competitions where only one offer is received.

Figure 5: Level of Competition for DoD PBL Contract Obligations, 2000-2016



Source: FPDS; CSIS analysis.

For the 2000-2016 period, 78 percent of DoD PBL contract obligations have been awarded without competition. This is not surprising, since most PBLs for platforms and systems go to the original manufacturer for several reasons, including:

- Most manufacturers retain the technical data rights to their platforms and systems, without which it is impossible for another vendor to perform the functions under a PBL contract.<sup>114</sup> One government interviewee leaned toward licensing technical data rather than trying to gain ownership rights, noting “[y]ou can own everything but not understand it.”
- Original manufacturers have supply chains already developed, whereas anyone competing to take over a PBL contract would have to build a new supply chain from scratch.
- Some experts mentioned their hesitance to try to compete for taking over an existing PBL contract, even when one was potentially going to be put up for competition, due to the large advantage that the incumbent vendor is perceived to have.

Nonetheless, there has been a significant increase in the share of PBL contract obligations awarded after effective competition since the early 2000s. While only 1 percent of PBL contract obligations were awarded after effective competition in 2004, that share rose to between 23

<sup>114</sup> This can be true even in cases where the original manufacturer might be willing to sell those data rights, the cost is likely to be more than DoD is willing to pay.

percent and 25 percent between 2007 and 2011, with the largest portion made up of competitions receiving five or more offers. That share has declined in recent years, mostly hovering the mid-to-high teens, but nonetheless remains notably higher than in the early 2000s. Some of this decline may be attributable to former PBL projects not being renewed as PBL contracts. As one defense-unique vendor noted, a "renewal of the PBL is often harder than the initial PBL handling," in part due to all new personnel on the government side.

For both the Navy and Air Force, the share of PBL contract obligations awarded on a sole source basis has remained in the low-to-mid 80-percent range in recent years, which, while higher than the overall DoD PBL rate, is an improvement over the rates seen in the early-to-mid-2000s. The Army and the Defense Logistics Agency (DLA), by contrast, have always seen lower rates of sole source awards, with 52 percent and 62 percent, respectively, awarded on a sole source basis since 2000. This difference is primarily a product of the fact that the DLA and the Army spend a greater share of their PBL contract obligations on subsystem and component PBLs, which are more likely to have multiple vendors able to potentially perform.

## 5.5 Challenges to Designing Incentives

### 5.5.1 Breadth of Incentives

The literature review in section 3.5 reviews the history of the change in the number of incentives recommended as best practices. The DoD has gone from five categories of performance measures proposed by OSD(AT&L) in 2004 to the less prescriptive recommendation to adopt three to five top-level metrics in the 2016 PBL Guidebook. One defense-unique expert witnessed this winnowing on their own program, which initially had over 25 metrics "measuring every system, parts and pieces." The interviewee preferred moving to measuring the "availability of [the] weapon system [and] overall supply rate." After that, the metrics could be narrowed to those "that have the greatest effect on availability" and "[t]hose that the contractors have the most control [over]."

Two defense/commercial vendors put even more emphasis on metric parsimony. One expert had largely achieved this goal and worked on a project focused on availability with a secondary focus on spares. The secondary was recommended because the customers "[d]on't want them to buy just more spare parts," and instead want them to repair existing spares. The interviewee's philosophy called for "having one or two at max metrics that are most important to the customer. In a PBL you can have 20 that you track, but only one or two that you incentivize. Otherwise you are in constant argument mode over metrics." Another defense/commercial contractor went even further for component PBLs saying that the "[b]est PBLs have literally one [Key Performance Indicator], everything is focused on that [component] system availability."

Both industry and government experts agreed that choosing the right metrics was critical, and as one defense/commercial expert succinctly put it: "[if] you incentive the wrong things, you will get the wrong outcome." As was covered previously in section 5.2.1, it is also notable that metrics correspond to the things that vendors control, both for performance enhancement reasons and to avoid high risk premiums. This is viewed not as a hypothetical concern but one that has been seen in practice. A different expert with the same vendor pointed out that incentives can become diluted and confused for reasons beyond the PBL contract:

“But often they contract in lots, multiple overlapping, annualized sustainment, non-annualized, PBL. It can be difficult in big programs, so many contracts, you lose sight of the big pictures, incentivize every contract differently, reduces the value. Raises the risk of gaming the system, if availability is important, don’t want them gaming the system to have plenty of availability, do the best you can with a fair basket of spare parts.”

### 5.5.2 Flexibility, Adjudication, and Changing Metrics

Even comparatively simple PBLs with well-chosen metrics will have some factors beyond the control of the supplier. Both a government official and defense-unique contractor spoke to this challenge and similar solutions: determining up front what is beyond the control of the supplier, having mechanism to arbitrate anomalies, and having funding to handle the unexpected. The higher the level of metrics, the more important such arbitration mechanisms may be. This is also an alternative approach to the factors of control discussed in section 5.3.3, and the absence of good answers on this question may reduce the appeal of scope as an incentive.

