Reforming Acquisition: This Time Must Be Different

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June 2015

This research was partially sponsored by Lockheed Martin Corporation.

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Table of Contents

Executive Summary

The Department of Defense (DoD) has pursued acquisition reform for decades in an effort to address persistent cost and schedule growth across major programs. Although countless reforms have been proposed and implemented, headline-grabbing incidences of waste, fraud, and abuse continue to attract the attention of Congress and the American public. In light of emerging threats and increased budgetary pressure, problems within the defense acquisition system may grow deeper. The time to act is now. Failure to make needed changes will have lasting negative impacts on our armed forces and national security policies.

Defense acquisition can be viewed from four distinct perspectives: 1) what goods and services that are acquired, 2) how these goods and services are acquired, 3) who acquires them, and 4) from whom the goods and services are acquired. Over the course of several decades, reform efforts have been concentrated in one area, often to the exclusion of the others. While some reforms have had a meaningful impact, many others have proven transient. The fact remains that significant reforms must be made in each of these areas if the DoD is to achieve its objective: the rapid, affordable acquisition of systems, capable of meeting current and future challenges.

The current defense acquisition system is a product of decades of reform initiatives, legislation, reports, and government commissions. Major reform efforts began in earnest in the 1960s with Secretary of Defense Robert McNamara. His main reform efforts centralized control within the Office of the Secretary of Defense (OSD) and created the Planning, Programming, and Budgeting System (PPBS) for resource allocation. Throughout the latter half of the 20th century, each administration left its own mark on defense acquisition, focusing primarily on the acquisition process itself and DoD management. However, many ideas were recycled as various administrations shifted decision-making authority between the services and OSD, realigned oversight and accountability responsibilities, and altered the process (adding and removing milestones, phases, and so forth). Major changes in DoD acquisition management culminated with the Goldwater-Nichols Act of 1986. Based largely on the recommendations of the 1985 Packard Commission, Goldwater-Nichols codified the acquisition chain-of-command.

Following the end of the Cold War, and the subsequent military drawdown, the focus of acquisition reform shifted to requirements generation, the resource allocation process, and the composition of the acquisition workforce. Many of the 1990s reform efforts, led by Secretary of Defense William Perry, sought to streamline the acquisition process by 'buying commercial,' replacing costly 'military specifications' with commercial specifications. Indeed, many early reform efforts focused on the "how" (i.e. the acquisition process, its phases, milestones, and reviews). To this day, however, basic processes remain poorly aligned. For example, the requirements generation process is incongruous with the resource allocation process, resulting in

lapses in accountability and an erosion of the programming process. Additionally, there remains a lack of accountability with regard to programs' requirements stability and cost containment.

More recently, DoD has struggled to better align processes to mitigate the challenges posed by the acquisitions of IT and services, which now make up more than half of DoD's acquisition spending. At the same time, reliance on continuing resolutions (CRs) to fund the government has impacted the DoD acquisition process. For instance, the programming phase of the Planning, Programing, Budgeting, and Execution (PPBE) process has shifted from program offices to budget offices. In some programs, this shift has adversely impacted program performance.

Although defense spending increased drastically during the Global War on Terror and the wars in Iraq and Afghanistan, spending has declined in recent years with the withdrawal of most U.S. forces from the region. Accordingly, the most recent reform initiatives undertaken by DoD, Better Buying Power 1 and 2 have sought to "do more with less" by implementing affordable programs, increasing efficiencies, removing regulatory burdens, and empowering the defense acquisition workforce.

Despite these initiatives, cost and schedule growth continue. DoD's 2013 Performance of the Defense Acquisition System report noted that among Major Defense Acquisition Programs (MDAPs) initiated between 1970 and 2011, median cost growth for system development stood at 44% for Army programs, 30% for Navy programs, and 31% for Air Force programs. (USD[AT&L] 2013, 82).

Recent reform efforts have focused more heavily on what is acquired (e.g. commercial versus military-grade; modular "plug and play" systems vs. closed and/or platform-centric systems; low cost vs. best value), and who acquires it (i.e. the composition—number and skills—of the workforce that acquires the goods and services). DoD faces enduring challenges in both of these areas. For instance, DoD has struggled to reorient its acquisition criteria, too often contracting for goods and services on a low cost, as opposed to best value, basis. As for the workforce, it lacks a clear sense of empowerment given the "risk averse" culture that permeates DoD. Additionally, turnover in senior leadership has led to instability and the incapacity to sustain successful reform initiatives. Complicating matters, an aging workforce will see a wave of retirements in coming years, leaving an inexperienced workforce in its wake at a period in which fewer and fewer programs are being initiated, limiting the workforce's opportunities to gain valuable experience. Yet, this workforce must manage and lead increasingly complex hardware programs in addition to challenging information technology (IT) and services acquisitions.

Too often left out of the reform equation is the 'from whom.' In order to equip a fighting force capable of addressing the mission needs of the 21st century, DoD will need to rely on an industrial base that can develop and field cutting edge technologies quickly and affordably.

However, today as in the past, competition is limited to a small number of large domestic defense firms. Small domestic firms, commercial firms, and foreign firms face a multitude of barriers-to-entry. At the same time, unfavorable ownership rights with regard to technical data have deterred many commercial firms and small businesses from entering the defense market, limiting the DoD's access to cutting-edge and disruptive technological innovations available in the commercial market. For many non-traditional defense firms, the 'costs to play' are far too high; compliance with cost accounting standards, auditing burdens, and legal compliance with government regulations outweigh potential profits. Finally, import and export regulations limit DoD's ability to acquire high-quality goods from foreign firms, while domestic defense firms are barred from accessing foreign markets, limiting their revenues and, therefore, potential investment in DoD systems.

It is within this context that DoD must pursue meaningful reform. Given rising national debt service payments and entitlements obligations, reductions in national defense budgets may continue. At the same time, mission needs are continually evolving, thus requiring flexible and technologically-advanced capabilities. In order to retain our technological superiority, DoD will have to initiate increasingly complex, high risk, programs that are affordable. Clearly, the DoD must move beyond the mistakes of the past and adopt a comprehensive approach that tackles the underlying, and seemingly intractable, problems within the acquisition system. This time must be different.

Below, we provide the following recommendations, organized into the four categories described above: what is acquired, how it is acquired, who acquires it, and from whom it is acquired.

Note: Both the House and Senate were preparing acquisition reform provisions for the FY 2016 NDAA while we were in the final stages of drafting our report. Although we have noted their work, and some of our recommendations are similar to some of those proposed, we do not fully endorse any of their proposals since the legislation has not cleared the conference committee.

What is Acquired

- *Ensure requirements are stable and technically realistic.*

  Leaders, at all levels, need to carefully guard against the additive result from incremental requirement increases, known as "requirements creep", as well as the use of immature technologies.

- *Use cost as a requirement.*

  In a resource-constrained environment, the unit cost determines the quantity of systems that can be acquired. DoD should make unit cost a critical design requirement.

- *Reinvigorate DoD's Programming process.*

  As a result of continued budget uncertainty, programming decisions have effectively shifted from program offices to the budget office, and are made on an ad hoc basis to comply with appropriations. Reemphasizing the Programming process will provide a more strategic view of the Department's programs.

- *Establish a Program Management funding reserve through Congressional appropriation.*

  Regardless of how skilled a program manager is, there are bound to be situations over the development and production of programs out of their control that require additional funding. A mechanism should be established to give DoD the ability to address extraordinary circumstance adversely impacting one program, without directly impacting other programs.

How Goods and Services are Acquired and Supported

Next, we put forth a series of recommendations for how DoD can improve its tradecraft of services, IT, and mission equipment, along with strategies to reduce costs in lifecycle sustainment, and ways to recalibrate the relationship between contracting officers (COs) and program managers (PMs):

- *Realign lines of accountability as originally envisioned in the Packard Commission Recommendations and intended in the Goldwater-Nichols Act*.

  The first step would be to revise the "Charter of the Joint Requirements Oversight Council", to include the USD (AT&L) as a member and co-chairman of the JROC alongside the Vice Chairman of the Joint Chiefs of Staff (VCJCS). Additionally, DoD must clarify roles and responsibilities for service chiefs and reengage them within the acquisition process.

- *Increase the use of multi-year procurements.*

  Multi-year procurements enable contractors to optimize their workforce and production facilities, and to order long-lead components and materials more economically. The savings produced typically range from 5% to 10%.

- *Increase reliance on modular capabilities and open system architecture, but be aware of their limitations.*

  In the commercial sector, firms incorporate major functionality upgrades into existing platforms on a regular basis. The DoD must strive to approximate commercial acquisition processes, but even then, it must remain mindful of limitations. Often, reliance on a "responsive" or "flexible" architecture, or modular concept, inculcate the often false belief that difficult technical problems can be addressed at some future point in the development process.

- *Develop strategies to mitigate risk and improve performance in system-of-systems acquisitions.*

  DoD must improve the efficiency with which it develops, acquires, and fields complex SoS. This will require significant changes to DoD management techniques to address the challenges within SoS programs.

- *Improve tradecraft of services and information technology.*

  Today, virtually every task that is not an inherently governmental function is carried out, at least in-part, with contracted services. Moreover, buying services is very different than buying weapons systems, and this requires a review, and potentially the creation of new acquisition processes, training regimes, contract standards, and management structures.

- *Leverage the benefits of Public-Private Partnerships.*

  Public-private partnerships have proven benefits for DoD, especially in sustainment of major hardware systems.

- *Reintroduce Public-Private competitions for non-inherently governmental work.*

  "Competitive sourcing" (competition for work between government employees and the private sector) is one way for government to improve its effectiveness, reduce its costs, and thus mitigate the effects of extremely tight budgets.

- *Combine TRANSCOM and the Defense Logistics Agency to create a new Joint Logistics Command.*

  Creating a Joint Logistics Command would designate a single combatant command and therefore a single commander in charge of, and accountable for, logistics across agencies.

- *Work to shift balance of power between the Contract Officer's control and the Program Manager, to produce a more balanced, collaborative effort.*

Today, the balance of power between the program manager and contract officer, has shifted in favor of the often "risk averse" COs. As a result, the CO's often dictate contract types and terms to the PM, not taking advantage of all the flexibilities that are available in the FAR to make the best business decisions.

From Whom Goods and Services are Acquired

To address challenges in regard to the industrial base, our recommendations focused on two main areas; fostering a greater relationship and increasing communication with industry, as well as addressing barriers to entry; namely: unfavorable intellectual property rights, regulatory and accounting burdens, and import and export controls:

- *As budgets continue to shrink, the DoD must plan for ways to maintain the required industrial base.*

  The defense industrial base needs to be responsive to rapidly-changing requirements; have a strong focus on technology and innovation; offer lower-cost alternatives; and provide responsible management. DoD should develop an appropriate mix of incentives for the industry to embrace its vision and take the actions necessary to make it a reality.

- *Review and relax import and export restrictions to encourage greater participation in the defense marketplace by domestic commercial firms.*

  Import and export controls are necessary in some cases, in order to ensure the protection of American military technology as well as the health of the defense industry; however, the current system has significant flaws that negatively impact economic growth and national security. Correcting these issues requires a strong plan of action to revamp and re-imagine the control system.

- *Remove barriers from doing business with non-traditional, commercial defense contractors.*

  Advances in commercial information technology, telecommunications, logistics, software, robotics, materials, manufacturing, sensor, energy, aerospace, maritime, and other technologies and business practices continue to develop solutions that have potential military applications. For DoD to leverage these developments, DoD leadership needs to aggressively advocate for the acquisition of commercial technology and work to reduce the existing barriers.

- *Use Intellectual Property as an incentive for innovation.*

  There is a need to balance DoD's desire to seek broad IP rights to foster competition and provide efficient product support during a system's lifecycle, with commercial firms'

desire to profit from their investment in research and development. The rights to IP provide a strong incentive for firms to conduct research and innovate, providing them with a competitive advantage. DoD must do a better job in protecting the data rights and develop profit policies that reward commercial firms with a fair market value for their technical data, so that there are strong incentives to innovate.

- *Formulate clear rules to encourage and define appropriate communications with industry.*

  DoD needs not only to be able to have an open dialogue with industry regarding the technologies and capabilities available to them as the customer, but also to help guide industry towards researching and developing technologies and capabilities that DoD will be interested in, in future years.

Who is Responsible for Acquisition, and who does the Acquisition

Last, in regards to the acquisition workforce, we recommended a number of strategies to train and empower the workforce to shift from a "risk averse", strict compliance mindset, into a performance-oriented approach:

- *Improve the defense acquisition workforce.*

  The DoD's desired end-state for the acquisition workforce should be one that centers on the concept of the "smart buyer." The "smart buyer" is one who is value focused, and has the requisite technical skills and experience to ensure the DoD is buying the proper systems and services, in the appropriate manner. Considering 55% of the DoD' acquisition workforce has less than five years of experience, this must be addressed as soon as possible.

- *Increase stability for senior leadership.*

  To the degree possible, senior government leaders must ensure that there is program continuity, especially with key program leaders.

- *Empower and incentivize program managers to achieve higher performance in their programs.*

  DoD should develop incentives for high-performing PMs to maintain their current positions to increase program stability and accountability.

  The success of these reforms will hinge on the commitment of senior DoD leadership and Congress.

DoD's Better Buying Power initiatives represent a step in the right direction, however, more definitive action must be taken to overhaul the system, rather than continue to alter broken processes. Congress has also shown a new resolve in defense acquisition reform. Under the leadership of the new Chairman of the House Committee on Armed Services, Mac Thornberry, a joint initiative between DoD and Congress has begun to perform a comprehensive review of the defense acquisition system. While these developments signal progress, there is still much work to be done to create a defense acquisition system able to produce technologically-advanced, yet affordable, capabilities, and, on time to our warfighters, that are capable of fulfilling mission needs.

I. Introduction

Over the past fifty years, the DoD has carried out dozens of reform initiatives to improve its acquisition of goods and services. These have often come on the heels of acquisition commissions and reports of problems. The Packard Commission in the 1980s triggered a reorganization of personnel in the DoD acquisition system and numerous policy changes to combat significant waste in defense spending that occurred during the Cold War. Following the National Performance Review under Vice President Al Gore, and the Section 800 report in the early 1990s, DoD and Congress responded with a slew of reform efforts aimed at improving efficiency in defense acquisition.

Today, there is no single review or report compelling DoD and Congress to take action; however, there are a number of factors that, taken together, create a "burning platform" for change. These factors include continued budgetary pressure; an uncertain and increasing threat environment; rapidly-evolving technology, with an associated increasing complexity of programs; the continued cost and schedule growth of DoD's acquisitions; and inadequate numbers and skill levels of the acquisition workforce. Solving these problems will require dramatic and comprehensive reform efforts to ensure the future security of the United States.

Fortunately, for the first time in decades it appears that there is an opportunity to make the necessary reforms. Displeased with the pace of reform engendered by the DoD's series of Better Buying Power initiatives, the Senate and House and Armed Services committees have proposed more than 120 reforms for inclusion in the FY2016 NDAA aimed at reducing costs and facilitating greater innovation. However, some have expressed concern that the House's proposals do not go far enough, in that they address smaller, though no less crucial, challenges such as program micromanagement and burdensome reporting requirements. On the other hand, the Senate's reform proposals, though sweeping in scope, are centered on returning acquisition authority and accountability to the military services. The rationale is that by reducing oversight, the individual services can initiate smaller, more affordable programs to test new innovations (Bennett, Cavas,& Mehta, 2015).

Past reform efforts have been developed and implemented with the ultimate goal of identifying and delivering the necessary capabilities for warfighters to carry out their mission using available resources, while maximizing performance and reducing cost and schedule. Unfortunately, these efforts have mainly focused on major hardware systems acquisition. Besides resulting in an overly-regulated and complex milestone process, it is poorly suited for the acquisition of services and information technologies (IT), which currently make up well over half of DoD's acquisition spending. And, even though reform efforts have focused on major hardware systems, cost and schedule growth in these programs have continued into the 21st century, resulting in the cancellation of multiple high profile programs such as the Future

Combat System (FCS) and the Comanche Helicopter, following investments of billions of taxpayer dollars in each.

Fortunately, DoD and Congress have responded with a joint effort to study and reform the defense acquisition system. Such an approach is necessary given the sheer complexity of the issues at hand, and the fact that these issues cannot be addressed solely through actions within DoD, but require legislative support as well.

Given the challenges facing DoD, these reform efforts will need to focus on achieving program lifecycle affordability, investing in and empowering a new generation of the defense acquisition workforce, and revamping DoD's requirements generation and PPBE processes through actionable mechanisms to implement and sustain effective reforms. The joint DoD-Congressional initiative gives hope that despite the cultural, political, and financial barriers impeding effective defense acquisition reform in the past, real progress will be made this time. In this report, we seek to describe the many challenges and offer recommendations that we hope will inform this effort.

This report was completed by the Center for Public Policy and Private Enterprise under the leadership of our Director, Professor and Roger C. Lipitz Chair in Public Policy and Private Enterprise, Dr. Jacques Gansler, former Under Secretary of Defense (AT&L). In addition we received valuable guidance and support from a Senior Advisory Group (SAG) of former DoD officials. The group consisted of the following members:

- General James Cartwright (Ret.), former Commander, U.S. Strategic Command, and 8th Vice Chairman of the Joint Chiefs of Staff;
- Dr. John Hamre, former Under Secretary of Defense (Comptroller), served as the 26th Deputy Secretary of Defense, and current President and CEO of the Center for Strategic and International Studies;
- General Paul A. Kern (Ret.), former Commanding General of the Army Materiel Command, former President and COO of AM General, and current Senior Counselor with The Cohen Group;
- Deidre A. Lee, former Administrator of the Office of Federal Procurement Policy, former Director of Defense Procurement and Acquisition Policy, and current Vice President for Operations at the Fluor Government Group;
- William J. Lynn III, former Under Secretary of Defense (Comptroller), served as the 30th Deputy Secretary of Defense, former Senior Vice President for Government Relations and Strategy at the Raytheon Company, and current CEO of Finmeccanica North America and DRS Technologies, Inc.;

- Maj. General Jasper Welch (Ret.), former Assistant Deputy Chief of Staff for Research Development, and Acquisition, U.S. Air Force, and has served as an advisor to the White House Office of Science and Technology Policy, the Defense Science Board, the Secretary of the Air Force, and the Office of the Secretary of Defense; and
- The Honorable Dov S. Zakheim, former Under Secretary of Defense (Comptroller), Senior Vice President at Booz Allen Hamilton, and currently a Senior Advisor at CSIS.

Preliminary findings and recommendations were presented and discussed with the SAG in an August, 2014 meeting. At that meeting, the SAG provided feedback and additional factors to consider. The SAG then provided comments on the draft of the report.

Report Roadmap

This report will begin with a background discussing the factors driving the need for acquisition reform, including a brief review of some of the major events and reform initiatives in defense acquisition over the past half-century. The remainder of the report examines the challenges within each of four acquisition areas: what is acquired, how goods and services are acquired and supported, from whom goods and services are acquired, and who is responsible for acquisition and conducting the acquisition. Each of these sections will be divided into two parts, the challenges and our recommendations.

II. Background

Acquisition reform has been a high priority topic for decades. Today, the need for effective defense acquisition reform may be at its greatest given persistent cost growth across major programs and the emergence of new national security issues. Moreover, within the next few years, defense budgets will likely undergo drastic cuts as mandatory obligations continue to rise and sequestration leads to significant cuts to discretionary defense spending. In addition, mission needs are more complicated than ever, and they are rapidly evolving.

Technological superiority is a main strategic objective for the U.S. military; accordingly, DoD must have the ability to acquire highly complex and flexible capabilities in order to fulfill a wide range of mission needs, requiring a responsive and efficient process culminating in the affordable acquisition of superior products and services. Over the past six decades, Congress and the DoD have initiated many reforms to improve DoD's acquisition systems and processes. We summarize these briefly in the next section.

Summary of Previous Defense Acquisition Reform Efforts

Past trends in defense acquisition reform focused on creating, eliminating, and reorganizing the phases, milestones, and requirements of the acquisition process. There have also been major changes in the leadership and oversight of defense acquisitions. These reforms included creating of the Under Secretary of Defense for Acquisition, Technology, and Logistics (USD [AT&L]) position; redefining the acquisition chain of command within the services; and adjusting oversight responsibilities of major stakeholders within the process. One major element of reform that has been overlooked, at least until recently, is improving the acquisition workforce.

