Managing the Defense Industrial Base: A Long-Term Strategic Approach

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Managing the Defense Industrial Base: A Long-Term Strategic Approach

 TODAY'S FISCALLY CONSTRAINED AND COMPLEX THREAT ENVIRONMENT REQUIRES THE DEPARTMENT OF DEFENSE (DOD) TO TAKE A MORE ACTIVE ROLE IN MANAGING THE DEFENSE INDUSTRIAL BASE (DIG). OTHERWISE, DOD RISK THE LOSS OF CORE COMPETENCIES ESSENTIAL TO U.S. NATIONAL SECURITY. IN ORDER TO RE-SHAPe THE DIB TO SUPPORT DOD'S TWENTY-FIRST CENTURY REQUIREMENTS, U.S. POLICY MAKERS MUST PROVIDE STRATEGIC GUIDANCE AND DIRECTION. THIS GUIDANCE SHOULD BEGIN WITH IDENTIFICATION OF THE CORE COMPETENCIES REQUIRED TO ACCOMPLISH THE MISSION SET NEEDED TO SUPPORT THE NATIONAL MILITARY STRATEGY. ONCE THESE REQUIREMENTS ARE DETERMINED, THE DIB MUST BE ASSESSED TO IDENTIFY CAPABILITY GAPS AND VULNERABILITIES. THIS ASSESSMENT WILL INFORM THE DEVELOPMENT OF AN INTEGRATED LONG-TERM STRATEGY DESIGNED TO ALIGN THE DIB'S EFFORTS WITH THE NATIONAL SECURITY STRATEGY, TO MANAGE THE DIB COLLABORATIVELY DURING AN ECONOMIC DOWNTURN, AND TO REFORM THE CURRENT REGULATORY REGIME IN ORDER TO LEVERAGE THE BENEFITS OF GLOBALIZATION. A COMPREHENSIVE RESTRUCTURING OF THE DIB PROMISES TO BE A LENGTHY AND COMPLEX PROCESS. THIS SRP IDENTIFIES THE CHALLENGES AND SUGGESTS A METHODOLOGY TO PREVENT THE ATROPHY OF THE DIB-A STRATEGIC ASSET ESSENTIAL TO U.S. NATIONAL SECURITY FOR OVER SIXTY YEARS.

Acquisition, Procurement, Contracting, Sustainment, Budget, Industry
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Abstract

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Today’s fiscally constrained and complex threat environment requires the Department of Defense (DoD) to take a more active role in managing the Defense Industrial Base (DIB). Otherwise, DoD risks the loss of core competencies essential to U.S. National Security. In order to re-shape the DIB to support DoD’s twenty-first century requirements, U.S. policy makers must provide strategic guidance and direction. This guidance should begin with identification of the core competencies required to accomplish the mission set needed to support the National Military Strategy. Once these requirements are determined, the DIB must be assessed to identify capability gaps and vulnerabilities. This assessment will inform the development of an integrated long-term strategy designed to align the DIB’s efforts with the National Security Strategy, to manage the DIB collaboratively during an economic down-turn, and to reform the current regulatory regime in order to leverage the benefits of globalization. A comprehensive restructuring of the DIB promises to be a lengthy and complex process. This SRP identifies the challenges and suggests a methodology to prevent the atrophy of the DIB—a strategic asset essential to U.S. National Security for over sixty years.
Managing the Defense Industrial Base: A Long-Term Strategic Approach

Permeating all of our hard problems in security, including force levels and budget allocations, is the question of the mobilization base. The base must at once be economical enough to be bearable in the long pull—the lean years and the boom years—but at the same time, it must be quickly and fully responsible to the complicated and ever-changing requirements of modern war.

—President Dwight D. Eisenhower

In 1953 the Eisenhower Administration faced an array of challenges that closely mirror those of today: it was challenged to right-size the military in the aftermath of a prolonged period of war, while retaining the capability to prevail in future conflicts. President Eisenhower realized that America’s economic vitality was the key to its security. Also, despite his reservations about the military industrial complex, he realized that the Defense Industrial Base (DIB) was an essential strategic capability. Over sixty years later, the Cold War and its bipolar international order are gone—replaced by an emerging multipolar order, replete with strong economic competitors and numerous potential near-peer military contenders. In the twenty-first century volatile, uncertain, complex and ambiguous operating environment, the DIB must be agile enough to equip forces employed across the full spectrum of military conflict.

The current complicated threat landscape and challenging national fiscal situation are unprecedented, requiring policy makers to view the DIB through a different lens. Sustaining a viable and versatile DIB will require effective government-industry coordination and management. To succeed, the Department of Defense (DoD) must develop a methodology for better management of the DIB by creating a long-term strategy aligned with the National Security Strategy (NSS), by managing the DIB
collaboratively during economic down-turns, and by overhauling the current regulatory regime.

**Creating a Long-Term DIB Strategy Aligned with the NSS**

The first step in creating a long-term strategy for managing the DIB is alignment with the NSS. This effort entails recognition by U.S. policy makers of the critical importance the defense sector plays not only in national security, but also in the nation’s economic vitality. The DIB is generally recognized as consisting of two components; the Organic and the Commercial. The Organic component refers to the DoD’s network of Depots and Arsenals. The Commercial component refers to the private business entities that provide goods and services to the DoD. This Strategy Research Project focuses exclusively on the Commercial component of the DIB; all future references to the DIB should be interpreted in this way.

**Magnitude and Impact of Defense Cuts**

The current fiscal climate and its impact on defense spending is an issue of great concern. The Budget Control Act of 2011 cuts $1 trillion from the DoD. $500 billion of the cuts have already been planned, and the remaining $500 billion in reductions will take effect automatically over the next decade.\(^2\) The expectation is that additional reductions are on the horizon, with the defense budget viewed as the bill-payer for the Administration’s domestic agenda. While decrementing the defense budget in inter-war periods is not uncommon, the magnitude and rapid implementation of the current cuts, coupled with a sagging economy and soaring debt, has many defense contractors at a crossroads.
Is the DIB Too-Big-To-Fail?