Another form of flexibility is the government and supplier knowing when to go above and beyond. In one defense-unique example provided by industry, a particular part may suddenly become a problem because the manufacturer that produced it in the eighties does not want to produce it any more. Part of handling this problem is inherent in a PBL contract for a mid-life platform, and the incentives are there to encourage a proactive approach. However, there may be times when it is worth it to the customer for the vendor to take on more risk in exchange for more fee and incentive. Other times, industry may invest tens of millions to show they can handle a particular problem and potentially be rewarded with greater duration. Similar dynamics were described by a defense/commercial vendor who said that in their first major PBL, either the government or industry could have come to the other with a major problem that was not explicitly in the scope of the PBL and have it handled because of their common focus on the “doing the right thing by the warfighter.”

One possible source of anomalies is when one side does not believe that the demand signal that is the basis of the fee, for example number of flying hours, fleet size, or number of repairs, captures the underlying reality. As is covered in section 5.2.2. getting these measures right is critical, but there is no one single answer. Mismatches between estimated flying hours and actuals, which can be driven by budget restrictions or operational requirements are one possible source of challenges. One international government official noted that “[y]ou can put surges into a system to get higher performance for a certain time” but that there are real risks if that is done for too long. A defense-unique vendor suggested that a factor limiting the DoD’s ability to respond to operational challenges is that “if you operationally overfly” it is possible to add funds to the project “but that’s always late to need.” Working capital funds may be a means to overcome this challenge, as they can easily move money, but they can lead to different challenges with PBLs. This color of money and flexibility issue will require significant upfront thought for the F-35, which draws on the treasury accounts of multiple services and funds.

Both a government and industry experts acknowledged the hard limitation on the other side’s ability to exercise flexibility. One defense-unique vendor emphasized that “stringency is fair” the government must be scrupulous when deciding when to be flexible. The government should not



make adjustments and “be seen as easy to get it because it’s easy to negotiate your way out of trouble.” A government official likewise observed that capitalism means that an industrial program manager may be able to take a loss once for the greater good of the platform, but doing it repeatedly would likely result in that manager being replaced. Moreover, flexibility must be grounded in a transparent, trusting, and reciprocal relationship as discussed in section 5.4.1.

One form of flexibility is to revise metrics over the course of contracts, typically as part of a renewal. This approach is controversial, even if executed in a manner that avoids a change order. One commercial/defense contractor defined ineffective incentives structure as one that “changes parameters along the way, re-baselines, renegotiates.” The complaint about such changes is that they undermine the incentive structure that vendors use to make their investments as well as the positive incentives to achieve higher results. On the other hand, as one former government official commented, end users may love a 100 percent availability rate, but there are always tradeoffs, and the resources are often needed elsewhere. High availability may mean that there’s room to strike a different balance between performance and cost. One approach favored both in the United States and abroad is to re-baseline at pre-defined intervals. As is noted in section 5.1.2, industry argues that if the intervals on such changes are short, it undermines the incentive to make major investments. Another way metrics might change is for those PBLs that do not have a platform as scope (e.g. an entire weapon system such as plane or a ship), because the government may lose confidence that it knows what it is buying with these incentives. One defense-unique contractor spoke of the risk of complacency, hitting subjective metrics for complex systems with regular incremental adjustments until the customer ultimately lost interest and changed over to a transactional arrangement. Thinking through the possibility of bigger changes earlier might have allowed both parties to find mutually agreeable new arrangements. As a defense/commercial contractor observed, “it helps both the customer or contractor know how the field is doing. When period comes to an end do you want to review, change incentives, or is everything going very well?” The larger goal in any such adjustments is to make sure that the metrics used are delivering the results that are relevant to the field.

### 5.5.3 Handling Suppliers to the Vendor

One challenge of special interest emerged during interviews. As one government interviewee put it: “it’d be naïve to say we have agreement with a prime, it’s going to guarantee performance. It’s not just prime behavior, it needs to trickle down to the top-level suppliers.” In a PBL environment, some vendors hold their larger subcontractors responsible for their role in meeting performance metrics, such that if they are responsible for the vendor not meeting the metric, they also share in the penalty.

Managing suppliers is the largest challenge in a platform-level PBL. As one defense/commercial interviewee noted, one platform-level PBL may have 2 or 3 suppliers, another may have 7 or 8 suppliers, but regardless of the number, the prime has “to hold all the suppliers to outcomes. The integration challenges are easier in a system-level PBL, which complicates the appeal of scope as an incentive, as discussed in greater detail in section 5.3.2. However, a wide spectrum of interviewees noted that holding suppliers accountable does not necessarily means passing down incentives. Experts with one defense-unique firm noted that in a well-constructed supply chain, the subcontractors should already exist as part of a team with the prime vendor, and a sense of

shared responsibility for meeting performance metrics should already be assumed, even absent of shared penalties.