> *"We all know what needs to be done. The question is why aren't we doing it?"*
>
> David Packard, 1986

Recent reforms have shifted from an emphasis on the acquisition process itself to the reworking of the Joint Capabilities Integration Development System (JCIDS), requirements generation, PPBE, resource allocation, and various processes in order to improve efficiency and streamline acquisitions.

Defense acquisition reform began in 1958 with the Defense Reorganization Act, which gave the Office of the Secretary of Defense (OSD) more authority and oversight over the Army and Navy, and lead to the creation of the Planning, Programming and Budgeting System (PPBS). The next wave of reforms began a decade later under the leadership of Deputy Secretary of Defense David Packard, who brought his "management by objective" mantra from the commercial sector to DoD, reversing the centralized approach of Secretary McNamara.

Fast-forwarding to the 1980s, acquisition reform became a hot topic once again, as defense spending ramped up for the Cold War under President Reagan. The first set of reforms, the Acquisition Improvement Plan (AIP), sought a greater role for the Services in the PPBS, increased reliance on multiyear procurement (MYP), and more realistic budgeting. Congress also sought greater influence in controlling cost growth of major programs. The Nunn-McCurdy Amendment to the 1982 National Defense Authorization Act (NDAA) triggers congressional notification and review once a DoD program exceeds its planned cost by 15 percent. Cost growth of 25 percent may result in program cancellation.

As incidences of waste, fraud, and abuse within DoD came to light in the mid-1980s, President Reagan created the Packard Commission to study government procurement and DoD management, with many of their recommendations implemented in the 1986 Goldwater-Nichols Act. This landmark legislation established the chain of command for defense acquisitions; from the PM, to the Program Executive Officer (PEO), to the newly-created Service Acquisition Executive (SAE), to the new position of Under Secretary of Defense for Acquisitions (USD [A])—who was the Defense Acquisition Executive (DAE). The requirements generation process was also overhauled to include the Joint Resources Management Board (JRMB). The general consensus during this recent period of reforms was to make the defense acquisition system faster, cheaper, and more efficient by formalizing a new authority hierarchy. Following that theme nearly a decade later, Secretary of Defense William Perry spearheaded efforts within DoD to make commercial specifications the default requirements for acquisitions, replacing the preference for costly military specifications.

Further discussion and description of past defense acquisition reform efforts may be found in Appendix A.

Existing Problems

Despite all of these reform efforts, many of which made real improvement to organizations and processes, program cost and schedule growth have continued. Table 1 below notes a variety of studies tracking the cost and schedule growth of DoD's major systems. Generally speaking, cost growth has ranged from 30-87% for major programs, and has not shown any sign of improving.

This persistent cost growth can be traced to numerous factors, including over-optimism, estimating errors, unrecognized technical issues, requirements creep, and a lack of incentives to control cost, quantity changes, and schedule extensions. And, although these challenges have been studied and understood for decades, government initiatives have not been able to control costs. One need only look to the F-35 (Joint Strike Fighter), the DoD's largest quantity and most important aircraft program. The program acquisition unit cost for the F-35 (i.e., the cost of development and procurement amortized across the expected production run) has skyrocketed

from a design-to-cost target of $35 million each, to the initial cost estimate of $50 million per aircraft, to over $161 million (GAO, 2012).

Source	Sample	Findings
Fox, 2012	30 major programs in the 60's	38 ongoing programs in 1969 had cost estimates 50% higher than original
RAND, 1979	17 mature programs in the 70's	Mean cost growth was 34%, dollar weighted mean cost growth was 20%
RAND, 2006	46 completed programs from 1968-2003	Mean total cost growth, adjusted for quantity changes, was 46% from Milestone II baseline
RAND, 2008	35 completed programs	Total cost growth was 60%: 12.9% for requirements, 21.9% for quantity, 10.1% for cost estimate, 8.9% for schedule changes
2013 Performance of the Defense Acquisition System	MDAP Development Contracts (1970-2011)	Total median cost growth is 44% for the Army (97 programs), 30% for the Navy (146), and 31% for the Air Force (179)
2014 Performance of the Defense Acquisition System	Sampling of Development and Production MDAPs (2001-2013)	Mean cost growth for development: 48-87% Mean cost growth for production: 18-30%

Table 1. Studies Tracking Cost and Schedule Growth

Need for Achieving Affordable Programs

Affordability has a significant impact on military capability. In 1916, Frederick Lanchester (1916) theorized that the power of a military force is proportional to the square of the number of its units. In theory, then, a force of 15 pieces of artillery will have a nine-fold advantage (in terms of relative effectiveness) over a force consisting of five pieces. Even within the context of modern warfare, technical superiority cannot compensate for insufficient numbers of weapon systems. Or, as Vladimir Lenin is reported to have said, "quantity has a quality all of its own" (Dunnigan, 2003).

Yet, because affordability is not typically given adequate attention, DoD programs often must reduce planned quantities in order to stay within its planned budgets. The Air Force's latest air superiority fighter, the F-22 Raptor, suffered this fate. As costs increased, quantities were reduced, causing program costs (adjusted for quantity) to increase, which, in turn, triggered

further reductions in quantity. Originally, the Air Force planned to order 750 F-22s at a cost of $26.2 billion (Williams, 2002). Beginning in 1991, the Air Force reduced its order to 650 aircraft, then to 438 in 1994, and finally down to 183 in 2011. As late as 2006, the costs continued to climb from $361 million per aircraft, to $412 million per aircraft in 2012 (GAO, 2011c). In the end, the F-22 was not procured in the numbers required to replace the F-15s. Moreover, the F-22, although praised by DoD officials and pilots alike, included far fewer capabilities than originally planned.

New and frequent mission changes are fueling a greater diversity of acquisitions. At the same time, it is likely that the DoD will see significant budget cuts in the coming years. As the DoD adjusts to these reduced budgets, it will operate within a global security environment that continues to present a wide range of threats.

The Future Environment for Defense Acquisitions

Of all the changes that have taken place, the one with the greatest influence on the acquisition environment in the twenty-first century is the reorientation of the international security environment. In the 25 years since the fall of the Berlin Wall, the monolithic threat posed by the Soviet Union has been replaced by distributed and complex threats that have proven far more difficult to satisfactorily address. These threats include those arising from failed and failing states (which have resulted in civil wars, regional instability and humanitarian catastrophes), the growing proliferation of weapons of mass destruction; and expanding threats from global terrorist organizations. This volatile international security environment makes it difficult to project, with any level of confidence, the precise threats that the nation may face even five years from now.

As a result, the current environment is highly unpredictable. Future operations may include activity against global terrorist networks; preparations for potential peer or near-peer competitors, such as China, or Russia; missions related to maintaining security against weapons of mass destruction (WMD), including the pursuit of rogue nuclear states such as North Korea and Iran; and, finally, non-traditional national security challenges such as global pandemics, pirates in critical sea-lanes, cyber security attacks, natural disasters, or energy security dilemmas which could require DoD intervention.

In response, DoD has shifted from threat-based planning to an alternative approach centered on capability-based planning. Capability-based planning is believed to provide a more rational basis for making decisions on future acquisitions—making planning more responsive to uncertainty. The impact of these changes on DoD's acquisition processes has been significant, demanding quick, affordable responses to rapidly-evolving environments.

Shrinking and Uncertain Defense Budgets

Although the Bipartisan Budget Act of 2013 provided temporary relief for DoD in the fiscal years (FYs) 2014 and 2015, sequestration-level spending caps will return in FY 2016, and have been extended to 2023 as part of the compromise. According to the *Estimated Impacts of Sequestration-Level Funding* summary included in the DoD FY 2015 budget request, previous and future cuts to comply with sequestration-level caps will amount to $1 trillion from the President's FY 2012 ten-year plan (USD [C] 2014, 1-1). If DoD is unable to keep its spending below the mandated sequestration levels following FY 2016, the defense budget will be subject to automatic spending caps that will indiscriminately cut across the board (Figure 1). In such a short time, it will be impossible for any long-term reduction plans to take effect in time to reduce spending at the level required by the Budget Control Act (Murdock, et. al. 2012, 33).

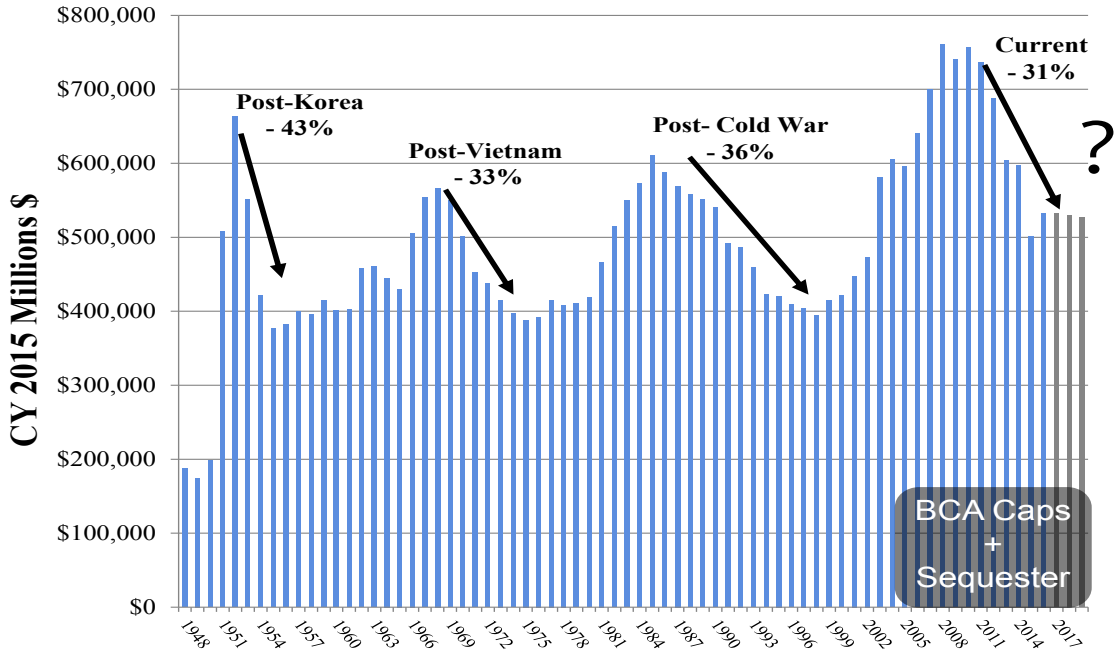

Figure 1. DoD Budget Trends in CY 2014 $. Based on Data from the National Defense Budget Estimates for FY 2015, Office of the Under Secretary of Defense (Comptroller) April 2014

Equally troubling as the overall decline in defense spending is the composition of defense spending. Research, Development, Test, and Evaluation (RDT&E) and Procurement accounts are easier to cut and accordingly are on the decline, while the operations and maintenance (O&M) and military personnel accounts are on the rise (Figure 2) due to increases in salaries, benefits, and health care for DoD personnel that are unlikely to be cut. Continued growth in O&M accounts is projected despite reductions in military personnel; due in part because there have been no corresponding domestic base closures. If O&M and military personnel costs

continue to rise at the rate they have over the past decade, O&M and military personnel appropriations will consume the entire DoD budget by FY 2024 (CSBA 2013, 4).

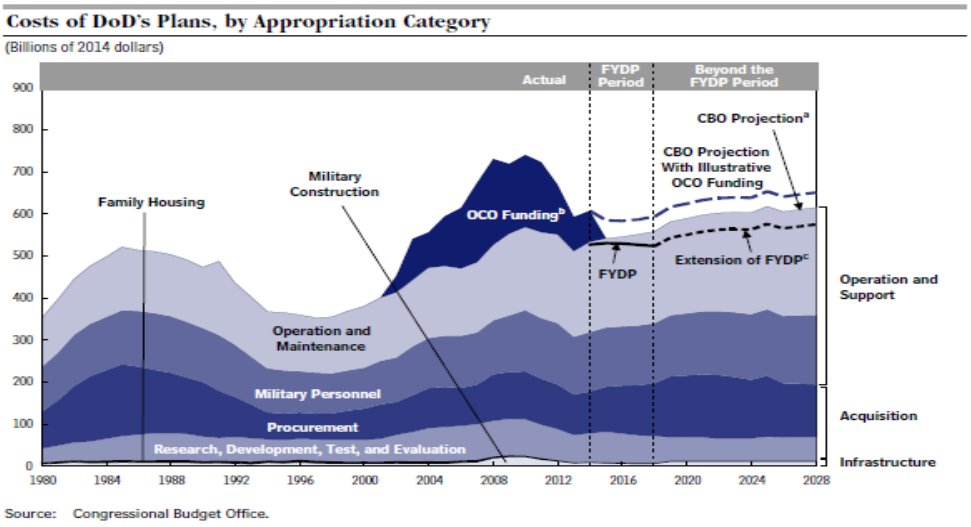

Figure 2 –Source: CBO 2013, 6

Changes to Mission Needs

The international security landscape is constantly evolving, and as a result, DoD needs flexible capabilities that can be suited for a wide range of mission needs. Acquiring modernized capabilities to respond to these new security challenges as they emerge is paramount to the United States' national security initiatives. With the high cost of developing cutting-edge technologies, however, there are key requirements and programming decisions to be made to ensure that taxpayer dollars are spent on the most cost-effective capabilities. Additionally, given the pace of technological change, a system may approach obsolescence shortly after, or even before, it is widely fielded. DoD needs to be able to acquire these new systems and technologies in a timely manner.

Rapidly Changing Technology

In 1965, Gordon Moore observed that the complexity of semiconductor components had doubled each year since the first prototype microchip was produced in 1959 and projected that the number of components per integrated circuit would continue to double approximately every two years. Over forty years later, despite skepticism that this trend would continue, the transistor counts exceed a few hundred million for logic chips, and even more for memory chips. Some have expanded Moore's Law to describe the exponential growth of technology in general.

In addition, the controlling and embedded software for these technologies continue to evolve on 12 to 18 month cycles, demanding a much more responsive acquisition system than

ever before. This trend of accelerating technological change will continue to have a critical impact on warfighting and weapon systems, as the military develops applications based on these new developments, including advanced information technologies, quantum computing, nano-technologies, bio-technologies, and robotics.

Furthermore, in an effort to leverage the advances of the information revolution, DoD adopted a doctrine of "net-centric warfare." The goal was to use extensive systems networking from widely-distributed "sensors to shooters," creating shared situational awareness, thereby enabling collaboration and improved speed of command. To facilitate the greater level of integration that NCW required, an innovative DoD acquisition strategy arose: system-of-systems (SoS) development. SoS views the constellation of military assets in an integrated and coherent way—as a complete, interconnected system. The *Defense Acquisition Guidebook* (Defense Acquisition University, 2011) defines a SoS as "a set or arrangement of systems that results when independent and useful systems are integrated into a larger system that delivers unique capabilities" (1.4). These new capabilities can be derived from the integration of new systems, legacy systems, or a combination of both.

In general, DoD systems are designed, developed, procured, managed, reviewed, budgeted, and supported on an individual basis. This acquisition structure is becoming increasingly problematic in today's environment. For example, the historic development of single platforms (e.g., ships, aircraft, etc.) has placed a premium on performance—producing the best weapon system attainable—as opposed to considering the potentially complementary capabilities of other systems in the DoD arsenal or those under development.

Identifying and Defining Challenges to Defense Acquisition Reform

Based on our research and input from the SAG, we identified challenges to defense acquisition reform. Although the challenges we identified and discuss herein range from politics to DoD culture, we have organized them under our four-part framework: what is acquired, how goods and services are acquired and supported, from whom goods and services are acquired, and who is responsible for acquisition and who does the acquisition. These four areas comprise the next four sections of the report. Within each section we provide a brief introduction and discussion of the appropriate challenges, followed by the corresponding recommendations.

First, we will explore the challenges surrounding what is acquired. We discuss the requirements generation and resource allocation processes that identify and pay for capabilities to fulfill mission needs. Next, we look at the challenges facing how goods and services are acquired and supported. Specifically, we examine contracting; acquisition strategies for equipment, services, and IT; and product support for major systems. We then examine the challenges encountered by firms from whom the DoD acquires goods and services, including "costs to play" concerns, and barriers to entry for small, commercial, and international firms that,

in effect, limit DoD's supplier base and its access to cutting-edge technologies. Last, we focus on challenges for who is responsible for acquisition, and who does the acquisition; the acquisition workforce, program management, and senior DoD leadership that have a large stake and role in the defense acquisition system.

At the end of each "challenges" section will be a corresponding set of recommendations based on the challenges discussed and input from the SAG. The recommendations encompass a range of actions from those that may be implemented immediately by DoD, to those that would require legislative action. Aside from the statutory or regulatory changes that these recommendations may require, our recommendations also require a sustained commitment from the leadership within DoD, as well as formal mechanisms to ensure their adoption. These may be the biggest obstacles as some of the recommendations have been previously identified or have consensus support, but have lacked leadership willing and capable to ensure their implementation. These recommendations will help DoD to fulfill its needs to do more with less, respond much faster to a changing threat environment, and maintain technological leadership. Following the last section of recommendations is a brief discussion of the barriers DoD will face in implementing successful reforms.

III. What is Acquired?

For defense acquisitions, the first steps in the acquisition process are the "requirements" generation, and the resource and allocation processes, JCIDS and Planning, Programming, Budgeting and Execution (PPBE)[1]. In order to deliver the required systems, in a timely manner, and within the allocated budget, the requirements, acquisition and resource processes must all be closely integrated. Each process relies on a variety of actors to identify current and future mission needs, potential solutions to fulfill those needs, the development of a specific solution's requirements, and the metrics to evaluate the outcomes.

Congress worked to simplify and streamline the management of defense acquisition with the passage of the Goldwater-Nichols Act. However, many believe that as a consequence (perhaps unintended), uniformed military leaders are too far removed from the acquisition process. As a result, there is a pronounced disconnect between the evaluation of the military's needs and the technical feasibility and resources that will be required. This is unfortunate given that it is well known that the best time to reduce life-cycle costs is early in the acquisition process when there is the greatest room to maneuver in the cost, schedule, and performance trade-space, effective coordination between requirements generation and resource allocation is absolutely necessary to develop (Land, 1997). In fact, according to Newnes et al. (2008), "50-70% of the avoidable costs of a product are in-built within the concept design stage" (100). In effect, lifecycle costs are in large part determined by the requirements of the system. Accordingly, it is during the requirements generation phase that system modifications should be made to achieve the desired balance between cost, performance, and schedule. Thus, effective coordination between requirements generation and resource allocation is absolutely necessary to develop effective, affordable programs.

Challenges

Requirements Generation

Determining the requirements for the development and production of a weapon system has huge implications for lifecycle costs, as well as the schedule and performance of systems, see Figure 3. Due to the current security environment, constant changes to mission needs lead to requirements uncertainty throughout the process. In addition, there is not enough accountability through the requirements generation process to ensure the ultimate requirements are loyal to the

[1] Execution was added to PPBS. During the execution phase, program metrics developed throughout the process now help measure actual output versus expected performance.

intentions of the Joint Requirements Oversight Council (JROC)[2] when the program was initiated. With the way the system now works, the JROC essentially hands-off the requirements after the conclusion of the JCIDS process, but not before development is complete, allowing for significant changes that will have major cost, schedule, and performance implications that may conflict with the original intentions of the JROC. In his draft of the acquisition reform bill, Mac Thornberry, Chairman of the House Armed Services Committee, expressed concern that systems engineering and tradeoff analyses during requirements generation are insufficient to prohibit requirements creep. DoD also does not weigh operations and sustainment costs strongly enough in early engineering tradeoffs, creating expensive logistical challenges later in the lifecycle of systems. In addition, because Congress often changes the program's budget (for political reasons) this frequently changes the "requirements" (that the military establishes) such that the program is no longer affordable.

Decisions made in determining program requirements have major implications for the cost of the system over its lifecycle as seen in Figure 3 below. However, DoD fails to use commercial best practices that make "unit cost" a critical requirement, limiting DoD's ability to develop affordable requirements (including required quantities) for its programs.