As a strategic asset, the DIB requires more careful handling than it has been given in the past. Otherwise, it risks atrophy and loss of key competencies. In recent years, policy makers have intervened to preserve sectors of the economy deemed vital to U.S. national interests. The intended purpose of the 2008 $770 billion Troubled Asset Relief Program was to rescue the banking and automotive industry from insolvency. The mounting global financial crisis and U.S. recession brought to prominence the “Too-Big-To-Fail” philosophy. In 2008, Federal Reserve Chairman Benjamin Bernanke defined “Too-Big-To-Fail” as:

A Too-Big-To-Fail firm is one whose size, complexity, interconnectedness, and critical functions are such that, should the firm go unexpectedly into liquidation, the rest of the financial system and the economy would face severe adverse consequences.³

The DIB, by conservative estimates, directly employs 1.05 million Americans and another 2.48 million indirectly (second, third tier suppliers, etc.). As a share of American economic output, the DIB contributes 2.23% to the Gross Domestic Product.⁴ However, while the DIB’s contribution to the economy is significant, of greater concern is the prospect of an atrophied industrial base unable to respond in a timely manner to a national security crisis, leaving U.S. forces deployed into harm’s way ill-equipped.

The twenty-first century threat environment is unique. The geopolitical isolation that has allowed America to drawdown in the past is no longer the effective barrier it once was to foreign aggression. U.S. policy makers must understand this new environment and realize that as a consequence there will be a sustained demand for military products. The best hedge against uncertainty in the current security environment is a properly equipped, trained, and ready force.
Chairman Bernanke went on to state in his 2010 testimony before the Congressional Financial Crisis Inquiry Commission:

Governments provide support to Too-Big-To-Fail firms in a crisis not out of favoritism or particular concern for management, owners, creditors of the firm, but because they recognize that the consequences for the broader economy of allowing a disorderly failure greatly outweigh the costs of avoiding the failure in some way.\(^5\)

Simply put, the DIB is Too-Big-To-Fail in many respects. Recognizing the potential crises that lie ahead, U.S. policy makers should take action now to prevent a costly bailout, or worse. In a recent interview, former Deputy Assistant Secretary of Defense (DASD) for Manufacturing and Industrial Base Policy (MIBP) Brett Lambert stated that among other issues, “\textit{pension liability may become a major issue, as prime contractors typically pool and spread out pension risk. One example was the NASA cancellation of the space shuttle. As part of the termination settlement NASA was obligated to pay approximately $500 million to cover contractor employee pensions.}”\(^6\)

In order to sustain the DIB, a fundamental and disciplined shift in U.S. policy and military decision-making must occur. The military, as one of the four instruments of national power (diplomatic, informational, military and economic (DIME)), derives its mission set through the policy formulation process.\(^7\) However, decision-makers often fail to consider the DIB when determining the capabilities required to support the military’s role in achieving policy objectives. Deep cuts to defense spending threaten to undermine the military’s ability to effectively play its role in a Whole-of-Government-Approach to security challenges.\(^8\) Assuming the DIB is at a constant state of readiness without active government collaboration and support is unrealistic in the current tumultuous economic and political environment.
Top-Driven Procurement Planning

At present, the level of DoD strategic planning and collaboration with the DIB is insufficient. Defense procurement priorities should be a top-driven process. The process should originate at the Grand Strategic Level and become more detailed as U.S. policy and military-decision makers consider the ways and means required to achieve national interests (ends) through their respective lenses. The nation’s strategic defense documents (National Security Strategy, National Defense Strategy, National Military Strategy, Joint Strategic Capabilities Plan and informed by the Quadrennial Defense Review) should be nested and incrementally provide planners (DoD and DIB) a greater degree of specificity. Currently, the aforementioned documents are not sufficiently integrated and often fail to provide the level of fidelity required for long-term procurement planning. Clear strategic direction is an imperative for the DIB to achieve the national security focus DoD requires.

A national security focus enables the DIB to better develop affordable mission solutions for DoD, and concentrate on sectors of growth to actively reshape their portfolios.\(^9\) In 2011, President Obama announced at the Asian-Pacific Economic Cooperation (APEC) Summit a “Pivot to the Pacific” or a “rebalancing” of U.S. strategic focus away from Europe and the Middle East, and toward the Pacific Region.\(^10\) Further, the 2012 Defense Strategic Guidance focuses on implementing the newly devised AirSea Battle (ASB) Concept and Anti-Access/Area Denial (A2/D2) strategy.\(^11\) DIB executives should take cues from these often ambiguous but sometimes revealing strategic documents. ASB and A2D2 suggest a greater reliance on air and naval platforms potentially at the expense of landpower. Therefore, DIB executives might anticipate a growing demand for systems and capabilities that support these strategies.
and orient their business plans accordingly. DoD must encourage the DIB to shed outdated Cold War industrial-era business models and processes.

The DIB and Joint Capabilities Integration and Development System (JCIDS)

Once the Nation’s defense requirements are developed, DoD’s JCIDS process is initiated to identify gaps by clearly articulating the void between current and desired future capabilities. Identified gaps are assessed to determine whether a material solution is required, or the capability gap can be filled through changes to Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, Facilities, or Policy. In the event a material solution is required, both DoD and the DIB should collaboratively analyze the requirement to ensure industry has the capacity and capability to produce it on the desired timeline.

The Strategic Choices Management Review (SCMR), convened in mid-March 2013 at the direction of Secretary of Defense Chuck Hagel, included the top DoD military and civilian leadership. The SCMR focused on assessing the impact of sequestration on funding priorities within the Department. The resulting efficiencies and reform options, driven by sequestration, were designed to inform DoD’s FY 2015 budget request and serve as the foundation of the 2014 Quadrennial Defense Review. A high-level forum like the SCMR that bridges strategic defense priorities with available resources could serve as a model for future fora that includes industry participation.