Passing down incentives, according to one government interviewee, makes the most sense “if there’s an opportunity for a supplier to otherwise make saving at the expense of long term.” A defense-unique vendor sees it more as a risk reduction technique: “[w]e mitigate by obtaining FFP from our vendors and flow downs of terms and conditions, warranty, etc.” However, passing down incentives has disadvantages as well. First, the overhead is simply higher on PBLs, due to the management requirements for ensuring outcomes. Second, the same government interviewee wanted to avoid paying for a metric buffer (for example if a prime vendor trying to meet 96% availability ask for 99% percent availability from a supplier). Finally, as a commercial/defense vendor noted, what matters most may not be whether or not incentives are used, but whether the outcome is a strong relationship where ownership is taken at every stage of the supply chain, as covered in section 5.4.1. One hallmark of this arrangement is that the staff of both the prime and the subcontractor directly answer customer technical questions without filtering through the prime.

## 6 Analysis Results

Having described the various forms of incentives that were identified and the expertise about them gathered in the course of this study, it is now time to review and reach some conclusions about the hypotheses postulated at the start of this paper:

1. A larger scope in a PBL contract allows for more effective and ambitious incentives. These larger contracts make it easier to balance of revenue, profit, and risk.
2. Flexible incentives are generally more desired by contractors and thus more effective.
3. For incentives to be effective, the platform/system must be complex enough to allow for meaningful inputs and innovations.
4. Similar incentives are valued by both government and commercial vendors, but there are meaningful differences in how government customers and commercial customers evaluate incentive structures.

None of the four hypotheses found unconditioned support, but the results were clarifying for each case. The results for hypothesis 1 found that while greater duration may be seen as an unalloyed good by industry, greater scope can drive risk when not accompanied by control, meaning that larger scope is not always an unalloyed good for PBL. Hypothesis 2 did find that flexibility on both the government and vendor side could be important, but the flexibility may be derived from a good relationship and well-chosen demand mechanics, rather than directly baked into the metrics themselves. In fact, poorly designed flexibility, such as poorly chosen demand bands, can significantly increase contractor risk and possibly undermine the PBL's potential to achieve savings. Hypothesis 3 found that while some degree of complexity may be necessary for a true PBL to be worthwhile, performance-based metrics and longer duration can be used with less complex systems, and highly complex software may be challenging for incentive design. Finally, hypothesis 4 found more differentiation between vendors than expected, with cost accounting standards and fee structure discussions as an area where some defense/commercial vendors had a different take than defense-unique firms. The second half of the hypothesis was strongly supported with multiple distinctions found between government and commercial customers.

### 6.1 Hypothesis 1: Larger Scope

**Larger scope in a PBL contract allows for more effective and ambitious incentives. These larger contracts make it easier to balance revenue, profit, and risk.**

The study team found mixed support for this hypothesis, depending on the definition of scope. The most inclusive PBL contracts, those that cover the entire platform or weapon system, are significantly more complicated than lower level PBLs, as section 5.3.2 covers, and interviewees found that this arrangement was not guaranteed to be the most effective. System-level PBLs have a critical advantage in that they allow for the closest alignment of performance outcomes and operational goals. However, this scope comes with challenges. As the contracts were described by some interviewees as a PBL of PBLs because multiple components and systems had to

operate simultaneously to deliver remarkable results in order to achieve overall performance goals.

As covered in section 5.3.3, the crux of the dilemma for contractors working on system-level PBLs comes down to control. In one interview, a defense industry contractor that worked on platform-level PBL contracts gave a straightforward explanation of the challenges inherent in many larger PBL contracts. Namely, these projects with greater scope often include portions that are handled in a transactional, rather than outcome focused, manner. For example, government run maintenance depots are a feature of DoD acquisition and are not a part of commercial or international PBLs. Industry interviewees did in fact desire greater scope when the control granted by the customer and/or public-private partnerships was sufficient to meet the challenge. Without that control, balancing the risk of greater scope becomes increasingly more difficult.

Scope is more likely to be construed as a straightforward benefit when discussing PBL contracts at the system or subsystem level. While some interviewees thought that fill rates and other procedural measures were the right approach for their system, others wanted incentives that offered greater risk as well as greater reward. However, even in this instance, tailoring the scope to the conditions of the project is vital, and the repeated comments from interviewees appears to reflect a preference for outcome measures over transactional ones, rather than a preference for more expansive contracts.

When CSIS formulated this hypothesis, the study team had not yet separated duration as a category distinct from scope, as both are dimensions in the lifetime magnitude of a contract. The analysis in section 5.1 found contract duration to be critical. From an industry perspective, greater duration allows initial investments to be recouped later. It also enables the tradeoffs between risk, revenue, and profit suggested by this hypothesis. From the government perspective, a longer scope does give up a measure of control and an opportunity to re-compete contracts. Although, effective use of extension mechanisms, particularly triggered options and rolling extensions discussed under ‘International Approaches’ in section 5.1.2, can provide many of these benefits. Likewise, interviewees described PBL arrangements as providing end-of-year actual cost summaries to the government customer. Longer contracts may be used at predefined intervals to re-baseline expectations. This led to some disagreement from contractors working on the industry side, but it was described as reducing, rather than undercutting, the appeal of duration.