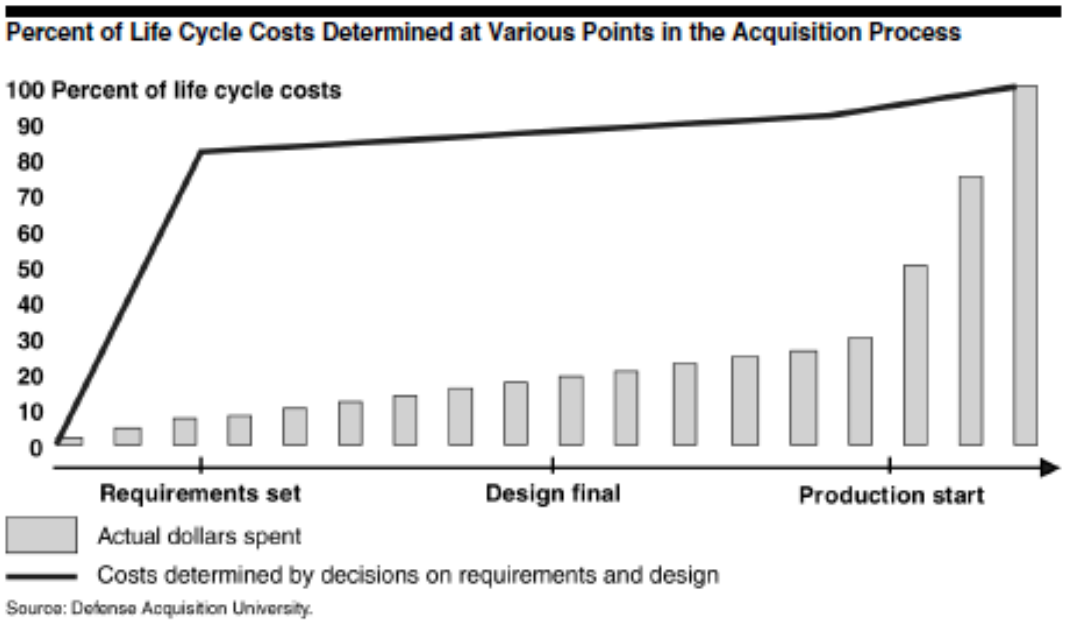

Figure 3. Determination of Life Cycle Cost. Source: Defense Acquisition University

[2] The JROC reviews programs designated as JROC interest and supports the acquisition review process in accordance with Title 10 U.S.C. 181. The JROC accomplishes this by reviewing and validating all JCIDS documents for Acquisition Category I and IA programs, and other programs designated as high-interest.

Thus, DoD needs to perform extensive tradeoffs in requirements generation between cost, schedule, performance, and lifecycle costs. This also applies to IT acquisitions. Since technological cycles are about 18 months for software, DoD needs to ensure that requirements are structured to allow interoperability as new software and technologies are matured that can be incorporated into IT systems to reduce costs and achieve higher performance over the lifecycle.

Additionally, requirements can go a long way in mitigating technical risk. As mentioned earlier, most of a system's life cycle costs are determined by its requirements. If the requirements rely on immature technology, risk and costs increase. Risk is also significantly increased when immature technologies, on multiple systems, are integrated during development. A Government Accountability Office (GAO) study found that "technology maturity is an important indicator of whether sufficient early acquisition planning and analysis has been conducted," finding that when mature technology is incorporated early in the development process, a program can more reliably meet cost and schedule estimates (GAO 2010, 3).

The best time to reduce risk is during the Technology Development phase ending at Milestone B (DAPA 2006, 49). However, immature technologies are, at times, still incorporated beyond that point, which leads to technical problems in Engineering and Manufacturing Development (EMD). This also impacts DoD's ability to achieve affordable programs. Rather than evolving system requirements, often relying on immature technologies, DoD should develop requirements that rely upon mature technologies for critical elements, and use open systems standards that allow for integration of new technologies to maintain a technological edge, focusing on affordability, and schedule demands.

Once new requirements are implemented they are often not evaluated or analyzed to measure the effect that they have on the existing program. Then-Air Force Vice Chief of Staff, General Philip M. Breedlove, discussed these issues in the context of the development of the long range bomber, stating that "[I]n a short period there were so many additional items hung on the platform that it was quickly unaffordable. The requirements document had grown to over 1,000 pages" (DBB 2012, 14). The program was eventually approved, but only after an abbreviated requirements document was negotiated between senior officials.

As General Breedlove stated, adding on requirements can quickly make a program unaffordable. Unfortunately, OSD, the services, and the JROC do not have an adequate modeling capability to determine the cost, schedule, and performance impacts of program tradeoffs to offset the desire for additional requirements. Additionally, a 2011 GAO report found that the JROC had an insufficient role in determining program tradeoffs (GAO 2011, 23). Analysis of Alternatives (AoA) was identified as the point in the acquisition process when the majority of tradeoffs are made, however, the JROC is only able to provide input for the Initial Capabilities Document (ICD), which needs approval before the AoA, and for the Critical Capabilities Document (CCD), which is evaluated during the Technology Development phase (GAO 2011,

12). This is problematic, as the JROC has limited influence over what technologies are developed and changes in requirements, beyond the JCIDS process, creating an accountability gap.

Requirements also have an impact on contracting. Fixed-price contracts are the preferred contract type, as long as the conditions are appropriate, as they shift risk from the government to the contractor and incentivize contractors to keep their costs low. Fixed-price contracts however, are generally ineffective during program development when requirements are unstable. In these cases, contractors often underbid to win contracts, assuming that they can readjust their bid to earn a fair price when requirements are inevitably changed. This is known as requirements creep, i.e. when requirements are altered that change the scope of the program (sometimes also referred to as "gold plating", in which non-value added requirements are added to a program). Both these phenomena may occur when unit cost is not a requirement, and the resulting requirements instability in both cases hampers DoD's ability to achieve affordable programs.

Planning, Programming, Budgeting, and Execution System

Due to limited resources and a multitude of capability needs, DoD must have planning and programming activities capable of balancing competing interests and priorities for the best use of those resources. In order to do this, DoD uses the PPBE process, which "Seeks the most effective mix of forces, equipment, manpower, and support attainable within fiscal constraints" (USD [C] 2013, 2). The first phase of the PPBE process, planning, analyzes the needs of combat commands and supports DoD by analyzing the various mission needs of the force and identifying capability gaps, based on the Quadrennial Defense Review and National Military Strategy, which define our national defense strategy and outline plans for force structure and modernization (Dale 2014, 2). Following the planning phase is programming, in which programming objectives are developed and proposed to build a force capable of performing the mission needs, outlined in the planning stage (Schwartz 2010, 5). Issues from the planning process carry over into programming because of the lack of a single platform that incorporates mission needs, funding, development, and operations and maintenance planning. Because the decision making behind each of these components is conducted separately, it provides an additional challenge for decision makers.

In recent years, the integrity and effectiveness of the programming process has eroded. The SAG attributed this largely to the budget uncertainty and the use of continuing resolutions (CRs) over the past few years. As a result, programming decisions have effectively shifted out of program offices and into the budget office to make changes each year based on budget limitations. The programming phase was originally envisioned as a process to analyze competing programming options to guide multiyear programming objectives (Jones and McCafferey 2005, 6). DoD Directive 7045.14, defining the PPBE process, highlights the importance of execution reviews that "assess actual execution performance based on goals and strategic objectives," and

directs that, "recommendations from these reviews shall be linked to decisions on future resource allocations," (USD [C] 2013, 2).

Difficult Programming Decisions

DoD must also make difficult decisions during programming in regards to modernization of existing programs versus starting new programs, complicating the PPBE process. The mine-resistant ambush-protected vehicle (MRAP) program during the Iraq War illustrates this dilemma. During the Iraq War, improvised explosive devices (IEDs) became the weapon of choice for Iraqi insurgents causing 50-80% of deaths from 2005-2008 (Christopher Lamb Testimony, 13). DoD's immediate solution was to procure more armored Humvees and to add armor to those already produced. This was quickly seen as ineffective, and by late 2003, Army and Marine commanders were requesting MRAPs, which were recognized as an effective vehicle to counter IEDs and appropriate for irregular warfare that characterized the fighting in Iraq. However, it was not until 2006 that the MRAP requirements process was approved, and not until November 2007 that the MRAPs finally made it to Iraq, following intervention from Secretary of Defense Gates. The MRAPs had a significant impact in theater. In the first year MRAPs were deployed in Iraq the percentage of U.S. casualties from IEDs dropped from 60% to 5% (Christopher Lamb Testimony, 17). Despite the success of the program, it exemplifies many of the challenges in programming.

The MRAP program came at a very high cost to produce a capability best suited for irregular warfare, rather than counter-insurgency; the latter being more important in our current security environment. MRAPs also have very high logistics costs in terms of their transportation, fuel costs, and maintenance since there are many different versions of the vehicle. Last, the decision to buy so many MRAPs took funding away from the Humvee Replacement program and the Joint Light Tactical Vehicle, the reason for resistance to the MRAP in the first place, which are better strategic options for future mission needs. This shows the complexity in programming, especially in tradeoffs between short-term upgrades and long-term modernization efforts, as well as considerations of manpower in developing materiel programming solutions.

The SAG suggested that the programming process is currently ineffective because it is done on a transactional rather than strategic basis, as it was intended. They believed that as is, Cost Assessment and Program Evaluation (CAPE) does not have the capacity to perform independent program reviews; and even if those were performed, DoD lacks mechanisms to implement the findings of those reviews into future programming decisions. Additionally, programming suffers from too much advocacy from stakeholders, that is, too many new programs are started, decreasing funding for existing programs to balance the budget (Fox 2012, 190). With the absence of an effective programming process, these issues will persist.

The next part of the PPBE process is the budgeting phase. Within DoD there is competition between the Services for a greater portion of DoD's overall resources. Due to resource constraints, the budgeting process allocates resources proportionally, rather than strategically, to the Services, creating a mismatch between priorities and programs (GAO 2006,

25). Further, budgeting is complicated by the 'color of money' of appropriations. DoD is limited in its ability to strategically allocate resources across its appropriated accounts; RDT&E, procurement, O&M, and personnel. Since major programs are allocated various amounts within each budget category, PMs are limited in their ability to use the total resources of the program in the most efficient manner possible; leading to waste or cost growth. This limits DoD's ability to employ best business practices in acquiring major systems. 'Color of money' limitations are further complicated by the milestone-based acquisition process, as funds for development are used to develop the product as far as possible with the limited resources available up to Milestone B. In the long-term, it is more efficient to invest more in development to reduce operations and sustainment cost, but as a result of the 'color of money' limitations, this cannot be achieved.

As mentioned previously, the execution stage of PPBE is responsible for evaluating program performance; however, that role has been diminished in recent years. Although the CAPE office reviews programs, its findings are often not incorporated into future programming decisions. Additionally, the SAG expressed concerns that CAPE lacked the capability to perform truly independent program performance reviews in the first place and did not have enough of a strategic role in the process by providing a comprehensive analysis of programming options.

Recommendations

Recommendation 1: Ensure requirements are stable and technically realistic.

Leaders, at all levels, need to carefully guard against the additive result from incremental requirement increases, known as "requirements creep". Ineffective control of requirements changes (i.e., adding, deleting, and modifying a system's requirements during the development process) leads to cost growth and program instabilities. Reliance upon immature technologies may also have the same effects.

These requirements changes generally have an impact on several constituent systems. More problematic still is that the precise nature of the impact often cannot be anticipated (from a technical, schedule, or cost point of view). At best, several subsystems must be modified to compensate for, or otherwise facilitate, the modifications to other sub-systems as they occur. Of course, each time a modification is made, thorough simulation and testing is required. At worst, if the change is fully integrated, serious system-level challenges may result. Individual technologies may have the same adverse impacts, when they either do not mature in time or necessitate requirements changes because they are realized as impractical given cost and schedule parameters. Failure to mitigate this technical risk early in the process has grave implications for schedule growth, especially in systems-of-systems (SoS) programs.

The problem is two-fold. On the one hand, the process by which requirements are generated and approved may not fully consider the impact to the development program's cost

and schedule. High levels of requirements volatility extend development, and, as a result, long-duration programs are viewed as works in progress that often fail to deliver the functionality initially envisioned. On the other hand, ignoring requests for necessary requirements changes early in a program can cost significantly more to remedy once the system has been fielded. Consequently, failure to aggressively monitor and manage a system's requirements increases the development time and cost. Consideration should be limited to technologies that are realistic and feasible for cost and schedule baselines during requirements generation. Further, there should be strict criteria that prohibit programs with critical technologies that are immature, based on the Technology Readiness Assessment (TRA), from entering the EMD phase.

Recommendation 2: Use cost as a requirement.

In a resource-constrained environment, the unit cost determines the quantity of systems that can be acquired. DoD should make unit cost a contract requirement and, therefore, a critical design requirement. Moreover, in addition to schedule and performance, cost should be explicitly represented within the trade space; rather than merely designing to cost, program leadership would have the flexibility to trade higher performance for lower costs provided that the objectives of the program were maintained. It is important to recognize that "Lanchester's Law" states that: total force effectiveness is proportional to individual weapons effectiveness times numbers squared; so numbers are critical! Therefore, today unit cost is a "critical military requirement," given the shrinking budget.

Thus "target costing", as is used in the commercial sector, makes unit cost a critical design requirement, which ensures that non-value added requirements are not added. It is widely used by commercial firms throughout the developed world. Whereas cost traditionally has been considered an outcome of product development, target costing treats it as an input. Target costing promotes creativity and new ways of thinking to increase performance while discouraging the inclusion of non-value-added functions, producing higher quality products, at lower costs (e.g., personal computers, smart phones, and automobiles). Too often, the perceived uniqueness of the defense market is used to justify relaxed policies with regard to cost control. However, the commercial sector's experience indicates that holding fixed the required cost of a product is not only a possibility, but a preferable strategy in today's competitive market.

The success of target costing in the commercial sector relies on a series of proven practices, including: (1) reliance on cross-functional development teams; (2) adherence to incremental product development; and (3) the use of pre-manufactured components and subcomponents. These practices, and the structures that enable them, exist within the DoD, however, they are often used inconsistently.

Recommendation 3: Reinvigorate DoD's programming process.

The programming phase of the PPBE process is intended to develop a balanced set of programs that respond to the guidance and priorities of the Defense Planning Guidance, within the nation's fiscal constraints. When completed, a comprehensive description of the proposed programs, including a time-phased allocation of resources (forces, funding, and manpower) by program, projected five years into the future is produced. However, as a result of continued budget uncertainty, programming decisions have effectively shifted from program offices to the budget office and are made on an ad hoc basis to comply with appropriations. The focus of the programming stage needs to be long-range and strategic, and not transactional. Moving forward, DoD should add an "E" to the PPBE process for "evaluation;" requiring the collection, and review of performance information, so that it can be used to inform programming decisions. This would require the development of standardized metrics that define "value" in defense acquisitions that include, but are not limited to, the considerations of acquisition cost, schedule, technical performance, and lifecycle costs. Then, in order to adapt a greater strategic role, CAPE should perform analyses on varying program decisions to determine their impact on future outcomes. These could then be used to make tradeoffs between alternative programming strategies.

Finally, OSD should embed unallocated margins within off-year budget requests, so that adjustments can be made as the program transitions to the current year, to accommodate unanticipated costs or circumstances. Without additional resources to manage this problem, DoD is forced to divert funds away from other programs, or draw from O&M accounts, in order to correct budget deficiencies. Embedding these margins would minimize concern, but would provide flexibility to allocate those funds where they are needed to stabilize a problematic program, without disrupting the entire budget.

Recommendation 4: Establish a Program Management funding reserve through Congressional appropriation.

Successful acquisition programs require accurate planning and stable budgets. Unfortunately, within the DoD, costs and schedules are generally optimistic and budget stability rarely exists. When the actual funding is less than the planned funding, work must be delayed or deferred, resulting in program disruption. Budget reallocations and shortfalls result in the purchase of reduced quantities and/or programs that are extended beyond initial schedule estimates. The end result is short-term savings—but the price is long-term cost and schedule growth. Further, variability between annual budget predictions and the ultimate budget authority makes program planning difficult. In order to prevent a vicious cycle wherein reductions in quantity lead to increases in unit cost, programs should ensure that there is an adequate management reserve (MR) budget. The MR budget is typically used by contractor program

managers to cover unknown problems that arise during development that fall under the scope of work.

Regardless of how skilled a PM is, there are bound to be situations over the development and production of programs out of their control that require additional funding. Creating a program management funding reserve, appropriated by Congress, and administered by the USD (AT&L), would give DoD the ability to address extraordinary circumstance adversely impacting one program without directly impacting another, or having to rely on O&M funds. This would provide DoD with strategic discretion on how to best allocate resources among programs experiencing cost growth, and achieve cost savings by providing programs' stability. Such a fund would likely be viewed as a 'slush fund' by Congress, therefore, the DoD must make a strong case to Congress for its adoption.

IV. How Goods and Services are Acquired and Supported

Most of DoD's acquisition reform efforts have focused on improving the process for the acquisition of major systems. Although most of these initiatives have had little impact on constraining cost and schedule growth, they have incrementally added regulations and oversight that have resulted in time consuming bureaucratic processes. This has not only had an adverse effect on cost and cycle times for major systems, but, more importantly, has slowed the acquisition of systems that are urgently needed by the warfighter to support of combat operations.

Furthermore, as the spending on services (now over 50% of total acquisition spending) and IT continue to increase, there is an immediate need to improve the DoD's tradecraft and processes for these acquisitions. And, since services are generally funded from DoD's O&M accounts, the department has a greater opportunity and flexibility to improve their acquisition.

Challenges

Continued Budget and Requirements Uncertainty

Acquisition strategies and planning are frequently undermined by fluctuations in program funding. Program funding is subject to Congressional changes on a yearly basis. These changes require shifting funding priorities in development and procurement of future programs, as well as sustainment and readiness of current programs. This impacts DoD's ability to execute efficient rates of production and provide accurate cost and schedule estimates. When funding for a given program is decreased, its schedule must be lagged, reducing production to less economic rates. Reducing quantities has the adverse result of increasing the cost per unit and provides far less value per unit to the taxpayer following high investments in development (CSBA 2011, 21). On the industry side, budget uncertainty makes business planning and supply-chain management difficult, leading to uneconomic outputs, research, and capital investments (HASC 2012, 78).

Congressional Influence on the Budget

The DoD budget is particularly challenging with regards to weapon system procurement because the budgets are enacted yearly, while development programs take multiple years to complete. Since weapon system procurement is discretionary spending, Congress debates appropriations levels and what is funded each year (Tyszkiewicz & Daggett 1998, 32). For example, funding to sustain current A-10 aircraft at $635 million and an amendment to prohibit its retirement was included into the 2015 National Defense Authorization Act that passed the House on June 20th. This came after DoD expressed its intent to retire the aircraft in favor of newer aircraft such as the F-35, which would save the Air Force $4.2 billion over the next five years (McLeary 2014).

Increasing Systems Integration and Complexity

DoD systems are generally still designed, developed, procured, managed, reviewed, budgeted, and supported on an individual basis. Although this acquisition structure, developed over the past half century, has produced some of the most advanced weaponry in the world, it has significant drawbacks. For example, the historic development of single platforms (e.g., ships, aircraft, etc.) has placed a premium on performance—producing the best weapon system attainable—as opposed to considering the potentially complementing capabilities of other systems in the DoD arsenal, or those under development.

With the advances in information technology and networking capability, these individual systems have been networked to create a system-of-systems (SoS)[3]. However, in this new SoS environment, DoD's legacy governance structure is a growing liability—not only must each DoD program's personnel have knowledge of other systems across the range of DoD programs, but they must also work to actively integrate these systems. Moreover, attempting to optimize each element of a SoS can, in fact, produce a suboptimal result.

For the majority of their history, the military forces have operated within their own domains (i.e., land, sea, and sky), and each Service has its own core mission, derived primarily from the environment in which it operates. As a result of the requirements generation process in place, the Services often acquire hardware systems lacking the interoperability necessary on the modern battlefield.

As a result, this equipment is frequently unable to support joint functions, such as intelligence, surveillance, and reconnaissance; nor adequately provide communication services (DSB 2009, 9). According to the former VCJCS, General Cartwright, as recently as the 2003 Iraq War, the Army and Marines were unable to communicate below the division level in operations as a result of each service procuring closed communications equipment without the necessary interoperability, limiting communications and coordination of ISR to support warfighters.