The DIB and Planning, Programming, Budgeting and Execution (PPBE)

Once the capabilities required to support U.S. strategic objectives are determined (through a collaborative process with the DIB), the requirements must be matched against available resources. Initial planning should ignore resourcing constraints. This enables policy makers to realize the total cost for what they expect the military to
achieve. These fiscal estimates may result in changes or adjustments to the national strategic objectives or to the means, prompting a shift to more cost-effective or timely elements of the DIME. Once fiscal constraints are applied, DoD, in conjunction with the DIB, can devise acquisition strategies that produce capabilities that both equips U.S. formations and sustains the DIB. This collaboration informs a more efficient execution of DoD’s Defense Acquisition System (DAS) and the PPBE decision support systems. Poor planning and collaboration with the DIB has been mitigated in the past by simply allocating more funding toward the problem. However, in today’s fiscally constrained environment this option is no longer feasible.

A Comprehensive DIB Assessment

A comprehensive assessment of the DIB is required to baseline a long-term strategy. The assessment should begin by defining the core competencies that must be maintained within the DIB to support achievement of the nation’s short, mid, and long-range strategic military objectives. Just as the federal government must make careful decisions about which sectors of the economy to aid in times of fiscal distress (e.g., Too-Big-To-Fail), so must DoD with regards to the DIB. The Office of the DASD (MIBP), in coordination with the Component Acquisition Executives and the DIB, are working toward this end with its Sector-by-Sector, Tier-by-Tier (S2T2) initiative. MIBP initiated S2T2 in 2011 to assist in producing a comprehensive database of the major defense contractors and their second and third tier suppliers by commodity area (or sector). The envisioned database will contain detailed information on approximately twenty thousand private sector companies in order to provide a point of departure for assessments on the relative “health” of the DIB.
DoD has identified Aircraft, Shipbuilding, Ground Vehicles, Missiles/Munitions, Missile Defense, Cyber and Command, Control, Communications, and Computers, and related services as critical sectors of the DIB.¹⁶ S2T2 is envisioned as an iterative process that provides the means to examine the capacity and capability of prime contractors and their second and third tier supply chains. Brett Lambert, who initiated the S2T2 initiative during his tenures as the DASD (MIBP), contends that, “under the old paradigm, for every dollar DoD paid a prime contractor, 30 cents went to subcontractors. However, with some exceptions, there has been a significant shift with approximately 70 cents of every DoD dollar now going to subcontractors.”¹⁷ S2T2 will give DoD greater visibility over the smaller suppliers on which prime contractors are increasingly reliant. Additionally, increased visibility provides DoD with an early warning capability and the maneuver room to develop contingencies in risky sectors.¹⁸

Identification of vulnerabilities (e.g., limited competition, production capacity, etc) informs the development of acquisition strategies and policies to assist these fragile components of the DIB.

**Defense Conversion and Scientific, Technological, Engineering and Mathematics (STEM)**

The utility of the S2T2 database is far reaching; it facilitates solution sets to other systemic ills inherent to the DoD-DIB relationship. One fallacy prevalent in U.S. policy-making circles is that Defense Conversion, or the commercial industrial sector’s ability to rapidly transform itself to meet wartime production demands (and vice-versa), is a viable premise.¹⁹ In the post-World War II period, weapon systems have become increasingly more sophisticated, relying on technologies and manufacturing processes that have no counterpart in the civilian sector. Additionally, retention of STEM talent is
difficult in an uncertain defense market. As the sophistication of current and planned systems increases, so does their procurement cost, which then leads to lower production volumes. Once a military production line ceases operation, and in the event there are no upgrades or planned successor systems, the DIB has no choice but to downsize its increasingly specialized workforce.

**Keeping Production Lines Warm**

Additionally, many of the manufacturing processes and materials utilized in today's systems require specialized tooling. Larger firms that maintain both military and commercial business units, have limited, or no, ability to achieve efficiencies through combining production lines and processes. Even though restarting a "cold" military production line is possible, doing so requires a significant capital investment and time to recruit lost expertise. Another potential benefit of the S2T2 database is its ability to estimate the magnitude and severity of shutting down a production line prematurely, vice structuring the acquisition strategy in a way that gives DoD more options.

The Virginia Class fast attack submarine is one example of modifying an acquisition strategy to support a vulnerable, yet critical, sector of the DIB. Currently, there are only two U.S. firms (operating six shipyards) that build vessels for the U.S. Navy. In order to expedite production, workload multiple companies, and maintain STEM talent, half the submarine was produced at Newport News Shipbuilding and another section at General Dynamics Electric Boat facility. The S2T2 initiative promises to identify situations like the Virginia Class more frequently by utilizing a systematic process.
The Increasing Importance of Foreign Military Sales (FMS)

The S2T2 database could also help target FMS and State Department managed Direct Commercial Sales (DCS) toward sectors that need additional production volume to remain solvent. The DoD's, Defense Security Cooperation Agency (DSCA) is responsible for running the FMS program. DSCA's 900 personnel support 102 partner nations. The mission of FMS is to provide defense material for partner nations; the current focus is to support nations that contribute to the U.S. war on terrorism. Similarly, the State Department’s DCS program issues export licenses for defense articles (usually valid for four years) directly to foreign entities. The role of DSCA and the State Department’s DCS program could be expanded to assist DoD in the identification of foreign customers and candidate weapon systems to keep production lines operational and retain STEM talent.

The F-16 Fighting Falcon multi-role fighter aircraft has benefited immensely from the FMS program. The United Arab Emirates Block 60/61 variant of the F-16, the Desert Falcon, is the most technologically advanced variant of the platform, more advanced in fact than the U.S. Air Force’s (USAF) F-16C/D Block 50-52. In this era of declining defense budgets, opportunities that attract foreign procurement, as well as investment in Research and Development (R&D) must be leveraged to the maximum extent practicable.