## 6.2 Hypothesis 2: Flexible Incentives

### **Flexible incentives are generally more desirable and more effective.**

This hypothesis was largely supported, with some objections and caveats. Flexibility can take multiple roles. A good incentive structure should be able to handle a range of circumstances and have a means of arbitrating what challenges are the contractor’s responsibility and which are the government’s. As section 5.5.2 covers, anomalies will arise, and there are times when it’s appropriate for one party to go above and beyond even when it may not be their responsibility per se. However, such actions must be the exception rather than the rule, and the willingness of a party to act beyond their contractually

mandated responsibilities comes more from the strength of the relationship (as covered in section 5.4.1) than from the flexibility of the incentives,

Flexibility is more likely to come in through re-baselining or incrementally adjusting metrics at regular intervals. The length of the interval varies between projects and countries, 5 years in some cited cases down to one for some single year options. Here, government interviewees and some contractors agreed that the option to make adjustment is critical. However, this flexibility does reduce the power of other incentives because many investments take years to pay off, and flexibility may mean smaller payments by the time a change works its way out the fleet.

### 6.3 Hypothesis 3: Complexity

**For incentives to be effective, the platform/system must be complex enough to allow for meaningful inputs and innovations.**

This hypothesis found support, however, complexity often appears to be necessary, but not sufficient, for incentive structures to be desirable. Across a wide range of industrial interviewees, the ability to make meaningful inputs and innovations was key, but there was little indication in the projects they worked on that complexity was ever a limiting factor. This may in part reflect the selection bias of the sample because the interviewees had direct experience with extant PBL contracts, rather than focusing on programs/systems that might be too simple to justify a PBL.

The relative absence of complexity as an issue raised by interviewees suggests that it may be an intervening variable, rather than a driving one. One defense-unique interviewee found it “very clear” to classify when performance measures and incentives were valuable and that “[s]o much out there just needs to stay transactional.” Specifically, “[n]uts, bolts, screws, hardware” and items with “[n]o changes,” just “bulk delivery on time,” do not need the full PBL structure. However, above that threshold, it is not complexity directly but instead “it really is where there are risks in performance, risks associated in the supply change.”

Complicating that view, the Australian approach to a performance based contract does look at ways that performance can be tied to duration in even the simplest of contracts. This can be seen in a slide provided by Dr. Jacopino to a prior CSIS study. In that slide, the [Performance-Based Contracting] Lightest category in the leftmost column faces no such complexity requirement.<sup>115</sup> This is not necessarily an area of disagreement between interviewees. The defense-unique specialist did speak of the value of longer contracts for even the simpler projects. These “light” performance-based contracts likely do not qualify as PBL contracts, but they could be considered on the same scale in a way that the hypothesis may not allow for.

Another defense-unique interviewee provided a counter-example, discussed under Flexibility, Adjudication, and Changing Metrics in section 5.5.2, where greater complexity contributed to the end of a system level PBL. In this case, the subjectivity of the metrics for software systems meant that the customer was not sure what they were buying, which led to the end of the PBL

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<sup>115</sup> Hunter et al., “Performance-Based Logistics: A Process Analysis for the Defence Logistics Agency,” 72.

arrangement. Software for advanced weapon systems certainly does not lack for complexity, and the interviewee did believe that better metric alignment may be possible, but they also believed that there was limited appetite on the government side.

#### 6.4 Hypothesis 4: Federal and Commercial Vendors

**Similar incentives are valued in the same way by both federal contractors and commercial vendors, but there are differences in how government customers and commercial customers evaluate incentive structures.**

To the question of “Do effective incentive structures work universally?” one defense/commercial expert replied: “They do, who really wouldn’t want to earn.” While the need to tailor PBL incentives to individual projects was universally acknowledged, the study team nonetheless found a notable exception to this idea: opinions on cost accounting standards. The interviewees from industry who agreed to speak to the study team were defense-unique and defense/commercial firms, so the project could not directly evaluate the views of commercial firms or divisions that did not principally contract with the federal government. However, the spectrum of views between these two contractor types and within defense/commercial firms illuminates a divide that grows into a chasm when interviewees’ experiences with commercial suppliers are considered. Namely, defense-unique and some commercial/defense firms have already implemented DoD cost account procedures. The procedures are relevant to PBL incentives because, as is discussed in section 5.2.1, these procedures are incorporated into PBL contracts that are fixed-price incentive fee and cost-plus incentive fee contracts, which are a means of incentivizing cost reductions. Those fee types allow for cost sharing between the customer and vendor, which encourages cost saving without allowing the contractor to keep the full amount saved like in a firm-fixed-price contract.