To transition our military into a next-generation fighting force, platforms and equipment must be integrated into SoS, providing greater flexibility, effectiveness, and efficiency. However, current governance structures do not adequately assess and mitigate the risks that occur within the SoS environment. The DoD is organized hierarchically; policies, regulations, and directives flow vertically, with few horizontal interactions. Moreover, authority is often segmented with different Services overseeing projects within their respective domains.

[3] "a set or arrangement of systems that results when independent and useful systems are integrated into a larger system that delivers unique capabilities." - Defense Acquisition Guidebook

High Cost of Sustainment

The DoD is one of the largest and most complex organizations in the world. DoD's budget dwarfs that of the world's largest corporation and it employs millions of people that operate worldwide. More importantly, the DoD spends approximately $200 billion on product support and sustainment, and maintains orders of magnitude of more inventory items than the largest retail corporations. The current "system" is largely an ad-hoc mix of government and industry, with little cost visibility or performance accountability, and does not perform to world-class standards for responsiveness, reliability, costs, personnel and visibility.

An integrated (end-to-end) system within DoD—a critical component of "world-class" commercial logistics systems—does not exist. In fact, to a large extent, the DoD continues to rely on traditional sustainment strategies. These are focused on conducting business transactions to procure parts and services, in an effort to ensure maximum weapon system availability. The military services has to estimate and compute the requirements, then procure, store, and when required, ship the necessary parts. As a result, DoD customers (military services and agencies) focus on ensuring that they have enough spare parts and inventory to meet any need or requirement (often referred to as a "just in case" system). This approach increases demand, creating larger than ideal inventories. A recent inspector general's report revealed that for some equipment, more than 10 years of spare parts had been ordered and were being stored on shelves at supply depots (Schwartz & Mosler, 2013). Needless to say, this approach has proven to be highly inefficient, with segmented accountability and control by various stakeholders (Combatant Commands, Services, Depots, Defense Logistics Agency, Defense Contractors etc.), each with individual requirements, restrictions, and priorities.

Additionally, with most military disciplines there are few sound commercial models. However, with respect to logistics transformation, many of the necessary tools and concepts have already been well proven in the commercial sector. Logistics costs are incurred during sustainment, when the majority of a major weapon systems' life-cycle costs are incurred. Although there are a number of mechanisms that can be used to reduce lifecycle costs during sustainment, reforms to do so are often limited by politics. Major political barriers-to-reform revolve around maintaining inefficient but politically important organic DoD depots. Legislative barriers to the efficient management of the DoD's depot operations includes Title 10 USC, Section 2464 that identifies core logistics capabilities to be inherently governmental; Title 10 USC, Section 2466 that requires "not more than 50% of the funds made available in a fiscal year to a military department or defense agency for depot-level maintenance and repair workload may be used to contract for performance by non-Federal Government personnel," regardless of effectiveness; and Title 10 USC, Section 2469 that requires the use of competitive sourcing for depot work valued over $3 million, but retains the 50/50 requirement set by Section 2466. Since military depots are a source of stable jobs and are funded through O&M resources, Congress has

little incentive to make changes to lifecycle sustainment strategies and logistics support even though they will achieve future cost savings.

In addition, public-private competitions pursuant to Office of Management and Budget (OMB) Circular A-76, which saved an average of 44% in baseline costs, and led to only 5% of DoD employees in competed positions being involuntarily separated, have been discontinued (Gansler and Lucyshyn 2004, 32). A-76 competitions are politically unpopular as they may shift work previously performed by public employees to the private sector.

DoD also needs to place a greater focus on lifecycle costs early in the development stages of the acquisition process. Open systems architectures that encourage innovation and allow DoD to harness technological innovation and leverage the benefits of competition in lifecycle sustainment for major systems, can help to reduce costs and improve performance over the lifecycle. Such system standards should be universally employed, however, large defense firms have resisted these attempts in order to restrict opportunities for commercial competitors, and because it continues "high-priced customer buying behavior," (DBB 2014, 12).

Inadequate Processes for Services and IT Acquisition

Services and IT now account for over half of DoD's acquisition spending, however, the vast majority of reform efforts have focused on major hardware systems. Acquisition of services can often be as complex, or more complex than, product acquisitions. There is much less regulation and Congressional influence over service acquisitions, which should give the DoD tremendous leeway in improving its approach. By law, acquisition of services must be done using performance-based acquisition (P.L. 106-398). While this should be the approach, absent the proper objectives, performance incentives, and performance measurements, performance-based acquisitions have not been effective. Additionally, the Department needs to do a better job of tracking its spending on services and measuring performance in those acquisitions. Mac Thornberry's draft of the acquisition reform bill attributed poor workforce and budget planning to the lack of data collected and analyzed for the acquisition of services.

IT is also vitally important to the management and business processes of the DoD. Recent major program failures have highlighted the challenges with designing and implementing IT systems. The challenges in IT acquisition are magnified by rapid innovation in the IT sector; thus requiring systems that can easy implement commercial-off-the-shelf (COTS) and government-unique IT software to remain effective and affordable. The DoD's goal is to acquire IT systems quickly and cost effectively. However, this goal is rarely achieved because the deliberate process through which the DoD acquires IT systems does not—and cannot—keep pace with the rapid development that is occurring in today's information age.

The DoD has made several revisions to its acquisition policies in an attempt to shorten the IT acquisition cycle-time. These revisions, however, consist of little more than changes to the

traditional acquisition model. Unsurprisingly, these reform initiatives have generally not had much impact—the time line for IT acquisitions remains incredibly long. A 2010 House Armed Services Committee (HASC) Panel on Defense Acquisition Reform found that the delivery of defense IT systems still requires between 48 and 60 months. Considering that commercial IT is on a 12- to 18-month upgrade cycle, it is often the case that the DoD's new IT systems are outdated—often by several generations—by the time they are implemented. Similar to services acquisition, IT acquisition presents many challenges and requires skilled personnel.

The long acquisition timeline is particularly problematic with regard to cyber security acquisitions. Because the associated technology advances so quickly, there is no acquisition cycle that is able to fully capture the most up-to-date product versions. It appears that cyber-related acquisitions must be exempted from existing acquisition regulations.

Major Failure in Defense IT Business Systems Acquisition

The Expeditionary Combat Support System (ECSS) program was terminated in December of 2012, having cost the Air Force $1 billion already, in the face of projections that the system would not be fielded until 2020 at one-fourth of its original capability (Mehta 2012). The ECSS was a logistics management system to replace the Air Force's business processes for resource management. In terms of size, the system would be replacing 420 existing systems and would be 28 times larger than any previous Enterprise Resource Planning (ERP) system. The ECSS program's size and complexity provided major technical and implementation challenges; ERP implementations in the private sector during the 1990s were often unsuccessful. From the onset, the program was plagued because its requirements contained ambiguous initial program descriptions and lacked defined benchmarks (PARCA 2013, 2-3). As a result, DoD did not have an understanding of its current, 'as is', business processes, or its intended, 'to be', business process under the ECSS, leading to cost and schedule growth (PARCA 2013, 33).

Unfortunately, in spite of the large share of the DoD budget going to logistics, its IT system is still not up to "world class" standards. For example, FedEx and UPS systems provide "total asset visibility," enabled by automatic identification technology. This technology allows logicians, managers, and users to identify parts and components and retrieve needed data at various points, or nodes, in the logistics supply chain. Moreover, the DoD lacks adequate inventory mobility; for example, one-third of the stored munitions and munitions at the Letterkenny Army Depot are obsolete; the Army lost track of $5.8 billion of supplies, between 2003 and 2011; and, per Vice Admiral Mark Harnitchek, the Director of the DLA, "[The Defense Logistics Agency in 2013] have about $14 billion of inventory for lots of reasons, and probably half of that is excess to what we need," (Paltrow 2013). Advanced logistics and ERPs are not the sole province of the private sector. Many government agencies, albeit smaller ones, rely on better systems. In fact, following the failure of the ECSS system (see box) and given the lack of world class logistics systems and ERPs across the DoD generally, it seems likely that the DoD will remain the only federal agency in non-compliance with the law requiring departments to perform annual audits (Paltrow 2013).

Contracting

Selecting the appropriate contract type and ensuring fair source selection are important components of the acquisition process, and critical steps in controlling cost and schedule growth, and incentivizing high levels of performance. This requires DoD to create acquisition strategies and sourcing criteria to identify the contractor best able to deliver the required capability, at the highest value to the government. Therefore, the focus for DoD program teams should be to design contracts that use available incentives, i.e. profits or contract duration, that align the contractor's objectives with the desired performance outcomes of the program. These objectives and incentives must be developed jointly by the Program Manager (PM), along with the Contracting Officer (CO). According to the SAG, however, COs often have too much influence on this process. They often dictate terms to the PM, even though PMs have responsibility for the performance of the entire program, to include the contract. Although the PM is officially in charge of the program, the CO is the only supporting team member that can question the PM's authority and decisions, based on the CO's responsibility to enforcing all applicable laws and regulations (often based on their interpretation). These interpretations, when too conservative, constrain the flexibility of the PM. According to the Defense Business Board, this is a result of the real or perceived pressure on achieving the lowest cost, rather than best value (DBB 2014, 13).

DoD also often employs inappropriate contract vehicles that are ineffective, given desired performance requirements. Although it can be difficult to structure contracts that incentivize contractors to provide or exceed the desired level of technical performance, it is clear that certain contract types, such as Lowest Price Technically Acceptable (LPTA) are insufficient and should only be used to source commodities or obtain clearly-defined services.

In the commercial sector, product development is market driven. Firms spend considerable sums in order to better understand what the customer is willing to pay for a product; a firm that adds extraneous features of little added value to the customer is punished in the market.

The defense market, however, is characterized by very few firms (in most sectors, simply an oligopoly of suppliers) and only one customer (i.e., a monopsony). Because weapons systems are contracted for in advance of their production, the contractor is generally not incentivized to translate the diffuse desires of the customer—in this case, the DoD—into an effective and efficient product. Rather, the DoD specifies requirements upfront, and in great detail. In fact, there is frequently a perverse incentive to "gold-plate" products by adding every desired feature, to include some of little marginal value. This is especially true within the context of complex product developments, where neither the DoD nor the contractor have full knowledge of the attributes and capabilities of the end product. Over specification and LPTA represent two extremes that should be avoided.

Chairman Thornberry's draft bill expressed concerns that LPTA is often used inappropriately, and asked that the Secretary of Defense take action to ensure that the trend did not continue. Likewise, the draft bill states that Indefinite Delivery Indefinite Quantity (IDIQ) contracting should only be used to acquire products for which there is no potential for technical advances. It is one thing to ensure the availability of boots, food, and munitions via IDIQ, it is quite another to rely on IDIQ to provide cutting-edge radios if its specifications were issued years earlier. When contracting strategies are used inappropriately, it leads to what the Defense Business Board calls "input-based-design", rather than "output-based-performance" requirements, serving as a barrier to achieving best value and acquiring new technologies (DBB 2014, 25).

DoD must also limit its use of concurrency[4] during system development, unless it can be proven to be cost-effective. Concurrency should not be used to shorten schedules for high-risk programs, but it has still been employed for programs such as the F-35 Joint Strike Force (JSF). Concurrency provides perverse incentives for the contractor, Congress, and DoD, since the contractor makes greater profits in production than for development, Congress does want to cut jobs created in production facilities, and DoD does not want programs cut, all of which are harder to do once production has started.

Recommendations

Recommendation 1: Realign lines of accountability as originally envisioned in the Packard Commission Recommendations and intended in the Goldwater-Nichols Act.

The first step is to revise the "Charter of the Joint Requirements Oversight Council", to include the USD (AT&L) as a member of the JROC and as co-chairman of the JROC, alongside the Vice Chairman of the Joint Chiefs of Staff (VCJCS). This will allow for an assessment of the requirements by the USD (AT&L) and will permit consideration of cost-performance trade-offs.

Additionally, DoD must clarify roles and responsibilities for Service Chiefs within the acquisition process. The current implementation of the Goldwater-Nichols Act removed the Service Chiefs from the acquisition decision process. Reengaging the Service Chiefs would help to improve the integration of the acquisition, requirements, and resourcing processes, as well as improve authority and accountability for DoD acquisition programs. Additionally, their increased authority would enable better cost, schedule, and requirements trade-off decisions, helping to ensure more executable programs. In order to ensure accountability, performance agreements need to be established with service chiefs and acquisition executives.

[4] Overlaps in the development and production of major weapons systems.

Recommendation 2: Increase the use of multi-year procurements (MYP).

For most programs, DoD uses annual contracting, i.e. where one or more contracts is awarded for each year's worth of procurement of the selected item. When DoD uses MYP, DoD instead uses a single contract for two to five years' worth of procurement of a given kind of item. Consequently, there is no need to exercise a contract option for each year after the first year. This enables the contractor to optimize its workforce and production facilities, and to order long-lead components and materials more economically. The savings produced typically range from 5% to 10%. DoD needs congressional approval for each use of MYP.

Recommendation 3: Increase reliance on modular capabilities and open system architecture, but be aware of their limitations.

In the commercial sector, firms incorporate major functionality upgrades into existing platforms on a regular basis. The accelerating rate at which new personal computers, smartphones, cars, and MP3 players appear on store shelves is as much a function of new technology (creating the demand for new capabilities) as it is the accumulation by industry of users' feedback and desires, the essential core of which is reflected in the design of the product. Once the two processes—user input and technological innovation—merge, an uninterrupted loop spurs ever increasing gains in efficiency and performance. Moreover, because development is incremental, commercial firms are typically well positioned to estimate costs. The DoD, for its part, cannot rely on these market forces, at least not to the same extent, because the customer base for each product is relatively small and systems have relatively long life cycles.

The DoD must strive to approximate commercial acquisition processes, but even then, it must remain mindful of limitations. Often, the failure to define the specific limitations of the available technology, and, instead, rely on a "responsive" or "flexible" architecture, or modular concept, inculcate the often false belief that difficult technical problems can be addressed at some future point in the development process. Striking the right balance is challenging.

Recommendation 4: Develop strategies to mitigate risk and improve performance in system-of-systems acquisitions.

Given the current and anticipated budgetary environment and the increased political pressure to reduce defense spending, the DoD must improve the efficiency with which it develops, acquires, fields, and supports complex SoS. Admittedly, SoS development and integration is complex and more abstract, however, given the number of organizational permutations that are possible, it is impractical to develop a single governance model. Nevertheless, many program-level functions (e.g., systems engineering, logistics, and test and evaluation) must also be performed at the level of the SoS to ensure the appropriate level of integration. An integrating management function must be established to manage requirements

and budget allocations, since changes in one system will potentially impact the other systems. This group would be tasked with coordinating these functions. As the SoS evolves, and requirements change, ensuring systems integration becomes critical. The management structure must decide on which element(s) of the SoS should be modified, and how those changes are to be resourced.

Recommendation 5: Improve tradecraft of services and information technology.

Contracts for services are essential to all aspects of military operations and support missions that range from routine base operating support, to highly skilled analysis, to direct support to battlefield operations. Contracts for services support major DOD programs and their associated administrative, technological, and logistics services are a strategic component of the expanding expeditionary military, stability, and reconstruction operations. The reductions in the numbers of uniformed personnel, coupled with today's demanding and uncertain requirement for military forces have resulted in the expansion of services contracting to over 50 percent of the DoD acquisition budget. Today, virtually every task that is not an inherently governmental function is carried out, at least in-part, with contracted services. Moreover, buying services is very different than buying weapons systems, and this requires a review, and (potentially) the creation of a new, acquisition processes, training regimes, contract standards, and management structures.

Additionally, information technology (IT) offers inestimable capability and has been leveraged extensively by the Department of Defense (DoD) to build national security systems, business systems, and virtually all of today's weapon systems. As the DoD continues to transform its forces and business systems to meet the challenges of the 21st century, it will continue to rely on the increased functionality that IT delivers, even as its cost decreases.

Multiple independent studies of the government's IT acquisition process have been undertaken in in an effort to identify ways to improve its overall effectiveness, and although some have focused directly on the DoD's IT acquisition, others have sought to address the more general, government-wide challenges. There are a series of initiatives that will allow the DoD to enhance the speed and efficiency with which it acquires its defense business systems. These initiatives include evolutionary development; smaller, quicker to deliver, useful sets of capabilities; rapid delivery; the greater use of COTS products; the aggressive use of prototypes and demonstrations; continuous and integrated testing; decentralized execution; the inclusion of end users; and enhanced competition.

Recommendation 6: Leverage the benefits of Public-Private Partnerships.

Public-private partnerships have proven benefits for DoD, especially in sustainment of major hardware systems. DoD should examine internal solutions that incentivize the use of public-private partnerships as well as leadership and training opportunities for its workforce to identify and implement successful public-private partnership agreements. Additionally, Congress

should reexamine the statutory language regarding 'core capabilities' and the '50-50 core' law to allow for greater cost savings in military depot work.

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

Partnerships can also provide built-in surge capability that might not be readily available otherwise. Most importantly, partnerships improve day-to-day support responsiveness by applying the best of organic and commercial capabilities to the support requirement.

Recommendation 7: Reintroduce Public-Private competitions for non-inherently governmental work.

"Competitive sourcing" (competition for work between government employees and the private sector) is one way for government to improve its effectiveness, reduce its costs, and thus mitigate the effects of extremely tight budgets. As a result of the competition, depending upon who wins, the competed functions can be performed by either in-house government employees, or contractor personnel. Operations-support functions, such as catering, aircraft maintenance, logistics, publishing, printing, and a host of other fields in which the public sector duplicates private sector activities, are good candidates for competitive bidding between public agencies and the private sector. The goal of competitive sourcing is not to move all those functions into the private sector, but to shift from an environment where government is the monopolistic provider to one that encourages competition, increasing both effectiveness and efficiency.

Competitive sourcing has led to significant cost savings in the past for DoD, thanks to the benefits of competition. Congress should remove its ban on OMB Circular A-76 competitive sourcing to reap the benefits of competition for services, or at the very least, commission a study to reexamine the issue of public/private competitions and/or make recommendations to improve the OMB Circular A-76 process. To improve the effectiveness of this process, DoD should work to more accurately assess the indirect and overhead costs of the government employees so that fair and accurate judgments can be made.

Recommendation 8: Combine TRANSCOM and the Defense Logistics Agency to create new Joint Logistics Command.

Currently, logistics is fragmented between the Services, DLA, and TRANSMCOM; decreasing efficiency and accountability. Creating a Joint Logistics Command would designate a single combatant command and therefore a single commander in charge of, and accountable for, logistics across agencies. With the current approach, each agency involved with providing logistics support—DLA, TRANSCOM, service commands etc.—is only concerned with optimizing its segment, not necessarily the performance of the entire provider network. Even if the performance of certain elements exceeds expectations, the failure of other elements to attain their goals negatively impacts the operation of the system overall. Moreover, even if all the segments are optimized, the overall supply chain may be sub-optimized.

While the specific composition of such an organization could be seriously debated, a centralized Command responsible for global, end-to-end logistics management is necessary to oversee effective logistics transformation. This Command could potentially subsume the current USTRANSCOM mission, absorb the DLA, and would be supported by the Service logistics commands (to include their depots) as service components. The Service logistics commands, however, would retain their Service responsibilities and continue to perform these functions, as is the case with other Service component commands.

The Joint Logistics Command could also create clearly defined joint logistics processes, well-understood roles and responsibilities, and shared logistics command performance metrics that would enable logistics goals to be met across the DoD logistics enterprise. Finally, such a command would allow for a single commander that would be accountable for the end-to-end processes necessary to sustain the required force structure.

Recommendation 9: Work to shift balance of power between the Contract Officer control and the Program Manager, to produce a more balanced collaborative effort.

In accordance with the Federal Acquisition Regulations (FAR) 1.602, the CO is responsible for ensuring that all requirements of law, executive orders, regulations, and all other applicable procedures, including clearances and approvals, have been met. On the other hand, the PM is responsible for program success; integral in that is the responsibility for contract execution. As a result, the responsibilities of the two positions meet where contract execution and overall program execution intersect. The contract is the legal document that embodies formal agreement between the government and the contractor for the acquisition, for which the contracting officer is responsible. The program manager is responsible for program success and that, of course, includes contract execution. In many instances, the CO does not report administratively to the PM; however, the CO should still respond to the PM's programmatic and technical requirements. Because of these tensions, this relationship has a potential for conflict.