Collaborative Management of the DIB in an Economic Down-Turn

DoD should play a role in providing strategic direction to the DIB to facilitate planning for continued operations in an economic down-turn. The cyclic pattern of defense spending is not unprecedented. The current round of budgetary reductions facing DoD are commensurate with post-war periods dating back to World War II.
However, due to the depth of the current fiscal crisis, the present down-turn is expected to last longer and likely require further defense cuts unless the economic situation improves substantially. Consider the following Center of Strategic and International Studies graph:\textsuperscript{27}

![Figure 1. Defense Drawdowns Compared](image)

**R&D Investment Shift**

Further, DoD’s investment in R&D continues to drop as the commercial sector increasingly drives technological innovation. In FY1998, 18% of DoD contracts were devoted to R&D efforts, however, by FY2012 that number dropped to just 10%.\textsuperscript{28} Commercial-driven R&D is expected to continue to rise as DoD enters an era where the defense sector is no longer the primary catalyst for technological innovation and change. Instead, DoD may soon be forced to consider adjusting its requirements to what the commercial sector is driving toward and not vice-versa.\textsuperscript{29}
In fact, this type of adjustment can already be seen in the Army’s recent adoption of fourth-generation, Long-Term-Evolution wireless technology. This move is illustrative of DoD’s shift toward capitalizing on the commercial sector’s lead in certain technologies. LTE coupled with the Multi-Access Cellular Extension project enables the integration of commercial cellular technology with military communication networks.

The revolutionary system brings commercial-style wireless fidelity access points to the battlefield. The result is a mobile ad hoc networking architecture that allows the dissemination of mission command data, imagery, streaming video and voice between individual soldiers and fixed command and control nodes.

**DIB Consolidation Concerns**

Nevertheless, many analysts contend opportunities are resident in an otherwise bleak economic landscape. The fundamental premise often lost in U.S. policy making circles is to develop a strategy *first*, then right-size the enterprise accordingly. Machiavelli best assessed the need for a pragmatic approach to adapting to a rapidly changing operating environment: “Whosoever desires constant success must change his conduct with the times.”

DoD and the DIB must collaborate or face many of the pitfalls experienced during previous down-turns. A round of substantial DIB consolidation occurred during the Post-Cold War down-turn, sparked by the infamous “Last Supper” in 1993. The dinner was hosted by then Secretary of Defense Les Aspin and his Deputy William J. Perry (who would later succeed him). The gathering included numerous defense industry executives who were informed by Mr. Perry that there were twice as many military suppliers as he wanted to see in five years, and that the Government was prepared to watch some go out of business. Following the meeting, a period of acquisitions,
mergers and consolidations swept the DIB. In less than a decade, over fifty defense firms consolidated into six.\textsuperscript{36} In 2013, the ten largest global defense firms commanded a 54% share of the global market, slightly down from 58% in 2010, and compared to just 39% in 1991 prior to the last down-turn. Former DASD (MIBP) Lambert contends that, “another round of prime contractor consolidations is unlikely, however some activity will occur at the second and third tier levels.”\textsuperscript{37}

Figure 2. Chart Data\textsuperscript{38} and Chart Format\textsuperscript{39}

While DoD should not assume the role of business advisor, it does bear the responsibility of providing strategic direction and encouraging efficiency. Strategic direction and efficiency are essential to assisting the DIB to develop the right capabilities at a price DoD can afford.

\textbf{Defense Acquisition System Reform}

Increased DIB efficiency is only one piece of the puzzle. The DoD acquisition process codified in Interim DoDI 5000.2 is recognized as slow and cumbersome--so much so that over the past decade alternate rapid acquisition processes have been
implemented to procure urgent material for soldiers in the field. The Mine Resistant Ambush Protected (MRAP) program exemplifies an expedited acquisition of a platform in response to a critical capability gap. The Improvised Explosive Device threat in Iraq and Afghanistan elevated the MRAP program to DoD’s number one procurement priority in May 2007. In February 2005, less than two years after the requirement was announced the contracts had been awarded and the U.S. Army and Marines began placing orders.⁴⁰

Figure 3. MRAP Timeline of Key Political and Acquisition Events⁴¹

However, in order for rapid acquisition to succeed, certain conditions must be met, according to a recent Government Accountability Office report:⁴²

1. A stable funding stream is required (MRAP was funded almost exclusively through supplemental appropriations).⁴³
2. Requirements must be kept to a minimum, relying solely on mature technology.\textsuperscript{44}

3. Significant competition should be injected into the contracting strategy.\textsuperscript{45}

4. Government should retain responsibility for final integration of subcomponents.\textsuperscript{46}

5. Regulations prohibiting foreign sourcing should be waived (e.g. Berry Amendment for MRAP’s armored plate steel requirements).\textsuperscript{47}

6. Political and Military stakeholder interests must be aligned.\textsuperscript{48}

Rapid Acquisitions also present sustainment challenges for DoD. Due to the speed of procurement, repair parts are usually not provisioned into the military supply system. Likewise, military maintenance personnel are often not trained to support rapidly fielded equipment. So for such equipment, the Army relies on costly contracted logistical support. Meeting urgent requirements is usually very costly, and these products rely primarily on mature technology. As defense budgets contract, rapid acquisition must be used only when absolutely necessary. Rapid acquisition diverts funding from developmental efforts aimed at assuring the U.S. military’s technological superiority.

While rapid acquisition provides a critical capability, it is not a viable alternative to the formal Defense Acquisition System (DAS).

Incremental Acquisition

Therefore, DAS must be modified to be more responsive and introduce more certainty and stability into the process. The interim Department of Defense Instruction (DODI) 5000.02, “Operation of the Defense Acquisition System,” was updated in November 2013. The new instruction includes six different program specific acquisition models: 1) Hardware Intensive Program; 2) Software Intensive Program; 3) Incrementally Fielded Software Intensive Program; 4) Hybrid Program–Hardware
Dominant; 5) Hybrid Program–Software Dominant; and 6) Accelerated Acquisition Program. However, while this new construct provides more program-specific pathways for procurement of defense materials, it neglects incremental hardware development. The primary focus is instead on incremental software development.