Multiple interviewees, including on the defense/commercial side, found these cost-sharing incentives to be useful in at least some cases. However, for firms that do minimal work with the federal government or only bid on firm-fixed-price contracts, the costs of setting up a compatible accounting system can be a barrier to entry for taking on these sorts of contracts. Based on interviews covered in the section 5.5.3, commercial suppliers often object to providing the detail necessary to meet these standards, and while there are regulatory options for commercial item acquisition, this objection can be a point of contention between the government, a PBL vendor, and their suppliers.

On the customer side, the study team found substantial support for the hypothesis. One defense/commercial succinctly expressed a sentiment heard from others: when dealing with commercial customers “there’s a lot more freedom, decisions and choices. Risks are higher, consequences higher, rewards are higher.” Another interviewee made the point that commercial work is no panacea, but rules compliance is much easier: “Trust me, civil customers aren’t easy to handle sometimes. But they do make faster decisions and far fewer gates. They don’t have to navigate a raft of contracting officer logs and rules.”

This difference in culture is driven, in part, by the requirements on public servants to uphold a wider spectrum of principles when contracting. Specific to agencies active in the field, like the

DoD, operational risk is also critical factor. As one government interviewee put it, they are “[n]ot in the business of saving money, but in effectively fighting wars.” Many of the disputes between vendor and customer raised by industry discussed in section 5.3.3 were not related operational risk; they were more traditional fights about costs and whether the government was getting a good deal. However, an underlying principle in both cases is that military departments have reason to be especially wary about giving up control and, as section 5.4.1 covers, building a trusting relationship is key to overcoming those fears.

One other observed difference, possibly with the same origin, was that governments appear inclined to use more metrics (three to five) than vendors cite as the number preferred in private industry (one to two). This phenomenon is discussed in literature review section 3.3 and analyzed in section 5.5.1. In the past decade, the DoD has emphasized the risks of too many metrics and reduced the number used in many extant PBL contracts. This finding may merit further study to compare whether the difference in number of top-level metrics can be attributed to defense unique requirements or different philosophies of incentivizing.

## 7 Conclusions and Recommendations

Industry has retained its enthusiasm for PBLs in concept, and the DoD is pursuing multiple opportunities in both cost savings and performance improvement. The technical sophistication of an international cadre of PBL experts appears to be growing, and the latest PBL Guidebook covers a multitude of possibilities and lessons learned from the past. This is a pivotal moment, as the largest acquisition program in history, the F-35, is entering use and will need a sustainment solution. However, despite corporate interest and government initiatives, the sense that this study team found from industry was that the incentives currently being proposed may not be enough to attract interest in an ambitious next generation of PBL contracts. With the DoD using its power as a monopsony buyer to implement a new set of techniques to minimize costs, notwithstanding the DoD's official preference for PBL as a sustainment strategy, time may show whether the next generation of PBL contracts will emerge. CSIS's analysis of PBL trends in section 1.1.2 may be missing some of the most recent PBL contracts; however, stories from interviewees of drawn out negotiations and projects that transitioned away from PBL arrangements appear to be supported by an overall trend in the contract data that shows a slow reduction in PBL obligations. For the time being, the U.S. government has not found PBL contracts appealing enough to justify offering vendors the duration, control, and potential fees that they are asking for. From the other side, the overhead and challenges of putting together a PBL arrangement seem sufficiently onerous that contracts that offer only minimal improvements over transactional arrangements.

To address the challenges of this moment, the study team has looked at the places where closer alignment to best practices could improve the incentives in DoD contracts. The outcomes from interviews are not brand-new concepts, but they do help point to areas where effort is likely to have a higher marginal return. These best practices will be followed by recommendations for future PBL contracts.

### 7.1 Presently Employed Incentives and Best Practices

#### 7.1.1 Contract Length and Extensions

The study team expected scope, writ large, would be a powerful predictor of effective incentives. However, the interviews revealed that this was not exactly the case. Instead, as shown in section 5.1, longer contracts have a broad base of support and are applicable to a wide range of PBL approaches. The latter is particularly important, as each DoD component has its own preferences and special concerns when using PBL methods, and each project should have metrics tuned to its circumstance.

These longer contracts do not have to lock the government into what may prove to be a bad deal. As discussed in section 5.1.2, both the United Kingdom and Australia have demonstrated extension mechanisms – triggered options and rolling extensions respectively – that allow for tuning and re-baselining, as well as off ramps in case of poor performance. Even smaller steps, like moving to multiple year options when statute allows, can strengthen government-vendor relationships while also reducing administrative overhead costs. Exploring and experimenting with these ideas, within the limits of statutory restrictions with O&M funds, could be a valuable focus of attention.