Today, the balance of power has shifted in favor of "risk averse" COs, and they often dictate contract types and terms to the PM, not taking advantage of all the flexibilities that are available in the FAR. While there are generally accepted contracting strategies, each acquisition program is unique, requiring input from the PM in developing the acquisition and contracting strategies, to ensure the requirements are met effectively, and provide the greatest value to the nation. To remedy this issue, DoD should establish a contracting center of excellence, as a resource for PMs and COs. When there is a difference in interpretation, the program officials could engage the center of excellence and get a definitive reading, so that the existing latitude within the FAR, and other governing policies, could be used. This will provide PMs 'executive support', when not using the most conservative interpretations, to make business decisions in the best interest of program performance.

V. From Whom Goods and Services are Acquired

The DoD relies on the defense industrial base to continue to develop affordable and technologically-advanced capabilities; however, DoD has failed to implement the proper incentives for high performance, cost control, and increased competition in the defense industry. As a result, the regulatory burden has induced high "costs to play" (high barriers to entry), and low profit margins, DoD has effectively created a defense industrial base conducive only for large, U.S. defense firms. These high "costs to play", in addition to unfavorable intellectual property rights, have limited commercial and small business utilization. Firms that do business with DoD have little incentive to spend money to innovate given their limited profits, which will threaten the United States' technological edge in coming years. DoD's ability to acquire affordable, modernized capabilities is contingent on the status of the defense industrial base.

In 2008, a DoD Defense Science Board task force found that "[T]he nation currently has a consolidated 20th century defense industry, not the required and transformed 21st century national security industrial base it needs for the future," (DSB 2008, 10).

Challenges

Maintaining the Defense Industrial Base

The current U.S. industrial base is dominated by five prime contractors, resulting in limited competition. Unlike other industries, members of the defense industry only have one client, and aerospace and defense firms have the lowest profit performance margins of all major industry sectors (AIA 2011, 19).

Regardless of profit incentives in prime contracts, it can appear to make more sense to vertically integrate (AIA 2011, 21). Vertical integration, however, further limits competition in the consolidated defense industry.

In the future, the industrial base may get even smaller for two reasons. First, looming sequestration cuts will lead to mergers and acquisitions, horizontal integration, in the defense and aerospace sector, due to fewer business opportunities. Second, because fewer programs are started now than in the past, if a firm loses out on a major contract, it will have to exit that market. For example, the Air Force recently announced that it will award a contract for its newest long-range stealth bomber to replace the B-2, by the middle of 2015. This bomber replaces plans for the next-generation bomber and has a planned procurement of about 100 planes at a unit cost of $550 million, for delivery in 2025 (Sweetman 2013). The loser of the competition between Northrop Grumman and the Boeing and Lockheed Martin team will most likely drop out of the bomber market, as there most likely will not be another bomber program in this generation.

Barriers Preclude the DoD from Reaping the Full Benefits of Globalization

Current U.S. defense policy does not address today's technology and industrial globalization nor their implications. Because there is no agreed-upon point of reference, Congress, industry, and the public regularly scrutinize DoD decisions to buy or lease foreign systems, collaborate on projects with overseas partners, or share technology with allies, regardless of the details. However, globalization of the defense industry is already well underway, and largely irreversible. Some might be surprised to learn that virtually every U.S. weapons system contains foreign parts. To be sure, there are risks associated with globalization, especially within the context of national defense; which is precisely why the United States must pursue a defense industrial policy that anticipates, rather than reacts to, the expansion of global trade and technological innovation.

The impacts of globalization on defense must be better understood, so that policy-makers can better balance the requirements of defense industrial and trade policy with political, economic, and security considerations. By embracing the advantages afforded by globalization, and guarding against its adverse consequences, the U.S. military can maximize efficiency and effectiveness in order to promote stability, in an ever-changing world.

However, current import restrictions impede the United States' ability to acquire defense-related goods as efficiently and cost-effectively as possible. The DoD is barred from acquiring foreign suppliers' products—products that are not only cheaper, but in some instances, technically superior. Although there is a waiver process, it is often lengthy, creating needless delays for products that may not even be available domestically.

Export regulations also present challenges. Today's most important export regulatory authorities, The International Traffic in Arms Regulations (ITAR) and the Export Administration Regulations (EAR) both derive from the 1970s. The leading legislation includes: Arms Export Control Act (AECA) of 1976, International Emergency Economic Powers Act (IEEPA) of 1977, and Export Administration Act (EAA) of 1979. Both AECA and EAA rely on regulatory mechanisms for enforcement; namely the ITAR, administered by the Department of State, and the EAR, administered by the Bureau of Industry and Science within the Department of Commerce. These organizations develop the lists of controlled exports in each category, determine which applicants receive licenses, and punish those who violate the law. In order to remain in compliance when exporting products, the exporter is required to navigate a demanding licensing process that can take a significant amount of time and resources.

Due to these export regulations, commercial firms and small businesses fear that if they do business with DoD, the products or critical components that they provide will be designated as critical technologies and subject to export controls. If US policies were more open to allowing

technology sharing and bilateral arms sales with allies, development and production costs would drop significantly and, in the long run, future security issues could be addressed by a coalition of allied nations sharing the costs of investment and reaping the benefits of more advanced capabilities.

Likewise, restrictions on foreign imports can increase costs. The two primary import restriction laws are the Buy American Act and the Berry Amendment. The Buy American Act, passed in 1933, gives preferential treatment to the use of American-made products. Another statute related to the government procurement of foreign goods is the Berry Amendment[5]. While the Buy American Act gives preference to domestic products over foreign products with certain exceptions, the Berry Amendment overrides these exceptions for particular items, namely food, clothing, and specialty metals, but applies only to defense contracting, and is enforced worldwide.

Barriers to Entry and High 'Costs to Play' Limit Competition

The Federal Government's acquisition processes, in general, and DoD's acquisition process, in particular, are closely regulated. Both the DoD and Congress have implemented a complex regulatory environment, with the best of intentions. These regulations are intended to help improve acquisition processes; maintain public accountability; and prevent contractor waste, fraud, and other abuses. The end result is a structure of rules and regulations that has no consistent, overarching framework, but is a compilation of many individual mandates designed to address specific issues. Currently, the DoD's acquisition process is directed by three broad sets of regulations, the FAR, the Defense Federal Acquisition Regulation Supplement (DFARS), and unique component FAR supplements; as well as a variety of statutes and policies.

However, there are costs involved with implementing each of the numerous regulations promulgated by the government. Although the costs of complying with any individual rule may not be significant, the cumulative effects of complying with all the mandates are significant. Firms that deal primarily in the commercial market, when forced to comply, have to raise costs for all of their customers; or alternatively set up divisions to deal exclusively with the government.

Moreover, this regulatory environment creates disincentives and raises barriers to doing business with the DoD. Requirements such as government-unique standards, cost data for commercial (or modified commercial) items, and unfavorable intellectual property requirements, deter commercial firms from doing business with the DoD.

[5] The Berry Amendment was originally passed by Congress in 1941, and is codified in 10 U.S.C. 2533a. The statute prohibits the DoD from buying certain end products, components, or materials, unless they are entirely of U.S. origin.

This problem is not new. In 1986, the Packard Commission wrote "…the legal regime for defense acquisition is today impossibly cumbersome" (A quest for Excellence, 1986). Although there have been a number of studies that have attempted to estimate the DoD regulatory and oversight cost premium (Gavrieli, 2008), the most comprehensive and most cited is the 1994 Coopers & Lybrand study. This empirical study determined that DoD's acquisition regulations and oversight requirements added an 18 percent cost premium. This figure did not include DoD's direct oversight costs (e.g., government auditors). In the intervening two decades, the regulatory burden has increased, and that this percentage has likely risen; recent Air Force studies indicate a premium of 25%.

The Small Business Administration's (SBA) Office of Advocacy has studied the impact of regulation specifically on small businesses since 1995. In September 2010, the office released the study, which "demonstrated that small businesses bear a larger burden from regulations than large businesses" as of regulatory costs through 2008 (Crain & Crain 2010). In 2014. Congress member Eshoo expressed what many in the industry had known for some time, that the "thousands of pages of procurement regulations discourage small innovative businesses from even attempting to navigate the rules." In this time of declining budgets, it is critical to minimize the "defense unique" premium for products and services that the DoD buys.

In the past, the federal government and the DoD dominated research and development (R&D) spending. For example, in 1964, the federal government provided 67% of R&D funding, and served as the driver of innovation in the economy. Today, the private sector provides over 60% of U.S. R&D funding and accounts for over 70% of its performance advances. As the trend toward private sector R&D intensified in the 1980s and 1990s, defense policy-makers began to focus on how to access this emerging commercial source of innovation, especially as commercial products began to prove cheaper and, often, more reliable. For example, the commercial advances in the information technology industry enabled the 1990s net-centric revolution in military affairs. Today, the DoD is leveraging commercial technologies for the development of unmanned vehicles and other advanced systems, but a failure to reduce these barriers will limit DoD's to access cutting-edge technologies that drive commercial markets in the future.

There are several tools available to enable contracting with commercial contractors that include: commercial item (FAR Part 12) contracting; Other Transactions Authority (OTA); rapid acquisition authorities; and the use of intermediaries (i.e. primes, large subsystems contractors, and resellers). Unfortunately, these methods are generally underused in today's acquisition environment. Consequently, although the DoD currently obtains the commercial technology that it requires, it generally comes (at a higher cost) through intermediaries. Since the 1990's, there have been several efforts at commercial item acquisition reform, but none have been successful at lasting integration of commercial items and contractors. Congress and DoD have also attempted to engage in cooperative R&D with the commercial sector, but, after a short period, decided that these funds would be better spent on military-unique projects (HASC 2012, 57).

Intellectual Property Restrictions

Another area of concern is the government's attempt to impose what are perceived as unfavorable technical data rights policies. Some of these data rights policies discourage innovation. For example, Independent Research and Development (IR&D) by industry was originally considered a private expense, providing the contractor with rights to any intellectual property (IP). Under Section 824 of the 2011 Defense Authorization Act, IR&D is considered to be federally funded, because of indirect costs pools that cover part of their cost (P.L. 111-383). Unless a contractor can prove that their IP for a given contract was developed at private expense, the government now has the right to that IP (AIA 2011, 13), reducing industry's incentives to conduct independent research.

Additionally, these technical data rights policies limit competition, especially from commercial firms and small business. For example, section 802 of the National Defense Authorization Act for Fiscal Year 2007 removed the Federal Acquisition Streamlining Act (FASA) provision that assumed development at private expense for commercial items (P.L. 109-364). Although this was altered soon after to exclude "off-the-shelf" commercial items (affecting few procurements), the statute requires past engineering and accounting records to prove development at private expense that are not usually kept by commercial firms. Commercial firms could therefore lose intellectual property on past development for future contracts as a result of not maintaining records that are unnecessary in the commercial marketplace (ARWG 2014, 23).

The major implication of this for commercial firms is that they may lose intellectual property on products they sell in the commercial market, which was originally established through their own private R&D investments. Given that profits are higher in the market-driven commercial marketplace, it makes little sense for commercial firms to sell to DoD. Limited intellectual property rights hurt small businesses even more, as they have often have few products to sell. This was a major concern of the SAG; they believed that DoD did not do enough to protect the IP rights of small businesses or adequately compensate them, based on the value of their IP rights. Mac Thornberry's acquisition reform bill draft concurred with these sentiments, suggesting a Defense Business Board review of the government's regulations and practices surrounding IP rights. The cumulative effect of these barriers limits DoD's access to new and disruptive technologies.

Maintaining Collaborative Relationships between the DoD and Industry

An adversarial relationship between DoD and industry will inhibit industry's ability to develop and invest in the technologies and systems DoD will need in the future. DoD relies on the defense industry to continue to develop affordable and technologically-advanced capabilities, however, a lack of communication between the two parties makes this a challenge. A 2008 Defense Business Board Task Group on a "Strategic Relationship Model" found a significant lack of communication between DoD and the defense industry. Further, PMs limit

communication with industry out of fear that they take actions that will provide competitors grounds for a bid protest, even though FAR Part 15.2 encourages exchanges with industry. Without a clear strategic plan from DoD, members of the defense industry are neither able to make the proper capital investments, make the best use of limited R&D resources, nor inform DoD of developments they have achieved. This is especially true with regard to small businesses and non-defense firms (DAPA 2006, 37).

Additionally, DoD must do a better job of establishing guidelines for communication with industry during program execution, in the interest of program performance, while maintaining high ethical standards. This will hopefully foster a greater level of trust between DoD and industry. Brett Lambert, former Senior Fellow at the National Defense Industries Association, and current Vice President, Corporate Strategy at Northrop Grumman, cites budget growth since 9/11 as a reason for the breakdown in trust between industry and government; previously money, rather than communication, was used to smooth over problems between industry and the DoD on poor performing programs (Brett Lambert Testimony 2014).

Recommendations

Recommendation 1: As budgets continue to shrink, the DoD must plan for ways to maintain the required industrial base.

First, DoD must establish its desired vision for the required industry structure. Continued American military dominance will be based, to a large degree, on the ability of U.S. forces to maintain their technological advantage over potential adversaries. Although the U.S. does not currently have a peer competitor, other states and non-state actors are working diligently to bridge the technological advantage held by the American military. Additionally, technology continues to change and improve at an ever-increasing pace. In order to achieve its future objectives, DoD must continually focus on maintaining its technological superiority. This will require that DoD resist the demonstrated tendency to reduce funding for Science and Technology (S&T) research and other "engines of innovation."

Although the defense industry currently provides the department with the required weapons development, and manufacturing capabilities; the industry may not be well suited for the future security environment. The new structure needs to be responsive to rapidly changing requirements; have a strong focus on technology and innovation; offer lower cost alternatives; and provide responsible management.

Based on anticipated budgetary constraints, this vision should also address future industry consolidations and mergers. DoD must continue to review and evaluate the impacts of potential mergers and acquisitions, with a goal of maintaining at least two viable, competitive suppliers in mature markets. A greater number of suppliers should be maintained in areas that require innovation, or where demand is exceptionally high. The objective must be to create an industrial

base that is vibrant enough to preserve a competitive environment while discouraging anti-competitive consolidation (horizontally or vertically) and anti-competitive teaming. DoD should develop an appropriate mix of incentives for the industry to embrace its vision and take the actions necessary to make it a reality. DoD should also develop the review process for mergers and acquisitions focused on maintaining a competitive environment, and publicize it widely. Program offices should consult with OSD on any prospective industry teaming; "dream teams" can become monopolistic and limit competition.

Finally, as discussed below, the DoD must take a leadership role to remove barriers that prevent non-traditional companies from conducting business with the DoD.

Recommendation 2: Review and relax import and export restrictions to encourage greater participation in the defense marketplace by domestic commercial firms.

The United States must come to realize that defense industry globalization is already underway and in order to maximize the associated benefits, the nation must embrace this change and focus on some of the associated challenges. Denying the reality of defense industry globalization, or insisting that the United States could just as easily pursue a protectionist policy is counterproductive.

Import and export controls are necessary in some cases, in order to ensure the protection of American military technology as well as the health of the defense industry; however, the current system definitely has significant flaws that negatively impact economic growth and national security. Correcting these issues requires a strong plan of action to revamp and re-imagine the control system.

The underlying negative incentives that have developed around several decades of increasingly tightened export policies have left their mark on the decision-making process of many firms. Specifically, the leadership of commercial firms is concerned that having a product controlled by the ITAR, or even having a part go into a weapon controlled by ITAR, could keep it from being exported. To avoid these challenges some firms choose to never do business with the U.S. government, or at a minimum, refrain from selling a product to the U.S. government, until that product has wide distribution in the commercial marketplace. Barring a significant change in export control laws and their implementation, these factors will continue to impact many commercial firms' investments and government contracting decisions.

Recent initiatives to limit the impact of export restrictions on unmanned aerial vehicles (UAVs) (McLeary, 2015) and Gallium Nitride devices (Reuters, 2015) are a step in the right direction. Restrictions on other technologies, or on commercial parts that are used in weapon systems, should continue to be reformulated or removed as appropriate. These actions will ensure that the nation's industrial base maintains its technological advantage.

Further, protectionist import restrictions should be reduced, and eventually eliminated. The United States should rely on free-market exchange, not protectionist import policies, to promote and improve America's competitiveness both at home and abroad. Though protectionist policies may benefit certain industry segments, the market distortions that are created lead to higher prices, and reduced domestic consumption. Moreover, the industry segments that are protected have less incentive to innovate and reduce their costs. As a consequence, the industries themselves may suffer from their lack of global competitiveness, leading to decreased revenues from foreign sales. The longer protectionist policies are in place, the less competitive the industries will become. Reducing import restrictions would lead to the greater development of weapons systems and their associated products, both in terms of quantity and quality, while spurring economic growth.

Recommendation 3: Remove barriers from doing business with non-traditional, commercial defense contractors.

Advances in commercial information technology, telecommunications, logistics, software, robotics, materials, manufacturing, sensor, energy, aerospace, maritime, and other commercial technologies and commercial business practices continue to develop solutions that have potential military applications. As a result, commercial markets and technologies are becoming ever more important to the DoD. Since these technologies will be widely available, military advantage will flow to those nations who can incorporate these technologies and practices rapidly, and "stay out in front".

To that end, senior DoD leadership needs to aggressively advocate for the acquisition of commercial technology and for the adoption and integration of commercial business practices. The DoD must exhibit a firm willingness to pay market-based prices for commercial products (COTS or customized), provided that there exists a history of sales to non-government entities. This effort will require a long-term commitment, and should include the following actions:

- The requirements, standards, test and evaluation, and technology certification processes need to be reformed to alleviate tendencies to rely solely on military-unique solutions. Stronger legislation than the current preference for commercial items may be required to ensure that commercial solutions are the primary baseline to be first considered, and to conduct a cost–benefit analysis before considering any military-unique solution or technology above and beyond current commercial performance thresholds.
- Re-establish incentives to effectively and actively use existing authorities to access commercial firms for more than just COTS solutions.
- Identify and implement "best commercial acquisition practices" (by commercial sector and DoD application) throughout the DoD enterprise. Focus audit agency oversight efforts on benchmarking these governmental and private sector best commercial acquisition practices. Audit agencies need to question evaluation criteria that discriminate

against commercial items; otherwise, the efforts of the oversight community risk becoming the mechanism to increase DoD acquisition costs and reduce innovation. The GAO conducted similar best practices work in the 1990s and early 2000 time frame, but little has been done since that time.

- Reduce the burden of DoD unique compliance audits (financial, management, etc.) Where applicable use industry standards. Additionally, in terms of auditing, the Defense Contract Audit Agency (DCAA) should develop materiality standards specifically for small business, to decrease the burden for small defense firms, and encourage small commercial firms to sell to DoD.

- Constrain regulatory creep. Commercial companies are troubled by steady erosion in the government's use of a streamlined approach to commercial item acquisition. Regulatory creep, in the form of additional government-unique requirements, will negatively impact the DoD's ability to obtain the latest commercial technologies at the lowest possible prices.

- Reverse prior statutory change that removed the assumption of development at private expense for non-COTS commercial major systems, subsystems, or components of major systems. Striking this provision will help increase competition for major systems and their components. Absent this provision, fewer firms will compete for major systems, subsystems, and components since they do not regularly keep the necessary accounting data to prove development at private expense and defeat government challenges to technical data rights.

Recommendation 4: Use Intellectual Property as an Incentive for Innovation.

A company's IP and technical data rights are invaluable resources, central to a contractor's ability to innovate and compete for government and commercial business. Therefore, there is a need to balance DoD's need to seek broad IP rights to foster competition and provide efficient product support during a system's lifecycle, with commercial firms' desire to profit from their investment in research and development. The rights to IP provide a strong incentive for firms to conduct research and innovate, providing them with a competitive advantage. When the balance shifts too much in favor of the government, these incentives are diminished. DoD must do a better job in protecting the data rights and develop profit policies that reward commercial firms with a fair market value for their technical data. This is particularly important for small and commercial firms, if they are to do defense business. Specifically, for all commercial items, DoD should assume the development was done at private expense.