The previous version of interim DoDI 5000.02 (dated December 8, 2008) included an optional incremental procurement process called Evolutionary Acquisition (EA). Incremental acquisition alleviates much of the friction between meeting immediate needs and fulfilling desired objective capabilities. Interim DoDI 5000.2 (December 8, 2008 version) defined EA as:

The preferred DoD strategy for rapid acquisition of mature technology for the user. An evolutionary approach delivers capability in increments, recognizing, up front, the need for future capability improvements. The objective is to balance needs and available capability with resources, and to put capability into the hands of the user quickly. The success of the strategy depends on phased definition of capability needs and system requirements, and the maturation of technologies that lead to disciplined development and production of systems that provide increasing capability over time.49

Rather than waiting seven to ten years (or longer) for a full development program, EA divided the envisioned system into increments.

The first increment fields mature military and commercial technology rapidly, then subsequent increments are fielded as the technology becomes available through the development and testing process. Funding is associated with the severable increments, increasing affordability, capping requirements, and thereby giving DoD more flexibility in managing budgets and prioritizing requirements. An incremental hardware and software focused system is required to capitalize on the rapid pace of technological development. Moore’s Law stipulates that the number of components that can be placed on a chip doubles every 18 months. The law has been more practically applied to state the
amount of computing power you can buy for a dollar has roughly doubled every 18 months, for decades.\(^5\)

The F-22A Raptor fighter aircraft, the world’s most advanced military aircraft, provides a vivid example of how a prolonged development process can lead to obsolescence issues at the point of delivery. The USAF announced its requirement for an advanced air superiority fighter to replace the venerable F-15 Eagle in November 1981. Then, for more than two decades, the F-22A development effort was plagued by technical, budgetary, and schedule challenges. Eventually, the F-22 was delivered to the USAF after achieving its Initial Operational Capability in December of 2005. Two years later, the F-22 reached its Fully Operational Capability in December 2007.\(^5\)

Almost immediately, the viability of the computer processor for the airframe’s avionics became an issue. The most advanced fighter aircraft in the world relied on a computer chip (the i960MX) with the processing capability of a 32-bit, 25-mhz, commercial Intel i386 microprocessor. This chip was first developed in 1985 and marketed for home PC use in 1991.\(^5\) The USAF, due to Diminished Manufacturing Source and obsolescence issues, embarked on a costly effort to replace the i960MX with a more powerful processor. The i960MX upgrade required major changes to the F-22’s baseline computer architecture.\(^5\)

Additionally, the uncertainty of twenty-first century threats and advent of disruptive and asymmetrical technologies requires a more flexible approach to requirements. An EA-type system provides the flexibility to make in-stride requirements changes within the overall program through its incremental construct. As the pace of technological innovation continues to accelerate, DoD must adapt its procurement
system accordingly. An incremental hardware and software focused system offers a viable alternative in addressing short-term requirements, while maintaining the ability to develop new technologies.

**Critical Factor Determination**

Within DAS, Acquisition Executives require more flexibility to determine the critical factor in trade-offs between cost, schedule and performance. If schedule is the critical factor, the contract should be written accordingly, and the system subject to termination for convenience in the event the contractor fails to deliver on-time. The same paradigm would apply to thresholds established for Total Ownership Cost and other cost variations such as Build or Design-to-Cost. Traditionally, performance has long been the pacing item for programs, with DoD willing to exceed budgets and extend schedules in pursuit of cutting edge technology. However, in today’s fiscally constrained environment performance at all costs is no longer a practical option. The greatest amount of programmatic trade space and most advantageous risk reduction opportunities exist between Milestone A and Milestone B (prior to entry into the *Engineering and Manufacturing Development Phase*).\(^{54}\)

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**Figure 4. DAS-Hybrid Program (Hardware Dominant)\(^{56}\)**
Again, the objective is to inject more certainty and stability into the process in order to clarify expectations and impose penalties for noncompliance, understanding that the ability to recover sunk cost is limited. Once desired changes in the acquisition process are enacted, policy makers must give these modifications time to prove their value and become anchored in the organizational culture. DAS has undergone frequent modification. The DoD 5000 series, introduced in 1971, has been revised over a dozen times--approximately once every three years (most recently in November 2013).  

However, once a Program of Record has been officially initiated, Congressional interest and a protective constituency is often generated. Moves to decrement, curtail production, or terminate programs are often met with fierce resistance. Due in large part to the employment and revenue large programs bring to the Congressional districts in which they reside. Congressional interest should serve as a planning consideration for Acquisition Executives and Program Managers--not a deterrent.

**Encouraging DIB Efficiency**

Modifying the DAS process is a necessary step toward encouraging the DIB to adopt internal reforms to promote greater efficiency. The government should encourage the DIB to leverage sectors of the economy largely immune to the current fiscal crisis, sectors in which this nation maintains a technological edge. One area that receives scant attention is the ongoing revolution in manufacturing. The U.S. leads the world in robotics and 3-D printing. Also, Computer Aided Design (CAD) and Computer Aided Manufacturing (CAM) are facilitating more flexible acquisition strategies that could be tailored to workload multiple defense firms in fragile sectors of the DIB (e.g., The Virginia Class Submarine acquisition strategy cited previously). The precision CAD/CAM brings to the DIB facilitates concurrent manufacturing; it can also front-load
As manufacturing technology evolves, the DIB’s ability to support DoD requirements for shorter production cycles and lower volumes in a cost-effective manner is more likely.

Crowdsourcing

The Defense Advanced Research Projects Agency (DARPA) Crowdsourcing initiative has taken the CAD/CAM revolution to the system design phase. In a recent competition to design an amphibious armored vehicle for the U.S. Marine Corps, DARPA created a set of web-based collaborative design tools along with a comprehensive database to ensure designers understood how individual components interacted with one another. DARPA then divided the envisioned system into its primary work breakdown structural elements (e.g., drive train, armor, electronics, etc.) and gave over twenty-thousand competitors the opportunity to create and submit their design proposals. The most promising components were then combined by DARPA utilizing computer modelling. The crowdsourcing concept brings an unprecedented level of innovation, competition and abstraction to the design process. At the same time, it provides a level of precision that reduces subsystem integration costs and expedites the design concept’s progress to the prototype stage. Crowdsourcing is indicative of the design and production innovations DoD must harness going forward.