### 7.1.2 Building and Maintaining Relationships

For a PBL contract to deliver its results, the relationship between government and contractor must be strong and transparent. As covered in section 5.4.1, this premise enjoyed widespread, but not uncontested support from both the government and vendor side. The incentives and metrics in a PBL contract cannot guarantee outcomes on their own, but they do provide an accountable manner. This concept is already captured in the PBL Guidebook but merits additional attention. Specific methods, such as co-location of project teams (particularly engineers), may help build the sense of a common mission and enable the flexibility required to handle the unexpected and ensure metrics stay fresh, as is covered in section 5.5.2.<sup>116</sup> However, it is not necessarily enough to be an effective team and meet the initial requirements from operators. PBL contracts could also benefit from tracking total ownership cost<sup>117</sup> and being otherwise ready to document benefits to outside skeptics.<sup>118</sup> Interviewees suggested that this may be particularly important during staff turnover and as a PBL winds down or is potentially renewed, as many new staff may not be familiar with how PBL contracts operate in general, let alone for that specific project.

## 7.2 Recommendations for Future PBLs

### 7.2.1 Focus where Performance Gains are Necessary

Choosing projects wisely can aid in achieving mission outcomes and have salutary demonstrative effects for PBLs further out. The most straightforward cases for PBL contracts may be when systems are coming out of procurement with no clear cost data, have reliability issues, or are entering the later stages of their lifecycle. The form of PBL mechanism that would be appropriate varies for both new and qualitatively different platforms, components, and systems, and cost-plus incentive fee contracts may be a way to manage risk until the actual costs have been discovered.

For the parts of the government that are more skeptical of the cost-saving value of PBL contracts, focusing on areas where there is room for improvement means that there's more room for a win-win solution than with negotiations that are solely interested in squeezing out costs. The Australian model makes use of longer time frames but emphasizes being a smart customer rather than asking vendors to take an early loss on investments in exchange for large profits later. This approach does not claim the cost savings of the U.K. model, but it may be appropriate when the government wants to see more demonstrated results before considering giving up additional control. Likewise, when dealing with defense-unique firms and some defense/commercial firms,

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<sup>116</sup> Mentions of handling trust are present but not necessarily prominent. See for example, Stakeholder Alignment and PBL Categories, bullet 5 "Trust and Transparency: Is there significant trust and transparency among key stakeholders?" Assistant Secretary of Defense for Logistics and Materiel Readiness, "PBL GUIDEBOOK A Guide to Developing Performance-Based Arrangements," 42.

<sup>117</sup> Andrew Jacopino, "Cost Performance Measures | Performance Based Contracting (PBC) Blog," *Performance Based Contracting Blog*, 2017, <https://performancebasedcontracting.com/2017/08/05/cost-performance-measures/>.

<sup>118</sup> A practical example of the importance of managing the politics can be found in the literature review section 3.3. In that example, claims of savings were met with a complaint that "Additionally, we could not verify the \$40 million in savings claimed by the Principal Deputy for repair of reparable and consumable parts because no substantiating data was provided by his office." DoD Office of the Inspector General, "Excess Inventory Acquired on Performance-Based Logistics Contracts to Sustain the Air Force's C-130J Aircraft," 29.

incentive fee contracts are a traditional means of controlling cost that are better received than demand-band approaches that focus on the number of repairs rather than the utilization of the platform. However, when dealing with other defense/commercial firms and suppliers in the commercial sector, cost accounting standards may be a red line, and more traditional U.S. and U.K. approaches may be better suited.

### 7.2.2 Consider Mechanisms for Feedback from Operators

The PBL Guidebook regularly emphasizes the importance of the system operators: “Work with the Warfighter to establish sustainment requirements that are specific and measurable at program initiation. . . Ensure the broad product support strategy requirements are aligned with the Warfighter’s requirements.”<sup>119</sup> However, once the requirements are set, the focus is on meeting them with allowance for “changing Warfighter requirements or system design changes.”<sup>120</sup> Notably, the industry perspective calls for “[a]ccess to the end customer (Warfighter),”<sup>121</sup> which suggests that there is more room for greater engagement.

One defense/commercial contractor noted the importance of trying “to implement operator improvements,” which benefits both the government and the customer but, in their view, was more prevalent in international PBL contracts. In an approach reminiscent of the proposed methods for U.S. acquisition of adaptable systems, one international government official laid out their mechanism of choice: “Joint management boards, ensure that there’s at least one to two forums, lead supplier, contracting agency, operators.”<sup>122</sup> This approach can take advantage of what one defense/commercial witnessed in their firm-fixed price PBL contract, namely the “ability to roll in bulletins and upgrades at relative light speed” and make improvements in months rather than years. Not all PBL contracts will have the complexity to use such an approach, and not all complex systems can be measured with sufficient ease for such approaches to be meaningful. However, finding faster feedback mechanisms, particularly for the longer duration contracts, well suits PBL contracts and may be key to their achieving larger goals and maintaining support within the larger enterprise. This may become more important in coming years. As one government expert commented, the old rule of thumb about the time it takes to figure a system out, the duration of glory years, and then the decline of a system and rising cost “is becoming less becoming less and less akin to reality because of the need to integrate new technology into existing systems all the time.”

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<sup>119</sup> Assistant Secretary of Defense for Logistics and Materiel Readiness, “Product Support Manager Guidebook,” 31.