Recommendation 5: Formulate clear rules to encourage and define appropriate communications with industry.

These rules would apply to two different topics. First, DoD needs to communicate more effectively with industry to understand what kinds of products and technologies are being developed in industry, pre-solicitation, as is encouraged in the FAR; and to communicate DoD's needs moving forward so industry can be capable of fulfilling them. Currently, DoD often limits communication with industry out of fear of violating legal constraints. Absent this interaction, DoD will be less capable of leveraging developments in the private sector, while the defense industry will be unable to direct their R&D resources towards technologies and products desired by DoD. These rules should pertain to the industry as a whole in addition to one-on-one communications with individual firms. A 2010 Army Acquisition Review report found that the effectiveness of industry days are limited due to firms fearing to ask questions or provide recommendations around competitors.

Second, DoD needs to better communicate with industry partners over IP early in the acquisition process, to encourage small business and commercial participation in the defense industry, while ensuring DoD still receives the necessary proprietary information for the products they buy. Similarly, DoD should establish guidelines that enable greater communication between contractors and their DoD customers during program execution. Such guidelines should encourage a stronger relationship between the supplier and the customer to benefit program performance, while maintaining proper ethical and legal parameters.

VI. Who is Responsible for Acquisition, and who does the Acquisition

The composition (number and skills) of the acquisition workforce has a direct impact on the performance of the defense acquisition system. This workforce must respond to a volatile international security environment, rapidly changing technology, a wide array of new military operations, significant budgetary pressure, and many legislative and regulatory changes. The impact of these considerations on the acquisition workforce has been significant—demanding new skills and acquisition strategies, as well as additional personnel. For example, decisions to competitively contract for many non-inherently-governmental support services (such as many logistics support functions), have required members to have different skill-sets, focusing on management and oversight of complex service contracts.

The acquisition workforce has also received a significant share of the blame for poor program performance; however, many of the challenges facing the workforce stem from the regulatory, reporting, and oversight environment. Improving the acquisition workforce should not only focus on increasing training and resources, but also empowering the workforce to employ their knowledge and experience, to make decisions that focus on maximizing program performance.

Given the above-noted changes to the state of the acquisition environment, we believe that the desired state of the acquisition workforce for the twenty-first century should be one that centers on the concept of the "smart buyer." The "smart buyer" is one who is value focused, and has the requisite technical skills and experience to ensure the DoD is buying the proper systems and services, in the appropriate manner. Moving forward, we believe the DoD will face several challenges as it works to develop this required acquisition workforce.

Challenges

Rebuilding the Acquisition Workforce

DoD's acquisition workforce is composed of not only contracting and procurement specialists, but also of all the employees that form the total acquisition team—from those that help develop requirements, to those that manage programs, and, oversee contractor performance. This workforce must be large enough and skilled enough to handle the increasing complexity of defense acquisitions. In coming years, the workforce will be tested as DoD is hit by an upcoming wave of retirements. In testimony to the Senate Committee on Armed Services, USD (AT&L) Frank Kendall testified that 21,000 members of the workforce are eligible for retirement and 25,000 more soon will be, with PMs and PEOs retiring in record numbers, and not enough adequately trained and qualified personnel to take over those positions (Frank Kendall

Testimony 2014, 12). Replenishing the size and quality of the workforce will be one of the greatest challenges for defense acquisition in the immediate future.

Today's problems with the composition of the acquisition workforce can be traced to actions taken at the end of the "Cold War." At that time DoD's acquisition workforce was left with an excess capacity of both civilian and military personnel. Based on direction to achieve a "peace dividend", the DoD took actions to dramatically reduce the acquisition workforce during the 1990's. As spending and contract actions increased dramatically with the operations in Iraq and Afghanistan, DoD experienced chronic shortages of suitably skilled acquisition personnel. In 2007, the Gansler Commission Report ascribed poor contracting outcomes, including several contracting scandals, to the inadequate numbers of acquisition professionals coupled with dramatic increases in the acquisition workload (Gansler Commission, 2007).

The Gansler Commission used the 'Acquisition Organization Count'[6] to assess the size of the acquisition workforce, which provides the best historical data (see the Acquisition Organization count in Figure 4). That count decreased by 56% from 1987 to 2004. Another count of the acquisition workforce, the "Refined Packard Count"[7] (represented by the green trend line in figure 4) was initiated in FY1998; it provides a more consistent measure, since DoD's acquisition organizations were significantly altered. According to this measurement, the acquisition workforce decreased by approximately 14 percent from FY1998 through FY2008. In FY2004, through a process of assimilation, the Refined Packard and Defense Acquisition Workforce Improvement Act (DAWIA)[8] counts merged. Since then, the only count used in DoD is the DAWIA count. From FY2005 through FY2008, the acquisition workforce (black line in Figure 6) continued to decline. The workforce reached its lowest level since 1998, in FY2008 (125,879). And, 55% of this defense acquisition workforce had less than five years of experience.

In 2009, Congress approved the Defense Acquisition Workforce Development Fund (this was a $4.5 billion program) and DoD began to rebuild the number and skills of its acquisition workforce, with a goal to increase the acquisition workforce by 20,000. DoD used strategies that included increasing retention, hiring new professionals, and in-sourcing[9], which involved the conversion of functions currently performed by contractor personnel to performance by federal civilians (Gomez, 2012). As a result, by the end of FY 2014, that number had increased by 19.5% over the FY2008 total to 150,465 (USD[AT&L] 2014, 7).

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[6] This count consists of all personnel within an 'acquisition organization' as defined by DoD Instruction 5000.58-R, regardless of their position.

[7] The Refined Packard count differs from the Acquisition Organization count measures the core acquisition workforce (it removes non-acquisition personnel from within acquisition organizations from the count), but adds acquisition personnel from outside acquisition organizations to its total.

[8] Personnel designated under the Defense Acquisition Workforce Improvement Act.

[9] Better Buying Power 1.0 was distributed about one year prior to Frank Kendall taking office as the USD (AT&L), but the following two versions were issued under his leadership.

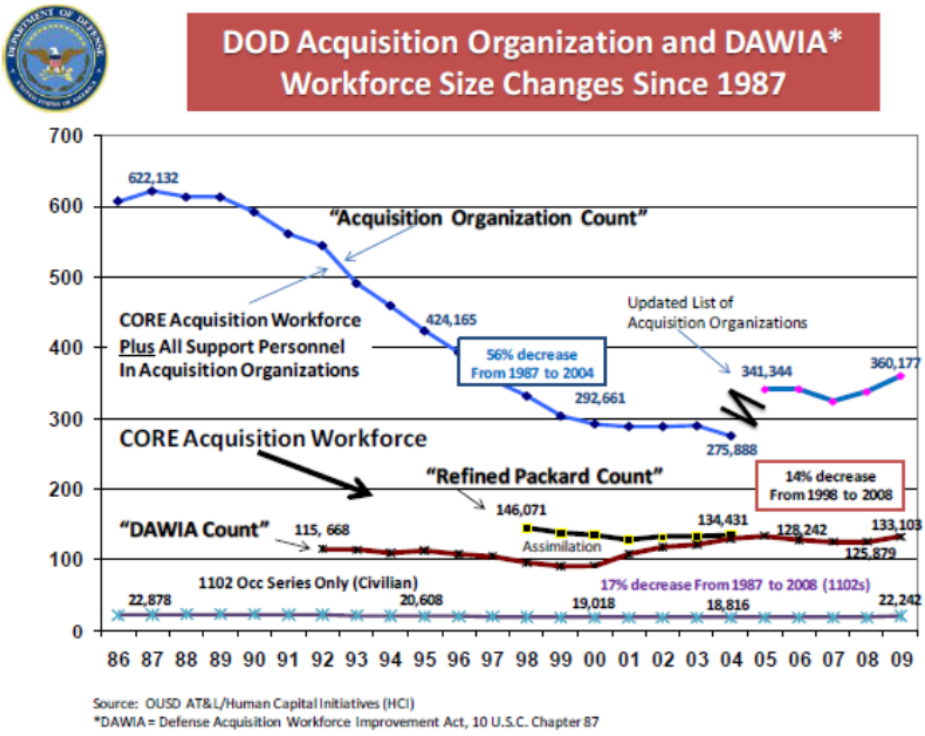


Figure 4. DoD Acquisition Workforce (Carter, 2010)

Moving forward, the challenge will be to sustain this growth, in the face of sequestration cuts, as the large number of retirement-eligible personnel exercise their options to retire in the coming years. These new employees will need training, as well as time to gain the experience and judgement they require, to fulfill their duties in the challenging 21st century acquisition environment.

DoD is actively tracking its acquisition workforce (the DoD's Human Capital Initiative tracks and reports data regularly; including its size, demographics, and meet/exceed certification level rates by career field). While this data provides DoD the capability to understand the size, education levels, and skill levels of their workforce (relative to position requirements), determining the requirements for the size, composition, and skill level of the acquisition workforce, as requirements change, is still challenging.

Acquisition Workforce is Often Inadequately Skilled

Whether or not the acquisition workforce is able to fulfill its duties depends as much on the skills of the workforce, as it does on the size of the workforce. Further, whether the workforce is large enough, and skilled enough, is not determined by the number of contract actions, or dollar amount of spending; but, rather, by what DoD is buying and the skills those acquisitions require from the workforce. For the evolving and unpredictable 21st century defense environment, DoD often requires highly complex systems. Four areas in particular will continue

to prove especially challenging for DoD in recruiting, hiring, training, and retaining-high performing personnel: systems engineering, procurement of IT systems, procurement of commercial systems and components, and the procurement of services.

Systems Engineering

As previously stated, DoD must be able to manage and oversee the development of increasingly complex systems, and systems-of-systems. Accordingly, the DoD has a need for highly qualified systems engineers, who have relevant domain experience to help manage these efforts. Those professional are also in high-demand in the private sector, usually with higher compensation.

Procurement of IT

DoD must work to ensure that the acquisition workforce has the requisite ability to control the development of its information systems. Acquiring IT systems is in many ways different from acquiring hardware systems. The acquisition workforce will need a significant familiarity with the IT marketplace and technology trends, knowledge of cybersecurity, a strong understanding of user needs and priorities, the ability to perform trade-off assessments between alternative strategies for implementing needed capabilities, the capacity to actively manage risk, and the skills necessary to create capability and investment road maps. For DoD's IT acquisitions to be successful, the DoD must have an appropriately trained, educated, and experienced acquisition workforce. In addition, it must overhaul its acquisition education and training curricula so that it is aligned with the realities of today's IT priorities.

Procurement of Commercial Systems and Components

The benefits of using commercial items are many, and well acknowledged. DoD's policies direct the use of commercial items, but their use is still limited. And, frequently even when commercial items exist, the DoD opts for a uniquely developed item, in spite of the demonstrated benefits (reduced cost and improved performance). The acquisition of commercial items often leads to questions about the ownership of intellectual property, technical data, and certified cost and pricing data; we believe the acquisition workforce require dedicated training to execute commercial acquisition successfully and consistently across the department. Concerns about DoD's ability to "buy commercial" were touched upon in Chairman Thornberry's draft bill. The draft bill requests a review on DoD's workforce development programs, focusing on areas where skills and knowledge of buying commercial could be improved.

Procurement of Services

DoD's acquisition workforce often lacks the knowledge and experience for services contracting, auditing, and oversight. This experience is lacking both generally, and also in

specific categories of services contracting. For example, knowledge and experience of contracting for research is useful, but does not directly translate to contracting for facilities maintenance. Further, the training, to a large degree is still focused on acquiring platforms, in spite of the fact that approximately 60 percent of procurement dollars are spent on contracting for services. A complicating factor is that functional personnel currently providing oversight for many services contracts are not considered members of the DOD acquisition workforce. Consequently, they are not routinely provided acquisition training under DAWIA requirements.

The aforementioned Gansler Commission, as well as the congressionally-mandated Acquisition Advisory Panel Report, had similar findings that the acquisition workload increase was caused by the "complexity of service contracting, which a growing share of all government contracting consists of; the fact that the number of transactions is no longer a good measure of workload; and the fact that 'best-value' procurement approaches are substantially more complex than 'lowest-price' contracting approaches." The report concluded that demands on the workforce outstripped its capacity (RAND 2009).

Training for the Acquisition Workforce is Inadequate

Training, motivating, and maintaining a skilled acquisition workforce in the future will be incredibly challenging because it will require DoD to undergo a cultural shift from emphasizing strict compliance with regulations, to aligning career advancement and pay incentives with program performance. Failure to fix and address these problems will result in the same recurring problems for DoD. The foundation of these issues stems from the "risk-averse" culture that permeates DoD, and impedes innovative solutions by the workforce. This culture can be attributed to onerous internal and external oversight. Fear of auditors, lawyers, bid protest, and conflict with DoD officials limits the decision-making ability of employees, and makes compliance with regulations a higher priority than program performance. DoD needs to improve its training for two main reasons. First, at lower levels, experienced professionals are retiring and there are not enough mid-career personnel able to fill these positions and train new hires, creating a "bathtub effect" (HASC 2012, 40). Additionally, as DoD starts fewer programs due to smaller budgets in the future, there will be fewer opportunities for the acquisition workforce to gain experience. As less experienced personnel and new hires replace experienced members of the workforce, with fewer programs to gain experience on, training for the defense acquisition workforce will become that much more important.

Recognizing the need for better recruiting, hiring, retention, and training for the acquisition workforce, Congress approved the previously-mentioned Defense Acquisition Workforce Development Fund, a $4.5 billion program to begin to rebuild and improve the skills of the workforce (Gomez 2012). However, these efforts did not put enough of a focus on training. In fiscal year 2013, DoD requested $374 million for recruiting and hiring acquisition

workers to fill vacancies, but only $120 million for training and development of the workforce (HASC 2012, 42).

Education and training requirements have been relied upon to ensure the acquisition workforce has the requisite skills to perform their job duties. The Defense Acquisition University (DAU) is the main institution proving education for the acquisition workforce, but it falls short of providing actual experience. Relying on training and education is not enough as there are shortcomings within DoD's training and education curriculum. For example, DAU has no classes on commercial best buying practices; without this knowledge, members of the acquisition workforce will have trouble working with and understanding the practices that drive industry. As DoD takes on a greater role in management and oversight due to outsourcing, understanding these practices will be important skills. The Defense Acquisition Workforce Improvement Act was passed in 1990 to remedy problems facing the defense acquisition workforce. However, its processes to determine the qualifications and potential of each member of the workforce are time consuming and cause delays for individuals to meet qualification requirements. Often educational career path requirements are waived if "the individual possesses significant potential for advancement," and as a result DoD lacks a standard knowledge base for various positions (10 U.S.C. § 1734).

Empowering High-Performing Program Managers

The current incentive structure for program managers in defense acquisitions favors those who comply with requirements, oversight, and rules over those who are innovative and engage in good business practices. The SAG agreed that in general most PMs were skilled people that were often rewarded to do nothing; they generally fear the repercussions of making any decision that was not in strict regulatory compliance. Opportunities for future career advancement depend on internal DoD approval and external Congressional oversight, and as a result, the main priority of PMs is to keep their program alive and move it through the acquisition process (Fox 1994, 2).

DoD's risk averse culture is reinforced by a lack of a consistent definition, and corresponding metrics to measure, for "program success". Lacking this definition, and incentives that reward achieving high program success, PMs will continue to conform to strict regulatory compliance. As previously discussed, the SAG was also concerned about the relationship between PMs and COs. As a result of these factors, there is a self-limiting behavior that precludes PMs and COs from using the full latitude of the FAR and DFARS. The result of these two problems is that COs make contract decisions that do not necessarily incorporate the best interest of the program as a whole, as PMs would have, and both are limited in their pursuit of creative contracting solutions that best incentivize program performance.

Stability of Senior Leadership

Accomplishing long-term goals and policies is unrealistic when the positions with the most decision-making authority experience the highest level of turnover. DoD has higher turnover rates for Senate-confirmed appointees than any other agency, averaging 30 months for the Secretary and 23 months for the Deputy Secretary. The average tenure is even worse for remaining senior DoD officials, ranging between 11 and 20 months (Gansler and Lucyshyn 2010, 24). Adding to this problem is the fact that vacancy rates last approximately 20 months for DoD political appointees. Since positions are left vacant for long periods of time, and turnover quickly once filled, the priorities of decision-making authorities change frequently. This has repercussions down the chain of command since DoD personnel are unable to anticipate how future resources will be allocated and which programs will be prioritized. Additionally, this has an adverse effect on accountability, as short tenures provide incentives for making decisions that value short term over long term benefits. The current USD (AT&L), Frank Kendall, is now the longest-serving USD (AT&L), at three and a half years, since the position was created in 1986, and only the second to make it past three years in the position. Assuming he remains in office through the duration of the Obama administration, that stability could go a long way in determining the success of the Better Buying Power initiatives[10].

With these high turnover and vacancy rates, it is incredibly difficult to assign responsibility to any one individual for the status of defense acquisition programs. A large part of this problem can be attributed to the system itself, which requires multiple reviews and decision authority approval for every step in the acquisition process. The SAG felt that there are too many senior-level DoD officials with a stake in acquisition programs. With so many requirements to complete and people to satisfy, the ability of senior leadership to drive the process and be accountable for the result is hindered. This complex system makes it so that everyone has a stake in the success of a program, but in doing so prevents anyone from truly being responsible. Furthermore, a lack of effective communication among senior-level acquisition professionals can lead to disconnect in the policies they implement as far as requirements, budgeting, and decisions are concerned (DAPA 2006, 29).

Recommendations

Recommendation 1: Improve the defense acquisition workforce.

"Workforce size is important, but quality is paramount[11]"

-- Ashton B. Carter

[10] The first of the Better Buying Power initiatives was published under Kendall's predecessor and current Secretary of Defense Ashton Carter, just one year prior to Kendall taking office.
[11] Defense AT&L magazine interview with Mr. Frank J. Anderson, Jr., April 5, 2010.

Given the above-noted changes to the state of the acquisition environment and the workforce, the DoD's desired state for the acquisition workforce should be one that centers on the concept of the "smart buyer." The "smart buyer" is one who is value focused, and has the requisite technical skills and experience to ensure the DoD is buying the proper systems and services, in the appropriate manner. To meet these requirements, we suggest that DoD's acquisition workforce should: have stable leadership; be flexible; be technologically savvy; be focused on performance; gain broad-based experience; and, behave at the highest ethical level.

To achieve this vision based upon the "smart buyer" model, DoD must overcome several challenges. First, due to low pay, DoD will likely encounter difficulties in trying to retain high-caliber acquisition personnel. In particular, we believe DoD will have difficulty retaining those who either have portable retirement benefits, or have already reached their retirement eligibility requirement. Second, problems with recruitment often occur as a result of: a shrinking talent pool; the inability of potential candidates to meet citizenship (or security clearance) requirements; and, a highly inefficient application process. Third, experience gaps are also detrimental to DoD's modernization efforts as employees often do not have the right mix of skills needed to effectively function in the twenty-first century acquisition environment. Fourth, a blended workforce (composed of military, civilian and contractor personnel) requires a unique approach to management, and presents a host of additional problems including: ambiguity in the definition of "inherently governmental" work that must be performed by DoD personnel; difficulty avoiding conflicts-of-interest; and, an incomplete view of the workforce's composition (as reflected in policies and practices).

In order to overcome these challenges to achieving an acquisition workforce transformation, we recommend the following initiatives be implemented DoD-wide:

- **Develop the required human capital.** In order to effectively develop the required human capital for the modern acquisition environment, we believe that DoD must: enhance recruitment by focusing on employing entry-level/mid-level acquisition personnel through expanding internships and collaborative educational programs; accelerate efforts to streamline hiring processes; strive for achievement of a high-quality, not merely a high-quantity, workforce; provide competitive wages, through revision of compensation packages to ensure current employees and potential hires are paid salaries comparable to the private sector; target personnel with prior industry experience; continue to undertake pilot programs to examine the benefits of incentivizing employees for improved performance; and, provide employees added incentives for additional training and education.

- **Develop and provide the necessary training.** Most of the legacy personnel and organizations have years of experience developing requirements-driven, specification-constrained, custom-designed and -built components and systems. However, as

discussed, much of the future acquisition activity will be focused on the acquisition of IT intensive complex systems, commercial products, and services. DoD must overhaul its acquisition education and training curricula to align it with these new realities.