New Start vs. Legacy System Upgrades

Although efficiencies and innovations contribute significantly to the design and acquisition of defense material, they are not a panacea for DoD’s fiscal challenges. Ongoing decrements to the defense budget are impeding DoD’s ability to initiate new-start developmental programs. So DoD must now rely more on commercial/non-developmental items or consider upgrading current legacy platforms. Accordingly, DoD
and the DIB must ensure all future developmental programs engineer into the design as much upgrade flexibility as possible. Initiatives like Modular Open Systems Architecture (MOSA) must become the norm going forward. MOSA incorporates into platform architecture a plug-and-play capability by using standard interfaces to facilitate future upgrades (thereby capitalizing on an incremental EA-type process). Upgrading legacy Cold War-era platforms involves overcoming limitations in Size, Weight and Power (SWaP). The Army’s Ground Combat Vehicle (GCV) program illustrates the friction between either initiating a multi-billion dollar new-start program of record, or upgrading a legacy system with limited SWaP flexibility.

The GCV program was initiated to modernize the current ground combat vehicle fleet (e.g., M2/M3 Bradley, M113A3 and M1126 Stryker). However, GCV protection, passenger capacity, and electronic subsystem requirements have pushed SWaP parameters in the current design beyond acceptable tolerances. Other obstacles include the immaturity of key technologies, such as armor and protection systems. The result is a much heavier vehicle than originally conceived (50-65 tons vice 30-35 tons). The heavier vehicle design and power demands of the networked communications and sensor equipment require a larger engine (1500hp equal to the M1 Abrams Main Battle Tank). Also, OSD’s Cost Assessment and Program Evaluation estimates for the GCV are 30% greater than the Army’s. Due to increased costs, the GCV program is scheduled to replace only 61 of the 346 vehicles in an armored Brigade Combat Team.

A Congressional Budget Office study and Army Analysis of Alternatives determined GCV provides only marginal improvements in capability over a less costly
($9.6 million) upgraded version of the Bradley Fighting Vehicle (+27% protection, +24% mobility and -7% lethality).  

As a result, the GCV program is essentially on-hold. The GCV will most likely be canceled, and the current M2/M3 Bradley Fighting Vehicle fleet upgraded. In the meantime, research and development of light weight armor and other defensive countermeasure systems will continue. The GCV/Bradley Fighting Vehicle model is likely to become the norm for the foreseeable future. The Services will remain under enormous pressure from the Office of the Secretary of Defense (OSD) and Congress to make more rigorous determinations on affordability and technical maturity in order to justify requests for new programs vice upgrades to current systems.

Overhauling the Regulatory Regime

Congress and DoD recognizing the magnitude of the fiscal crisis and vulnerability of the DIB must align their efforts to reform the current regulatory regime. The existing
body of legislation, regulation, and policy, developed in large part to safeguard America’s security and domestic economic interests are no longer suited to the increasingly globalized economy. The DIB’s ability to compete globally and leverage foreign sources of supply is severely inhibited by the current regulatory regime. Also, the massive and costly additional bureaucracy required by the DIB to ensure compliance is arguably no longer affordable and a barrier to efficiency. While not advocating a *laissez faire* regulatory environment, a balance must be struck between protecting the interests of the tax payer and the actual benefit achieved.

**Regulation Necessitates Oversight Bureaucracy**

The cyclic nature of defense spending, coupled with DIB consolidation, has fostered a “must-win” mentality amongst many defense companies. Some in the defense industry have compromised the integrity of the process by resorting to underbidding and presenting overly optimistic learning curve estimates to secure the decreasing number of lucrative DoD contracts. When these abuses are highlighted in the press, Congress has responded by enacting volumes of statutes and regulations in order to remedy the situation and placate their constituents. To enforce the regulatory regime, huge bureaucracies have been erected to oversee contractor performance (such as the Defense Contract Management Agency, Defense Contract Audit Agency and DoD Office of the Inspector General). In response, the DIB has, in most cases, divided their commercial and military business units into separate entities. Their military business units have become large bureaucracies to ensure government compliance; the incurred additional overhead expense is then passed back to the government.

Increased overhead expenses ultimately inflate the unit cost of procured items. In a
fiscally constrained environment, a cost benefit analysis is required to right-size and focus the regulatory regime to the actual problem.

In fact, several well-documented cases of infighting between the Defense Contract Management Agency (DCMA) and Defense Contract Audit Agency (DCAA) indicate a questionable return on the taxpayer’s oversight agency investment. Establishing a clear delineation of roles and responsibilities between the two agencies has proven an elusive goal. In November 2012, the DoD Inspector General reported that efforts by OSD Defense Procurement and Acquisition Policy to align the two organizations through modifications to the Defense Federal Acquisition Regulation Supplement resulted in further inefficiencies costing taxpayers $249.1 million. Meanwhile, other indicators of contractor performance cast further doubt on oversight agency effectiveness. Since 1993, development contracts have experienced a median of 32% cost growth. Similarly, since 1997 over 31% of all major defense acquisition programs have experienced cost growth of at least 15%. Inaccurate contractor cost estimates correlate directly to 40% of program cost overruns. In fact, cost growth was a contributing factor to the Army’s cancellation of twenty-two major defense programs between 1990-2010. While not solely responsible for these programmatic shortfalls, cost estimation and accounting system oversight is the shared domain of DCMA and DCAA.

Cost-based Accounting System

Another area requiring closer examination is the government’s cost-focused accounting system. The government requires the detailed accounting of each and every dollar spent on a defense program. While in the commercial sector, the principal focus is on the final price. This distinction causes many DIB companies to maintain two
different and often redundant business units to manage separate commercial and
government accounting systems. Complex programs do often benefit from additional
oversight, but a more selective or tiered regulatory system could lead to leaner
government oversight agencies and greater integration of DIB commercial-government
business units. Additionally, reduced overhead and complex accounting requirements
would likely encourage greater business participation and competition.