<sup>120</sup> *Ibid.*, 102.

<sup>121</sup> “Providing field service representatives at the operational or repair level enables contractors to see firsthand how the equipment is being used and allows for more responsive customer service” *Ibid.*, 97.

<sup>122</sup> See Preserving Cooperation in section 5.4.1 for more.

## Interview Questions

### *General expertise questions*

- What is your experience in negotiating/managing/operating under/studying PBL contracts?
- Could you list specific PBL contracts that you've worked with, and any others that you deem particularly worthy of study?
  - Have these PBL contracts been at the platform, system, sub-system, or component level?
  - In which domains have the PBL contracts you have experience with?
- What are the incentive structures that you have seen used in PBL contracts?
  - Can you help us access contracts or other sources that document the incentive structures?
  - Can you help us access performance and reward data for these incentive structures?
- What do you perceive to be the advantages and challenges associated with managing and operating under those incentive structures?
- What do you think differentiates an effective incentive structure from an ineffective incentive structure?
- (For those that have negotiated agreements) Have there been incentive structures that you've proposed that your counterparty objected to, or was hesitant to try? Why?
- Are there incentive structures that you believe would be effective that you have not seen tried yet? Why have do you think they have not been tried?
- Do effective incentive structures work universally?
  - If not, what factors regarding the product/service being acquired influence which incentive structures are most effective?
  - If not, what factors regarding the outcome being emphasized influence which incentive structures are most effective?
- Is there anyone else you'd recommend we speak with on these issues?

### *Specific case questions*

- What was your role in negotiating/managing/operating under/studying [this case]?
  - Can you help us access contracts or other sources that document the incentive structures?
  - Can you help us access performance and reward data for these incentive structures?
- What other PBL contracts have you had experience with?
- Are there any key characteristics or other aspects of [the case] that we haven't captured in our questions?
- Is there anyone else you'd recommend we speak with on these issues?

## Appendix B: Standard DIIG Methodology

### *Included Agencies*

This report tracks all contracting activity managed by DoD components with exceptions noted here. The civilian portion of U.S. Army Corps of Engineers contracting is also incorporated. However, contracts funded by the DoD but managed by other agencies, such as the General Services Administration, are not included except in budget-related charts where DoD *funded* contracts are explicitly referenced. Finally, in FY2013, the Defense Commissary Agency (DeCA) stopped reporting most of its contract obligations (approximately \$5 billion) into FPDS. Because this creates a significant data discrepancy that distorts trend analysis, CSIS has excluded DeCA from the dataset throughout the study period.

### *Data Reliability Notes and Download Dates*

Any analysis based on FPDS information is naturally limited by the quality of the underlying data. Several Government Accountability Office (GAO) studies have highlighted the problems of FPDS.<sup>123</sup>

In addition, FPDS data from past years are continuously updated over time. While FY2007 was long closed, over \$100 billion worth of entries for that year were modified in 2010. This explains any discrepancies between the data presented in this report and those in previous editions. The study team changes over prior-year data when a significant change in topline spending is observed in the updates. Tracking these changes does reduce ease of comparison to past years, but the revisions also enable the report to use the best available data and monitor for abuse of updates.

Despite its flaws, the FPDS is the only comprehensive data source of government contracting activity, and it is more than adequate for any analysis focused on trends and order-of-magnitude comparisons. To be transparent about weaknesses in the data, this report consistently describes data that could not be classified due to missing entries or contradictory information as “unlabeled” rather than including it in an “other” category.

The 2016 data used in this report was downloaded in February 2017; a full re-download of all back-year data was performed simultaneously. The sections below are specific to only those selected graphs or tables that posed additional technical challenges.

### *Competition*<sup>124</sup>

The study team followed DoD methodology and calculated competition by using two fields: extent of competition, which is preferred for contract awards; and fair opportunity, which is preferred for task and delivery orders under most indefinite delivery vehicles (IDVs). In the vast majority of cases, competitive status is classified for the entire contract duration. Thus, if a contract had a duration of three years and was competed for in the first year, it qualifies as

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<sup>123</sup> For example, William T. Woods’ 2003 report “Reliability of Federal Procurement Data,” and Katherine V. Schinasi’s 2005 report “Improvements Needed for the Federal Procurement Data System—Next Generation.”

<sup>124</sup> This section is adapted from Sanders, *Avoiding Terminations, Single-Offer Competition, and Costly Changes with Fixed-Price Contracts*.

competed for the entire duration. This also extends to single-award indefinite delivery contracts, which are classified based on whether the original vehicle was competed rather than consistently treated as only receiving an offer from the single awardee. However, for some other vehicles, such as multiple-award IDVs, the number of offers is instead tracked separately for each task order.

To better evaluate the rate of “effective competition,” the study team categorizes competitively awarded contracts by the number of offers received.<sup>125</sup> CSIS focuses on the number of offers for competed contracts because doing so reveals information about the request for proposals. A solicitation that only has a single respondent indicates some combination of three factors: thinness in the underlying market, a failure to notify or give adequate response time to potential competitors, or a contract that is unappealing to vendors.