- **Improve workforce agility.** To improve workforce agility and experience, we believe DoD must expand the use of rotational programs between Government, academia and industry. This will not only expose DoD personnel to the private sector, so they better understand how to develop effective contract incentives, but also enable experience personnel to enter government service, helping to bolster the experience level of the new junior workforce.

- **Adapt to the blended workforce and partnering environment.** In the future, it is anticipated that the DoD's workforce will continue to work in an environment with support provided by private sector contractors. In order to effectively function within this "blended workforce" (government/industry partnering) environment, we believe DoD must: clearly identify "inherently governmental" and ensure those functions are performed by government personnel. Additionally, DoD must continue to develop approaches to eliminate or mitigate any organizational and personal conflicts-of-interest to maintain the highest ethical standards.

The current state of the acquisition workforce is inadequate to meet the demands of twenty-first century national security requirements. However, the acquisition workforce can be successfully transformed to one which is composed of highly capable, "smart-buyers." This must be viewed as one of DoD's top priorities.

Recommendation 2: Increase stability for senior leadership.

To the degree possible, senior government leaders must ensure that there is program continuity, especially with key program leaders. All possible actions should be taken, and incentives created, to ensure consistent program leadership by maintaining the stability of key personnel.

Recommendation 3: Empower and incentivize program managers to achieve higher performance in their programs.

First, DoD needs to come up with a new definition and criteria for "program success" that guides career development and salary incentive structure for program managers. This definition should break free from traditional values of strict compliance with legislation and shift the focus towards program performance. Additionally there should be incentives in place for high-performing PMs to maintain their current positions to increase program stability and accountability.

Then, to aid PMs in achieving high performance, DoD should establish an Program Management Senior Advisory Group, staffed with "grey beards" to provide a resource for PMs, as well as a repository of lessons learned. This group would provide a resource for PMs to aid in developing and executing acquisition strategies and enhance program performance. Last, due to the complexity of services and IT programs, DoD should implement a system that assigns high-performing PMs to those programs, with compensation incentives to retain them in those positions.

VII. Conclusion

Although calls for defense acquisition reform have been made time and time again, this time, a perfect storm of factors have created the "burning platform" that should provide the unifying motivation to make the required improvements.

First, defense budget are expected to experience continued pressure in coming years due increasing entitlement obligations, increasing debt service, and possible sequestration. Equally worrying is the appropriations breakdowns by account. The growth of O&M and personnel continues to accelerate, consuming an increasingly large portion of the defense budget, limiting DoD's ability to continue to develop the desired technical capabilities. However, it should be noted that the formation of the Military Compensation and Retirement Modernization Commission, established in 2013, is a step in the right direction.

Second, the rapidly-evolving security environment requires increasingly complex capabilities that must also be flexible, as mission needs continue to change. Finally, complicating the acquisition of these systems is an overly burdensome regulatory environment and acquisition process. This regulatory environment not only significantly increases the inefficiencies of the acquisition process, but also imposes barriers to entry for non-traditional defense firms, limiting DoD's access to many of the most recent innovations. These factors, and their resulting inefficiencies, must be addressed to remedy the chronic challenges in defense acquisition related to cost and schedule growth, poor performance, and program cancellation.

Barriers to Reform

Although these factors are understood, and the challenges for acquisition reform are known, there remain significant barriers to reform. There is the ever present cultural bias and resistance to change, with a natural preference to continue to do "what we've always done." There are also the competing priorities and incentives for stakeholders, with varying abilities to influence the regulatory and legislative processes. These stakeholders include Congress, the DoD (and all the subordinate organizations), other executive agencies, government employee unions, major defense contractors, and foreign and commercial firms; these all have parochial interests and a variety of perspectives of the best approach to provide for national security. For example, in Congress, the Senate and House of Representatives have vastly different incentives based on their constituencies, term lengths, and the sizes and locations of military and industrial facilities within their districts and states. Additionally, differences arise within the DoD; the Services may be at odds over control of resources and program requirements, and their impact on Service interests and force structures, while civilian leadership within OSD often have different priorities (e.g. as witnessed in the Air Force's resistance to unmanned systems). These barriers make it difficult to build a coalition of support for acquisition reform initiatives and to sustain those efforts.

Concluding Thoughts

The challenges and implications of a broken defense acquisition process are known and real. It is in the hands of Congress and DoD to work together to fix the broken defense acquisition system; failure to do so will have consequences for our national security, our defense industry, and most importantly, our warfighters. Reforms must enable DoD to provide affordable weapons in sufficient numbers, respond much faster to a changing threat environment, and maintain technological leadership.

While many of the underlying issues with the acquisition system may require legislative and regulatory changes, there are many actions that can be taken within the existing regulatory framework. While positive steps have been taken, consistent and committed leadership that is willing to be held accountable is required to ensure reforms are effective. Issuing policies and memoranda are important, but in order for these to be successful, continued, consistent emphasis and incentives are required to bring about the necessary change within DoD culture.

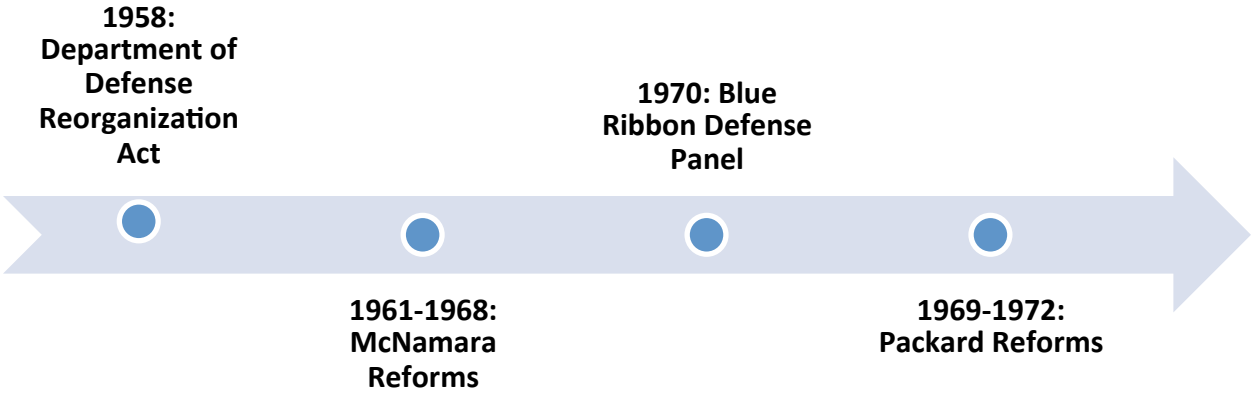
Given the current budgetary environment and the increased political pressure to reduce defense spending, the DoD must improve the efficiency with which it develops, acquires, and fields its weapon systems to successfully provide for the nation's defense. But even in the absence of such pressure, the DoD has a responsibility to the taxpayers, and to our military forces, to provide the required world-class capabilities at a reasonable cost. The nation deserves no less.

Appendix A – Historical Reforms

Progress of Acquisition Reform

Reforms over the past five decades have had three major themes, (1) cutting waste, fraud, and abuse, (2) increasing the efficiency of the defense acquisition system, and (3) improving the quality of the DoD acquisition workforce, all with varying success and mechanisms. Many reforms have been implemented over time as fixes to specific problems; however, in many cases the solutions have only decreased the efficiency of the defense acquisition system, as evidenced by the proliferation of the size and scope of the U.S. Code, the FAR, and its supplements. Early reforms focused on DoD management and the acquisition process itself, as outlined by DoD Directive 5000.01. Later efforts shifted focus towards the defense acquisition workforce in addition to increasing efficiency by focusing on the requirements generation and resource allocation processes. The latest DoD initiative, *Better Buying Power 1.0, 2.0,* and *3.0,* falls in line with the latter focus, under the guiding principle of "do more with less".

1958-1972: Origins of the Defense Acquisition System



> *Management is the gate through which social and economic and political change, indeed change in every direction, is diffused through society.*
>
> *-Robert McNamara, 1967*

The Department of Defense Reorganization Act of 1958 secured greater authority for the Office of the Secretary of Defense and the Joint Chiefs of Staff over the military services and department as a whole. Capitalizing on this autonomy, Secretary Robert McNamara led a series of innovative defense acquisition reforms during his time in office. From the outset, he made it clear that he would set the tone for DoD policy, as made evident when he assigned ninety-six review projects in March 1961 so that he could have an effective and active oversight role.

McNamara directed his Comptroller Charles J. Hitch to conduct a comprehensive analysis of requirements and processes and develop a five-year defense strategy, which developed into the Planning, Programming, and Budgeting System, providing the OSD greater control over requirements and resource allocation (RAND 2005, 33).

McNamara's vision of a transparent and efficient acquisition process created many positions and procedures that exist in today's system. This includes consolidation of contracting services, introduction of the program manager position, and a variety of reporting mechanisms to be followed during the development process (Fox 2012, 37). Furthermore, he strengthened contract oversight by developing acquisition organizations such as the Defense Contract Administration Service and the Defense Contract Audit Agency (Fox 2012, 37).

Despite the benefits of these reforms, the services resented OSD's control over requirements and resources, however, in many ways; this centralization was a positive because it kept US defense strategy unified in terms of force, budget, and missions (RAND 2005, 34). Unfortunately this joint approach limited the authority of the services in the acquisition process, giving those carrying out missions less influence in the process of determining what capabilities were required to fulfill mission needs.

Despite these reform, cost and schedule growth persisted, prompting President Nixon to commission the Blue Ribbon Defense Panel, also known as the Fitzhugh Commission, in 1970 (Fox 2012, 40-41). Their findings concluded that OSD held too much control over major programs. The panel determined that effective control at lower levels was impaired and opportunity to consider all relevant information was not present because these opinions are confined to the lower levels with little opportunity to be carried up.

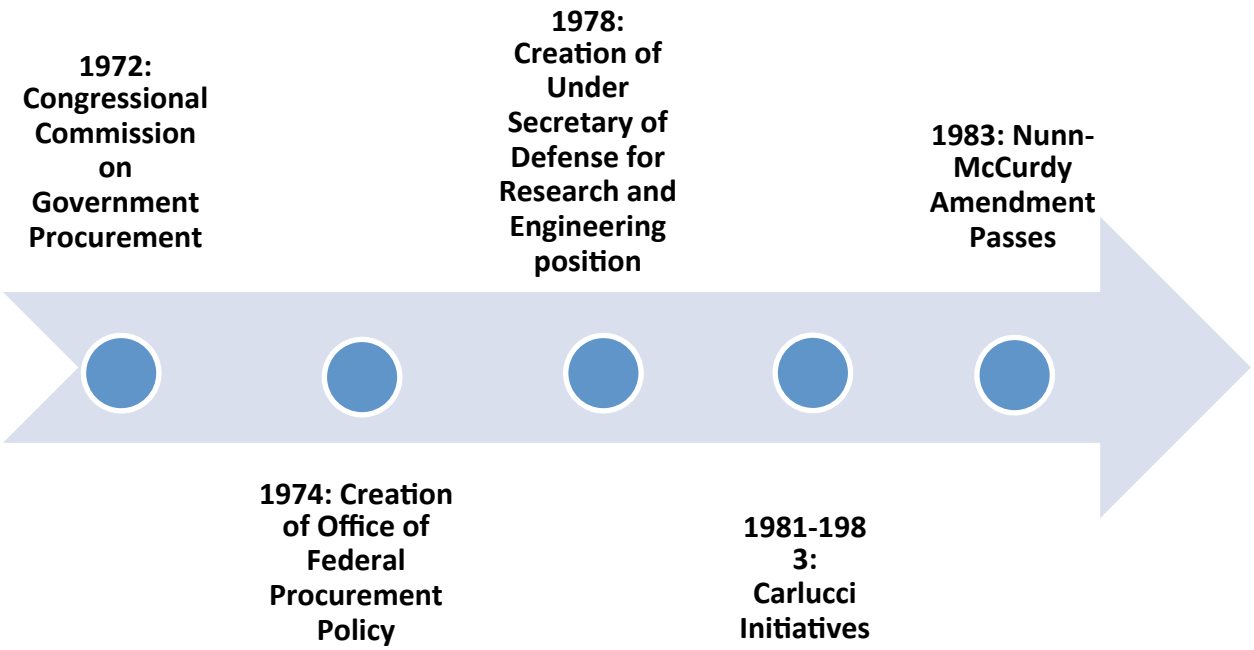
Furthermore, with regard to the tension between OSD and the military services, the panel found that solutions to many important issues were not realized because the services had such a small role in the decision making process (Blue Ribbon Defense Panel 1970, 1). In order to fix this problem, the panel placed emphasis on the idea of prototype testing in order to reduce technical risk and provide a more universal framework for analyzing program progress. Furthermore, the panel suggested that an Assistant Secretary be created to oversee research and development of weapon systems with input from new Unified Command positions (Blue Ribbon Defense Panel 1970, 4).

In the late 1960's, Secretary Laird, who succeeded McNamara, brought David Packard on as his Deputy Secretary of Defense for his superior management skills that had made Hewlett-Packard an industry leader. Packard brought his 'management by objective' mantra from HP to DoD, giving greater autonomy to the services through a decentralized system. In order to oversee weapon system acquisitions, Packard created the Defense Systems Acquisition Review Council (DSARC) to advise himself and Laird on the progress of major weapons programs at milestone reviews, based off of the program's Development Concepts Paper (Fox

2012, 48). Following the findings of the Fitzhugh Commission, Deputy Secretary of Defense David Packard focused on codifying these recommendations into new rules and procedures. Under this directive, the services were required to request and process more information from contractors involving risk and expenses, which added to the burden of potential bidders but also ensured that there was a more formalized decision process (OSD 1971, 5). Authority was also transferred down to program managers, who were given the responsibility of managing long-term projects, assuming that this change would improve cost and schedule estimates.

The roles of DoD Components and OSD were further refined to reduce program monitoring and increase their responsibility for the bigger picture and long term planning (OSD 1971, 2). Finally, three points were established in the defense acquisition process that would serve as formal decision points for DSARC reviews: programming, full-scale development, and production and deployment (OSD 1971, 2-3). These were the initial milestones of the defense acquisition process, and established basic criteria for programs at these stages which determined whether a program was on target or not. The intention behind these changes was to identify risk factors earlier in the process and better define system requirements.

1972-1983: Improving the Defense Acquisition System



Beginning with the 1972 Congressional Commission on Government Procurement, also known as the McGuire-Holifield Commission, the reforms of this decade focused on reshaping the system and formalizing accountability. One recommendation was to allow more competition

earlier in the acquisition process to respond to capability needs, while other recommendations focused on better management and simplification of the regulations (Commission on Government Procurement 1972, 24). In order to fix the issues identified by the Commission, the Office of Federal Procurement Policy was created to oversee effective implementation of these recommendations.

In an effort to reap the benefits of competition for the acquisition of services, OMB Circular A-76 was revised in 1979, to help DoD reap the benefits of cost savings and higher performance by competing government's most efficient organization in performing commercial services against private service providers. It thus became government policy to rely on commercial services, with exceptions for issues of national security. The Secretary of Defense or a designee retained the authority to determine if government performance was required, and could exempt a service from being competed under A-76 rules (OMB 1983, 5). In 2009, however, competitive sourcing under A-76 rules was banned by Congress, despite the significant cost savings that were realized when these rules were in effect. However, the results of thousands of A-76 competitions found it to be a legitimate step in improving the quality and significantly decreasing the cost of services through competition.

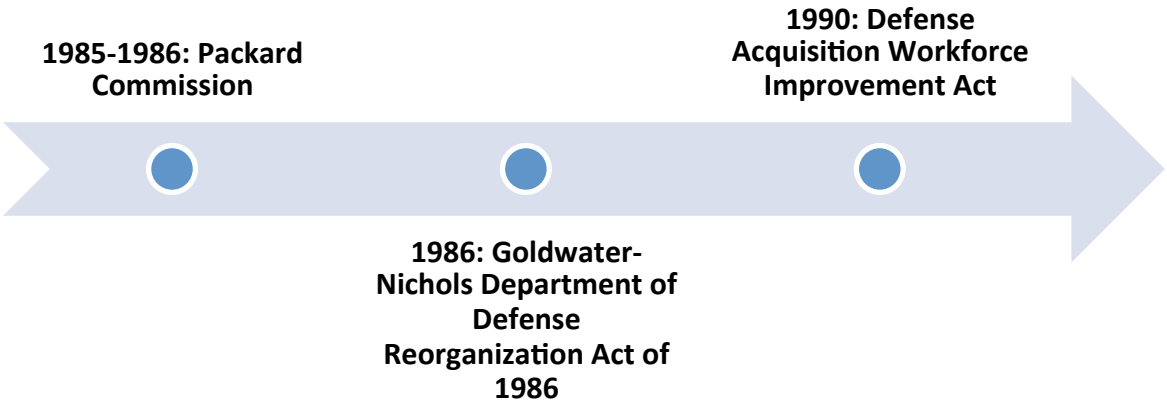
The 1970s also saw a reorganization of authority at the highest levels of DoD. Public Law 95-140 in 1978 created the Under Secretary of Defense for Research and Engineering position as the third ranking DoD official. The new Under Secretary was named the Defense Acquisition Executive, and acted as the principle advisor for acquisitions to the Secretary of Defense. This change represented a major step for streamlining and simplifying the defense acquisition process by focusing decision-making authority into one position in the OSD.

Efforts to further streamline the system and clarify accountability in the system continued when Deputy Secretary Frank Carlucci released his Acquisition Improvement Program (AIP), also known as the "Carlucci Initiatives", in 1981, containing thirty-two initiatives. This program focused on mitigating the effects of annual budget fluctuations in Congress, reducing program costs, maintaining efficient production rates, improving the readiness of deployed weapon systems, and enhancing long-term planning (Fox 2012, 99). Despite the intentions of this program, the drastic increase in defense spending that was already occurring prompted increased oversight by Congress and restricted the effectiveness of Weinberger's strategy. Congressional oversight resulted in the Nunn-McCurdy Amendment, requiring Congressional notification of 15% unit cost growth and cancellation, unless an OSD waiver is granted, for 25% unit cost growth (GAO 2011b, 1).

The AIP also sought to improve the PPBS process. This was accomplish through the Defense Resources Board, which subsequently took on a larger role in the planning process. The members of the DRB expanded to include the Service Secretaries, the Chairman of the Joint Chiefs, and the Commanders in Chief of the specified and unified commands (Fox 2012, 105).

The DRB focused on long-term planning and considered how to allocate resources and specific programs to national policies in order to maximize efficient use of limited resources ("Planning, Programming, Budgeting, and Execution System" 1994, 14). In order to streamline the acquisition process, these recommendations also revised DSARC to include only two milestone reviews for requirements and production (Rothenflue and Kwolek 2006, 12).

The Packard Commission and the Defense Reorganization Act of 1986



In response to reports and public statements issued by members of Congress that DoD continued to experience significant cost inefficiencies, President Reagan established the Blue Ribbon Commission on Defense Management in the summer of 1985, also known as the "Packard Commission". This commission focused on the acquisition process as a whole, while also considering general defense management practices. The problems that it found were the same as those that had persisted in previous reviews: cost growth, schedule delays, and performance shortfalls. In order to remedy these issues, the Packard Commission recommended a sweeping reform of the DoD acquisition system and organization, including a streamlined acquisition process, more prototyping, DoD organizational culture changes, and a competitive firm model (Christensen et.al. 1999, 1-2).

Many of the specific recommendations of the Packard Commission were enacted in the Defense Reorganization Act of 1986, the Goldwater-Nichols Act. These included the creation of the Under Secretary of Defense for Acquisition (USD [A])[12]. This position would fulfill the role of the Defense Acquisition Executive, replacing the Under Secretary of Defense for Research and Engineering which became the Director of Defense Research and Engineering (DDR&E) (DAPA 2006, 112).

[12] This title of USD (A), was subsequently changed tot USD (AT&L) to include R&D and logistics.