Domestic Protectionist Legislation

Protectionist legislation aimed at ensuring the preservation of domestic sources
of supply should also be reexamined. The *Buy American Act* and *Berry Amendment* are
often confused, and their titles sometimes used interchangeably. However, these are
two distinct pieces of legislation. The *Buy American Act* was enacted in 1933, a
depression-era measure levying a domestic preference on federal government
procurements. Only substantially amended four times since its inception, its most
significant amendment defined “American Made” as at least 50% of a commodity’s cost
being attributable to American content. Conversely, the *Berry Amendment* applies
specifically to the DoD; it includes a set of domestic sourcing restrictions that impose a
“super percentage” (100% American content) on affected commodities.

Impact on Whole-of-Government-Approach

The *Buy American Act’s* impact on DoD and the DIB is less significant than that
of the *Berry Amendment*, but it does potentially affect interagency procurements and
cooperation. The U.S. National Security Strategy articulates achievement of our national
interests through a Whole-of-Government-Approach. The approach employs all of the
instruments of national power (DIME). However, when these instruments operate under
different regulatory regimes, their ability to cooperate and consolidate requirements is
impacted. For example, the Department of Homeland Security may share Intelligence, Surveillance and Reconnaissance requirements with DoD, but it may also incur additional expenses while collaborating with DoD due to the super percentage required by the Berry Amendment.

Also, the U.S. Agency for International Development is required by the Buy American Act to procure motor vehicles, pharmaceutical and agricultural products from domestic U.S. sources. In times of emergency, local sourcing at international sites may make sense; however, lengthy waiver processes add an often unnecessary degree of complexity to an already hectic operating environment. Resulting delays stress other elements of the DIME to fill the void in order to provide immediate assistance. Therefore, standardized regulatory regimes that facilitate interagency cooperation should be considered when reexamining domestic preference legislation.

The Berry Amendment

The Berry Amendment, named after South Dakota Congressman Elias Y. Berry, was originally a series of provisions in the 1941 Supplemental National Defense Appropriations Act. The Act was crafted to preserve elements of the DIB deemed essential in wartime and to preclude the vulnerabilities inherent in foreign sourcing. The Berry Amendment was renewed and amended annually until passage of the FY2002 National Defense Authorization Act (NDAA), which made it a permanent part of United States Code (Title 10 U.S. Code 2533a, Requirement to Buy Certain Articles from American Sources; Exceptions). This legislation covers food products, clothing, fabrics, fibers, yarns, hand tools, measuring tools, and, until passage of the FY2007 NDAA, also included specialty metals. Specialty metals now have their own dedicated
section in U.S. Code (Title 10 U.S.C. 2533b, Requirements to Buy Strategic Materials Critical to National Security from American Sources; Exceptions).  

Nevertheless, are U.S. security and economic interests really served by the Berry Amendment? Critics contend the Berry Amendment unduly restricts free market trade and lulls affected businesses into complacency. Companies possessing a guaranteed customer may see no need to modernize, innovate, or seek efficiencies due to the lack of competition. A more rigorous, future-focused examination of the commodities subject to the Berry Amendment is in order.

Informed by analysis from the S2T2 initiative, the commodity list could be updated to support those items deemed both “fragile” and “critical” in the industrial base. Such an updated targeted approach is appropriate in a resource-constrained environment. Prudent risk must be accepted in some areas of the DIB. The FY2014 NDAA directs both DoD and the Army to study the availability of Berry Amendment-compliant athletic footwear--a situation where risk could be assumed. Another problematic situation involves the procurement of Berry Amendment-compliant uniforms for the Afghanistan Army. If U.S. national security objectives in Afghanistan include economic self-sufficiency, then domestic production should be the priority. A modified Berry Amendment could include provisions that ensure a majority stake of a particular commodity is awarded to domestic companies. Foreign competition could also be permitted in order to diversify the supply chain and infuse competition and innovation in currently “protected” areas of the DIB.

Export Controls

In order to diversify the supply chain and reduce barriers to both foreign investment and U.S. competitiveness in global markets, the International Traffic in Arms
Regulations (ITAR) also requires examination. The intent of ITAR is to safeguard U.S. trade secrets and prevent abuse of dual-use technologies. ITAR is administered by the State Department’s Directorate of Defense Trade Controls. Export controls like ITAR provide another area where the risk of less stringent regulation must be weighed against the benefit of increasing U.S. competitiveness in an increasingly globalized marketplace.

Export Control Reform

In 2009 President Obama announced the Export Control Reform (ECR) initiative to address the classification and licensing of items subject to ITAR restrictions. The current export control system involves numerous agencies. The Department of Commerce regulates the export of dual-use goods (commercial items with potential military application) by maintaining a roster of controlled items known as the Commerce Control List (CCL). The Department of State maintains its own list of regulated material known as the U.S. Munitions List (USML).

| I | FIREARMS |
| II | ARTILLERY PROJECTORS |
| III | AMMUNITION |
| IV | LAUNCH VEHICLES, GUIDED MISSILES, BALLISTIC MISSILES, ROCKETS, TORPEDOES, BOMBS and MINES |
| V | EXPLOSIVES, PROPELLANTS, INCENDIARY AGENTS, and THEIR CONSTITUENTS |
| VI | VESSELS OF WAR AND SPECIAL NAVAL EQUIPMENT |
| VII | TANKS and MILITARY VEHICLES |
| VIII | AIRCRAFT, (SPACECRAFT) and ASSOCIATED EQUIPMENT |
| IX | MILITARY TRAINING EQUIPMENT |
| X | PROTECTIVE PERSONNEL EQUIPMENT |
| XI | MILITARY (and SPACE) ELECTRONICS |
| XII | FIRE CONTROL, RANGE FINDER, OPTICAL and GUIDANCE and CONTROL EQUIPMENT |
| XIII | AUXILIARY MILITARY EQUIPMENT |
| XIV | TOXICOLOGICAL AGENTS and EQUIPMENT and RADIOLOGICAL EQUIPMENT |
| XV | SPACECRAFT SYSTEMS and ASSOCIATED EQUIPMENT |
| XVI | NUCLEAR WEAPONS DESIGN and TEST EQUIPMENT |
| XVII | CLASSIFIED ARTICLES, TECHNICAL DATA and DEFENSE SERVICES NOT OTHERWISE ENUMERATED |
| XVIII | RESERVED |
| XIX | RESERVED |
| XX | SUBMERSIBLE VESSELS, OCEANOGRAPHIC and ASSOCIATED EQUIPMENT |
| XXI | MISCELLANEOUS ARTICLE |