The study team’s focus on the number of offers also has a basis in the regulation known as the Single Offer rule (DFARS 215.371), which addresses competitive acquisitions in which only one offer is received. This rule was rewritten in 2012 to add a policy section that shifts emphasis away from an analysis of whether the circumstances described at FAR 15.403-1 (c)(1)(ii) (determining adequate price competition) are present, and, instead, focuses on whether statutory requirements for obtaining certified cost or pricing data are met and if the price is fair and reasonable. The revised rule also emphasizes the need to extend the period of solicitation when only one offer is received in order to see whether a longer response period can elicit additional bids. Essentially, the new standard suggests that if you cannot get two bidders, you must evaluate whether proceeding with one bid can be done while protecting the interests of the government.

#### *Contract Initial Duration and Size*<sup>126</sup>

When contract initial duration and size become factors, the dataset used is limited to contracts reported in FPDS that were initially signed no earlier than FY2007 and completed by FY2013. Determining when contracts are completed is the most challenging portion of compiling the dataset. Contracts closed out or terminated by the end of FY2013 are included even if their current completion dates run into the next fiscal year. However, many contracts in both FPDS and the sample are never marked as closed out or terminated in the Reason for Modification field. In these cases, completion status is based on the current completion date of the most recent transaction in FPDS. This method could accidentally include contracts that have not reached their ultimate conclusion dates and are merely dormant. However, the FY2013 sample end date means that any such contracts would have to be inactive for an entire fiscal year, which is unlikely.

FPDS raw data are available in bulk from USAspending.gov starting in FY2000. However, data quality steadily improves over that decade and a half, particularly in the commonly referenced fields of interest to this study. In most cases, unlabeled rates topped out at 5 to 10 percent. The

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<sup>125</sup> CSIS defines effective competition as a competitively sourced contract awarded after receiving two or more offers.

<sup>126</sup> This section is adapted from Sanders, *Avoiding Terminations, Single-Offer Competition, and Costly Changes with Fixed-Price Contracts*.

critical exceptions are the “Base and All Options” and “Base and Exercised Options” fields, which report contract ceilings. Prior to FY2007, these fields are blank for the majority of contracts. When that field is not available, calculating the extent of ceiling breaches is impossible. In addition, this study classifies contract size by the original ceiling and not the total obligations, because the latter figure is dependent on contract performance.

Because key dependent and independent variables are not available prior to FY2007, the study team chose to set FY2007 as the start date rather than risk sample bias by including only those earlier contracts that were properly labeled. This restriction poses the significant limitation that no contracts of more than seven years in duration can be included, and five-year contracts are only in the study period if they started by October 1, 2007 or were closed out early.

This study uses changes in the Base and All Options Value Amount as a way of tracking the expected scope of a contract. The Base and All Options Value Amount refers to the ceiling of contract costs if all available options were exercised. The alternative ceiling measure, Base and Exercised Value Amount, is not used, because contracts are often specified such that the bulk of the eventually executed contract, in dollar terms, is treated as options. In these cases, the all-inclusive value provides a better baseline for tracking growth.

#### *Vendor Listings*

To better analyze the defense industrial base, the study team made significant efforts to consolidate data related to subsidiaries and newly acquired vendors with their parent vendors. This results in, among other things, a parent vendor appearing once on CSIS’s top 20 lists rather than being divided between multiple entries. The assignment of subsidiaries and mergers to parent vendor is done on an annual basis, and a merger must be completed by the end of March in order to be consolidated for the fiscal year in question. This enabled the study team to more accurately analyze the defense industrial base, the number of players in it, and the players’ level of activity.

Over the past seven years, the study team has applied a systematic approach to vendor rollups. FPDS uses hundreds of thousands of nine-digit DUNS (Data Universal Numbering System) codes from Dun and Bradstreet to identify service providers. A salutary benefit of this standardization is that FPDS now provides parent vendor codes. These parent codes track the current ownership of vendors but are not backward looking. Thus, a merger that happened in 2010 would not affect parent assignments in 2000. This prevents the study team from adopting these assignments in their entirety. The study team investigates vendors that receive either \$250 million of total contract revenue or more than \$1 billion in obligations between 2000 and 2016, no matter how much they receive in any individual year. We have reinforced these manual DUNS number assignments with automated assignments based on vendor names. Qualifying for an automated assignment by name requires three criteria: 1) that the vendor name that matches with the name of a parent vendor after standardization, 2) that the name has been matched to the parent vendor by the CSIS or the Parent DUNS number field, and 3) that there are no alternative CSIS assignments with that vendor name. This process is not immune to error, but it reduces the risk that a DUNS code is considered large in one year but overlooked in another. As an error-checking mechanism, the study team investigated contradictions by comparing our assignments

to those made by Parent DUNS numbers for every DUNS number with \$500 million in annual obligations or \$2 billion in total obligations.

## About the Authors

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