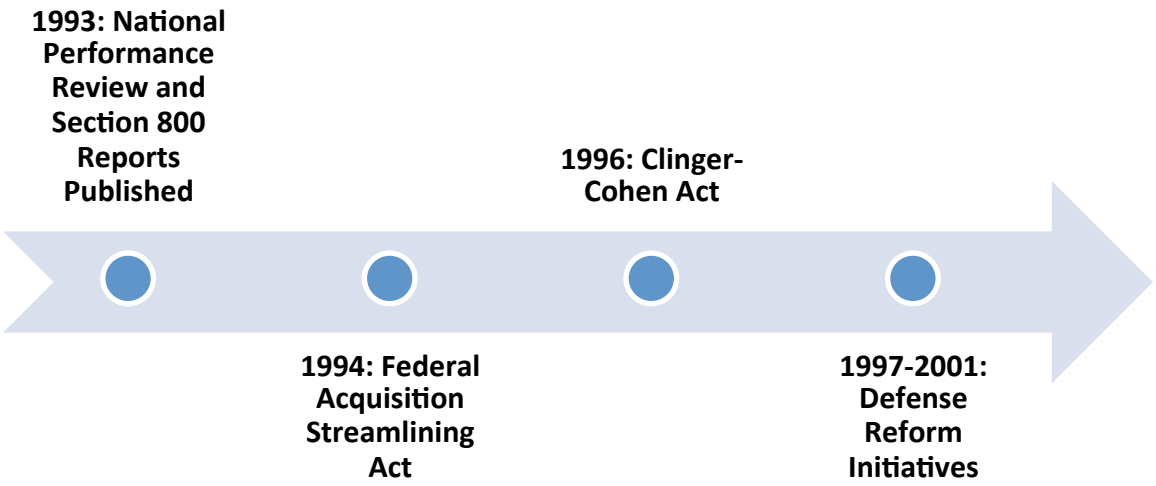
In addition to adding the USD (A) position within the OSD, the acquisition chain of command was formalized in the services. Each service or component had a Service Acquisition Executive who reported to the USD (A). Within these components, Program Executive Officers were appointed by the component executive to oversee Program Managers (Fox 2012, 129). This chain of command was supposed to designate clear lines of accountability. However, it did not work out as the Packard Commission intended, as service chiefs were largely cut out of defense acquisitions. The Goldwater-Nichols Act also recommended a Joint Resources Management Board to perform requirements generation. This board was to be co-chaired by two new positions; the USD (A) and the vice-chairman of the Joint Chiefs of Staff (Fox 2012, 129). In its implementation, however, only the vice-chairman of the JCS was made the chairman of the Joint Resources Management Board.

The Packard Commission made a significant push for increased training and education for the defense acquisition workforce; finding that they were undertrained and inexperienced. In response, the Defense Acquisition Workforce Improvement Act (DAWIA) was enacted and the Defense Acquisition University was created. This university was intended to fill the knowledge gap that had been plaguing the workforce by creating classes designed to further an employee's career and create a more standard skill set for the acquisition workforce. Implementation of DAWIA called for a vast overhaul of the defense acquisition workforce, establishing qualifications for all positions, and developing an extensive management information system (GAO 1993, 10).

The DAU provides training classes ranging from auditing to engineering to program management, however, its curriculum is not comprehensive, given that there are no classes that teach commercial best-buying practices. The Packard Commission encouraged the use of commercial products in order to avoid military components that were subject to strict restrictions. By not including these classes, DAWIA did not facilitate the use of prototyping, another recommendation made by the Packard Commission (Fox 2012, 131).

Overall, the Packard Commission and subsequent reforms highlighted the need for a 'faster, better, cheaper' defense acquisition process (RAND 2005b, xiv). Roles were revamped so that decision-making was more formalized and there were more clear lines of accountability. A greater emphasis was placed on having people in the process, from the workforce to the Undersecretary of Defense, who had a more defined skill set and a more focused role in the system. A major emphasis of the Packard Commission, which promoted long-term DoD budgetary planning and two-year appropriations bills from Congress, were not included in the Goldwater-Nichols Act.

1990's Reforms: Cashing in on the 'Peace Dividend'



The 1990s ushered in a new era of defense acquisition reform. Following the end of the Cold War and the dissolution of the Soviet Union, the United States sought to cash in on the "peace dividend". Efforts throughout the 1990s to reform defense acquisition centered on simplifying and streamlining the complex acquisition process, achieving cost saving through commercial purchases, removing military specifications, and identifying the best ways to acquire information technology. These efforts began with the "Section 800" panel and its accompanying report, published in 1993. The panel was tasked with simplifying statutes pertaining to defense acquisition, and delivered 300 recommendations for repeals or changes in law (RAND 2005b, 6). Meanwhile, Vice President Al Gore had initiated the National Performance Review, exploring ways to make government more efficient, which was also published in 1993. These recommendations provided a crucial first step in identifying problematic areas of law and guiding acquisition reform for the rest of the decade.

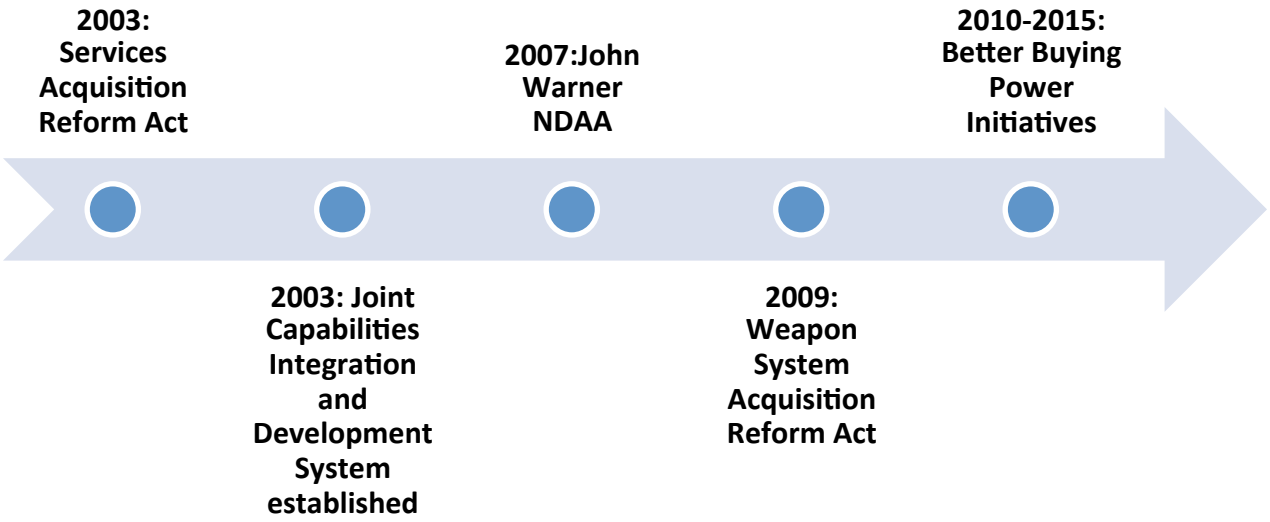
The first legislative step taken in acquisition reform came in the proposed 1993 Federal Acquisition Improvement Act (FAIA). The legislation promoted commercial acquisitions, increased competition, streamlined procedures for small purchases, and provided sizeable funding for small business set asides (Fox 2012, 165-166). However, the legislation lacked substance, and once the Section 800 report was released later that year, a new piece of legislation was developed drawing heavily on the FAIA. The Federal Acquisition Streamlining Act of 1994, incorporated many of the Section 800 panel's recommendations to develop a comprehensive new law. The main accomplishments of the law included; streamlined procedures for purchases under $100,000, a broadened definition of "commercial items", reduced regulations on commercial firms, and an amendment to the Truth in Negotiations Act (TINA) relaxing cost and pricing requirements for commercial acquisitions (Fox 2012, 168). Commercial acquisitions were also encouraged by the Single Process Initiative that allowed a contractor to produce commercial and

military products in the same facilities, while making 'block' changes to existing contracts to structure the change, which resulted in greater manufacturing efficiencies for the contractor and lower costs for the DoD.

The next significant acquisition reforms came in the 1996 National Defense Authorization Act, in the form of the Federal Acquisition Reform Act (FARA) and the Information Technology Management Reform Act (ITMRA), better known as the "Clinger-Cohen Act". FARA raised the dollar thresholds for simplified acquisition procedures and allowed simplified procedures for commercial purchases under $5 million; allowed contracting officers (COs) to limit the number of bidders to ensure efficient competition; exempted Commercial-off-the-shelf (COTS) from certain acquisition regulations; and further relaxed cost and pricing data for commercial sellers (Seitzinger 1996). The other component of the Clinger-Cohen Act, the ITMRA, set guidelines for executive agencies to improve their management and procurement of Information Technology (IT) by encouraging modular contracting and creating the position of Chief Information Officer (CIO) in each agency. The CIO position ultimately resulted in conflict over control over defense acquisitions with IT components.

Major revisions to the DoD Directives 5000.1 and 5000.2 were also made twice in the 1990s. In 1991, prior to much of the legislation previously mentioned, two new phases were inserted in the acquisition process, determination of mission need and operations and support, before Milestone 0 and after the production and deployment phases, respectively. Following the Clinger-Cohen Act in 1996, the 5000 series was revised to included automated information systems (AIS) and the provision requiring prototype competition was eliminated (Fox 2012, 225). Looking forward to the turn of the century, Secretary William Cohen laid out his Defense Reform Initiatives (DRI) plan in 1997, containing four key objectives; adopting modern business practices, streamlining organizations for greater efficiency, using market mechanisms for reduced costs and higher performance, and reducing excess spending to invest resources in core competencies (OSD 1997).

Recent Reforms: The Post-9/11 Era



Since the turn of the century, defense acquisition has faced a new series of challenges following the terrorist attacks of September 11, 2001, the subsequent wars in Afghanistan and Iraq, and the global financial crisis of 2007-2008. In his campaign for the Presidency in 2000, President George W. Bush was highly critical of the drawdown in the size of the military and defense spending, and promised an increased investment in DoD R&D funding to support innovation and emerging technologies in the defense industry (Peters and Woolley 2000). During his Presidency, significant reforms to the defense acquisition system took place. Between 2002 and 2003, the Critical Design Review (CDR) was created, and both the Initial Capabilities Document (ICD) and Capability Production Document (CPD) became requirements.

During this time, the Joint Capabilities Integration and Development System (JCIDS) was established as the requirements generation process (Fox 2012, 226). JCIDS marked the shift from a threat-based approach to a capabilities-based approach. Rather than identifying needs based on specific threats, warfighter needs are established (under the JCIDS process) based upon strategic guidance, e.g. the National Military Strategy and Quadrennial Defense Reviews; allowing for a greater joint coordination between the services (Schwartz 2014, 7-8).

In Congress, the Services Acquisition Reform Act of 2003 sought to improve the federal acquisition workforce and promote best practices in service contracting (O'Connell 2012). Furthermore, the 2009 National Defense Authorization Act established the Defense Acquisition Workforce Development Fund to ensure that enough resources were devoted to improving the quality of the workforce. These two acts not only acknowledged the issues with the defense acquisition workforce, but demonstrated a commitment to addressing and fixing these problems.

The John Warner National Defense Authorization Act of 2007 also addressed acquisition reform, requiring DoD to update Congress on a biannual basis on its implementation of acquisition reforms (Schwartz 2010, 21). Analysis and oversight were further supported by legislation passed in 2009 by both the House and the Senate. In the House, the 2009 NDAA addressed issues with the defense acquisition workforce, and created the Defense Materiel Readiness Board to assess and improve the materiel readiness of the armed services. The DMRB was intended to independently evaluate the ability of the industrial base to support the needs of the armed services, and from there, make recommendations to the Secretary of Defense (USD[AT&L] 2010b, 1). On the Senate side, the 2009 Weapon System Acquisition Reform Act required periodic MDAP assessments, MDAP prototyping, and mandated that the Director of Cost Assessment and Program Evaluation provide independent cost analysis to the Secretary of Defense (Schwartz 2010, 19). The result of these two pieces of legislation was even more formal oversight into the activities of the defense acquisition system.

During the Obama administration, acquisition reform efforts continued, following the cancellation of multiple major programs, including the Army's Future Combat System (FCS). Reform efforts sought to make DoD more efficient in the midst of budget cuts, the drawdown and exit from Iraq and Afghanistan, and looming sequestration cuts in the near future. Within DoD, *Better Buying Power 1.0, 2.0 and 3.0* were published in 2010, 2012, and 2014 respectively, as the new initiatives guiding defense acquisition. The memoranda have seven focus areas; making programs affordable; controlling lifecycle costs; incentivizing innovation and efficiency in industry; achieving effective competition; improving the professionalism of the acquisition workforce; reducing regulation and bureaucracy; and improving acquisition of services (USD[AT&L] 2012). Ultimately, the goal of BBP 1.0 2.0, and 3.0 is to deliver warfighting capabilities within a constrained budget. Despite the acquisition reform efforts of the past five decades, DoD has still suffered from cost and schedule growth, and has been forced to cancel many major programs.

Appendix B - Performance of the Defense Acquisition System

Overview of Current System

The aforementioned reform initiatives have created the Defense Acquisition System (DAS) that exists today. The DAS consists of three interrelated processes that work in concert with one another; the Joint Capabilities and Integration System (JCIDS), the Planning Programming Budgeting, and Execution System (PPBE), and the acquisition process itself under DoD Directive 5000.02. These processes attempt to make the system easier to navigate, but have imposed complex steps to the acquisition and development of weapon systems that make compliance and efficient development practices incredibly challenging to pursue.

Joint Capabilities Integration and Development System

JCIDS is the requirements generation process that begins the DAS. To begin, Capabilities Based Assessments (CBA) analyze military needs and propose both materiel and non-materiel capability solutions. If a materiel solution is proposed, an Initial Capabilities Document (ICD) is prepared to state the utility of the potential weapon system in completing a mission or otherwise improving military capability (Schwartz 2010, 4). During the whole weapon system development process, the ICD establishes the baseline for the capability gap that the weapon system is intended to fill, describes the specific requirements that the system must comply with, and evaluates different materiel approaches. The Joint Resources and Oversight Council (JROC), responsible for managing warfighter requirements, reviews the ICD and decides on the materiel solution. Pending approval, the project continues in the DAS (Schwartz 2010, 4).

Prior to JCIDS being implemented, the Services would each develop its own weapons in response to a perceived threat. By focusing on broader threats to the nation, however, JCIDS is able to more efficiently and effectively allocate resources. Now, there is a process to evaluating threats, combining the National Military Strategy, the National Defense Strategy, and the Quadrennial Defense Review strategy documents into a cohesive plan for resource allocation (Schwartz 2014, 4). While threat-based requirements often result in the acquisition of a new weapon system, some flaws in doctrine, training, or organization can also emerge and requirements can be shaped around remedying these issues as well.

Planning, Programming, Budgeting, and Execution System

At the core of initiating any defense acquisition program is the PPBE system which determines what capabilities are needed, how much funding is necessary to provide those capabilities, and how effectively resources were spent. The PPBE system works concurrently with JCIDS, with planning and programming activities performed during even-numbered, ‘on-years’, while budgeting and execution is performed on a yearly basis. The first stage in the PPBE process, planning, consists of analyzing the needs of combatant commanders as well as the goals

laid out by the President in the National Security Strategy and consolidating them in a Joint Programming Guidance (JPG) to guide the Services and components in planning acquisitions (Schwartz 2010, 5). Based on the JPG, DoD components design programs and submit their proposals in Program Objective Memoranda (POM), which may be altered by subsequent Program Decision Memoranda (PDM). Budgeting is performed side-by-side with programming. Budget hearings and PDMs lead to the submission of Program Budget Decisions (PBDs) to the Secretary of Defense (Schwartz 2010, 5). Execution occurs on a yearly basis to evaluate spending and program performance.

Defense Acquisition Process

The defense acquisition process, known as the 'little a' system, consists of five phases: (1) Materiel Solutions Analysis, (2) Technology Development, (3) Engineering and Manufacturing Development (EMD), (4) Production and Deployment, and (5) Operations and Support. Additionally, there are three milestone reviews to enter various phases: (A) to enter Technology Development, (B) to enter into EMD, and (C) to enter into Production. Based on user needs, an Initial Capabilities Document (ICD) is drafted for a Materiel Development Decision (MDD) determining whether or not the program should enter the system. Following that approval, the program goes through the Materiel Solutions Analysis phase, in which an Analysis of Alternatives (AoA) document is prepared to track each possible solution explored to fulfill the ICD requirements (Schwartz 2014, 8). The first Milestone review, A, takes place following Materiel Solutions Analysis and determines whether the program may progress into the Technology Development and Risk Reduction phase. During this phase, a Critical Capabilities Document is drafted to define what technologies and components are necessary, along with a Reliability, Availability, and Maintainability (RAM) guiding the program's lifecycle sustainment (Schwartz 2014, 9). These documents lead the way for a Preliminary Design Review (PDR), and then Requests for Proposals (RFPs), once program officials believe that the appropriate technologies have matured enough to deliver the program within cost limitations (Schwartz 2014, 10).

A Milestone B review determines whether or not the program can move into the Engineering and Manufacturing Development phases, needing an independent cost estimate, full funding in the Future Years Development Program (FYDP) and sets requirements, among other factors (Schwartz 2014, 11). An acquisition program baseline (APB) containing cost, schedule, and performance parameters is set at that time. During this phase the systems are fully designed, manufacturing processes are established, and subsystems and the system as a whole go through operational testing and evaluation. To progress onto the next phase, Production and Deployment, the system must have an approved Capabilities Production Document (CPD), a stable design, mature technologies, and funding in the FYDP (Schwartz 2014, 12). Production and Deployment begins with Low-Rate Initial Production to field limited quantities and inform the Full Rate Production (FRP) decision. Once enough systems are fielded for full operational capacity (FOC),

the system is ready for the operations and support phase, where the majority of costs occur (Schwartz 2014, 13). Throughout the system, decisions are made by the Milestone Decision Authority (MDA), which is determined by the size and category of the program, and it may enter at any of the milestones as long as it fills the criteria for that milestone and has an approved MDD.

Historical Performance

Major defense programs have been plagued by cost and schedule overruns despite decades of reform. In addition, many major programs have been cancelled after big investments from DoD have already been spent. Factors contributing to their growth include: optimistic cost, schedule, and performance baselines; underestimated risk; changes in quantities or program funding; and changes in requirements. A study in 1969 on 38 ongoing major programs found that cost estimates had risen 50% on average for those programs (Fox 2012, 40). A 1979 RAND study on 17 mature programs in the 1970s discover a mean cost growth of 34% (RAND 1979, 57). These, and countless other studies have tracked cost and schedule growth for programs in development or production, however it is very difficult to provide accurate lifecycle costs, which make up the majority of total system costs. Worse than cost and schedule growth, are cancelled programs. When this happens, large amounts of taxpayer dollars are spent with nothing in return other than technological offshoots from development.

Evaluation of Current Cost, Schedule, and Performance

Since the turn of the century, DoD has continued to struggle with costs and schedule growth for major programs. DoD's 2014 *Performance of the Defense Acquisition System,* measured mean cost growth for development of MDAPs in the range of 48-87%, and 18-30% in production between 2001 and 2013 (USD[AT&L] 2014b). In the past few years, DoD has also cancelled a handful of major programs including the Army's Future Combat System (FCS) (2011) and Comanche Helicopter (2004), having invested $20 billion and $5.9 billion respectively. In 2009, the Air Force cancelled its Transformational Satellite Communications System after a $2.9 billion investment, and the Navy cancelled its VH-71 Presidential Helicopter, having spent $3.3 billion already (GAO 2014, 8). DoD has also been plagued by several highly-publicized scandals of waste, fraud, and abuse. Most notably, in 2003 Principle Deputy Undersecretary of the Air Force, Darlene Druyun was indicted on corruption charges in awarding Boeing a lease deal for the KC-767 tanker, with whom she had negotiated a job after her retirement from the Air Force and intervened in order to keep her daughter employed (Leung 2005). While past scandals have exposed serious flaws in the defense acquisition system, often their solutions have had an additional adverse effect on the defense acquisition system, adding more regulations and oversight.

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Acknowledgement

This research was partially sponsored by Lockheed Martin, and we are especially grateful for the support and guidance provided by Mr. Lou Kratz and Mr. Ron Richburg. We are also grateful for the contribution of the Senior Advisory Group in the development of the recommendations, and the review of our work. The authors also would like to thank Caroline Dawn Pulliam for her assistance with the planning and coordination of this study.

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