Figure 6. The United States Munitions List (USML)
Further, restrictions on exports are administered by the U.S. Department of the Treasury, and enforcement of export controls are variously carried out by the Department of Commerce, Department of Homeland Security, Department of Justice and DoD.87 The ECR is focused on accomplishing four tasks: maintaining a single control list, designating a single licensing agency, assigning a single enforcement agency, and creating a single integrated computer database.88

The U.S. space industry provides an example of an industrial sector harmed by the complexity of the current export regulatory regime. In 1996 a Chinese rocket carrying an U.S.-manufactured satellite crashed just after lift-off.89 The Chinese government invited the satellite maker, Loral Space Systems, to participate in the ensuing investigation. The U.S. government quickly interceded, claiming Loral was not authorized to participate in the investigation under the issued export license. The Department of Justice ultimately levied a $14 million fine on Loral. Also, in the 1999 NDAA Congress directed that all space-related items, including satellites be controlled as defense articles under category XV of the USML.90 This legislative action addressed concerns that China was acquiring U.S. space technology to further its nuclear missile program.

The addition of satellites to the USML came at a time of decreased U.S. investments in the space program and rapid globalization of the international space market. International customers of U.S. space products were suddenly faced with a range of unpleasant choices: apply for export licenses for both the purchaser and end-user with processing timelines averaging six months; file lengthy and detailed disclosure forms regarding the purpose of the transaction; and potentially lose money because of
missed deadlines due to rejected export license requests. As expected, the market responded: European manufacturer Thales Alenia Space marketed a high successful “ITAR-free satellite.”

The Thales satellite did not contain any U.S. manufactured components, and therefore became an attractive alternative in the international marketplace. Even a single U.S.-manufactured component makes the entire item subject to ITAR. Fortunately for U.S. space product manufacturers, Congress acknowledged this error. The FY2013 NDAA removed commercial satellites from the USML. However, the extent of the damage done to the U.S. space industrial base is still not fully understood. Also unknown is whether or not the U.S. can recapture and grow its prior share of the international space market lost between 2009-2013.

USML to CCL Migration

The focus of the ECR effort since 2009 has been reevaluating the USML to determine which items are the true crown jewels of U.S. national security technology. The goal is to erect a tall fence around the items and technologies that require regulation for national security purposes. Items not meeting the crown jewel standard are being incrementally migrated (by USML category) over to the CCL. Eventually an estimated ninety percent of the USML is expected to be transferred over to the CCL. While the effort is making steady progress, there are significant political hurdles to cross. Further, critics contend some key issues are being overlooked.

Export Control Reform Progress

First and foremost, many multinational companies are concerned with the slow pace of ECR implementation, as the effort enters its fourth year with much work still to do. As mid-term Congressional elections approach, and given the deeply divided
partisan atmosphere in Washington, significant progress is unlikely in the near future. Additionally, as U.S. policy makers explore ways to streamline the export licensing process, both China and Russia are being excluded from consideration. China and Russia offer two enormous and lucrative markets that historically have large volumes of licenses in the system. If an appropriate degree of analytical rigor is being applied to migrating items from the USML to the CLL, then authorizing sales to Russia and China should not be an issue.

Also, many in Congress consider 2014 as the make-or-break year for the ECR initiative. In October 2014, the first set of new ECR regulations go into effect, with previously controlled USML items being available for export under the new system. However, questions persist as to precisely which enhanced controls will constitute the higher fence envisioned for the crown jewels remaining on the USML. Also, Congressional concerns persist regarding whether U.S. companies will move the manufacture of the newly de-regulated items overseas. Progress is being made, but U.S. industry is still operating in a stricter regulatory environment than its competitors. Until demonstrable changes are implemented and basic macroeconomic open market principles are observed, uncertainty will continue to discourage foreign investment and promote capital flight to other nations.

Aggregate Effect of Regulatory Regime

Individually, some aspects of the aforementioned measures (Buy American Act, Berry Amendment, ITAR and NDAs) remain sound policy. These aspects are worth retaining even in a globalized economy and fiscally constrained environment. However, the frequency of change and its aggregate negative effects must also be considered. Unraveling the complex, ever-changing and interwoven tapestry of regulation is
problematic. Violations are costly, both in terms of monetary penalties and accumulation of adverse past performance data that affect competitiveness for future government contracts. The current regulatory regime highlights the friction between obtaining the best value for the government and promoting domestic policy goals. However, DoD must do its part in informing policy makers of the corrosive effects the current regulatory regime has on U.S. commerce. Congressional support is essential to align stakeholder efforts to right-size, simplify, and update the current regulatory regime.

Conclusion

The Defense Industrial Base (DIB) must be preserved to prevent atrophy and loss of capabilities essential to U.S. National Security. A long-term strategy to manage the DIB is not a one time or simple fix. Instead, this strategy requires a sustained effort to convince successive Administrations to re-shape the DIB to support DoD’s twenty-first century requirements. The S2T2 and ECR initiatives provide two components of a broader strategy whose momentum must be maintained and anchored in the national security culture. Ultimately, U.S. policy makers must lead the effort to provide strategic guidance and direction that aligns the DIB’s efforts in support of the National Security Strategy; collaboratively sustains the DIB during the current and future economic downturns; and reforms the current regulatory regime.

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