Effective Acquisition Strategies for Systems Engineering and Technical Assistance (SETA)

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July 2012

This research was partially sponsored by the
Naval Postgraduate School

Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
JUL 2012		**00-00-2012 to 00-00-2012**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Effective Acquisition Strategies for Systems Engineering and Technical Assistance (SETA)	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **University of Maryland,Center for Public Policy and Private Enterprise - School of Public Policy ,2101 Van Munching Hall ,College Park,MD,20742**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT **unclassified**	b. ABSTRACT **unclassified**	c. THIS PAGE **unclassified**	**Same as Report (SAR)**	**81**	

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Executive Summary

This report addresses the policy changes that are necessary if the Department of Defense (DoD) is to reconcile its growing need for systems engineering and technical assistance (SETA) with the realities of today's defense industry. The DoD relies heavily upon SETA contractors to facilitate the acquisition of complex systems. SETA contractors are civilian experts who provide analysis and engineering services to the government and often work hand in hand with government engineering staff. This arrangement provides numerous benefits to the DoD. For instance, SETA contractors are able to provide the flexibility and quick availability of expertise to DoD programs without the commitment or expense of sustaining a large, long-term government staff.

It must be emphasized that decisions on many aspects of systems engineering concerning the organization of goods and services by the DoD (e.g., systems architecture optimization, cost performance options, tolerable technology risks, realism of schedule feasibility, etc.) are judgments that are inherently governmental and must be made by government officials with a background and understanding of systems engineering. However, the generation of the analyses and simulation, for example, that inform these judgments can be perhaps best done by private-sector SETA contractors, provided that they are, in fact, independent and, thus, objective.

However, as reliance on contractors has increased, so has vertical and horizontal consolidation within the defense industry, which has led to the significant reduction in the number of independent firms capable of providing the DoD with objective SETA services. Indeed, firms selected to design and construct military systems have, on occasion, also provided advisory services via one or multiple SETA contracts. This trend has led to the growing concern that firms may be considering their own, and possibly long-term, interests (or the interests of their affiliates) in designing a system, which disadvantages both the government and other firms. Organizational conflicts of interest (OCIs) of this sort present a serious impediment to the successful execution of DoD programs.

Beginning in 2009, as part of its wider efforts to reform government contracting and correct perceived abuses, the Obama administration began an initiative to insource (i.e., convert to civil service positions) some functions that had been provided through SETA contracting with private firms. The objective was to reduce reliance on contractors and, some believed, improve cost efficiency. But thus far, insourcing has not produced the anticipated results. Given the realities of our military's internal capabilities and today's defense industry, how should the DoD acquire objective, quality systems engineering and technical advice?

The Federal Acquisition Regulation (FAR, 2005) recognizes the importance of SETA contracts, stating, "The acquisition of advisory and assistance services is a legitimate way to improve government services and operations" (FAR, 2005, subpart 37.203). Accordingly, advisory and assistance services may be used at all organizational levels to help managers "achieve maximum effectiveness or economy in their operations" (FAR, 2005, subpart 37.203). In fact, the military has relied upon SETA contractors for decades. Since the end of the Cold War, however, two trends have increased the DoD's reliance upon SETA contractors: the growing complexity of modern military systems (and systems-of-systems [SoS]) and reductions to the DoD's acquisition and technical workforces. As a result, the DoD is unable to meet the increasingly complex requirements of systems acquisition using its organic resources.

The environmental factors that have shaped today's defense industry—the growing complexity of weapons systems, an inadequate acquisition workforce, and industry consolidation—have given rise to specific challenges, both real and perceived, that further constrain the DoD's ability to acquire SETA services. These challenges include both the occurrence of organizational conflicts of interest and the legislation designed to mitigate them. Additional challenges include the ambiguity surrounding inherently governmental functions and the perception, shared by government and many in the public, that there are too many contractors working for the DoD.

Beginning in the 1960s, Congress enacted federal guidelines to address OCIs and passed several pieces of legislation governing SETA contracting in particular. These laws were designed to create a contracting structure that is fair, efficient, competitive, and capable of providing the U.S. military with the services it requires. The relevant FAR was initially released in 1967, with the most recent version being issued in 2005. The FAR applies broadly to federal government

contracting, providing guidance to contracting officers of both military and civilian agencies. The FAR explicitly seeks to protect the competitive process by preventing unfair advantage and impaired objectivity (FAR, 2005, subparts 9.505-1 and 9.505-2). The FAR places the responsibility for determining the existence of potential or actual OCIs on federal agencies. The FAR does not offer specific guidance about what satisfies an agency's obligation to consider an OCI, nor is there a standard set of considerations that must be weighed. The FAR also does not indicate which mitigation procedures are most appropriate. Rather, the FAR delegates the decision to the program office, which may have the best perspective on the conflicts as well as on how they should be addressed.

In 2009, President Obama signed into law the Weapons Systems Acquisition Reform Act (WSARA), which was intended to reform the acquisition of expensive, highly technical SoS. The act directs the DoD to "provide uniform guidance and tighten existing requirements for OCI by contractors in major defense acquisition programs" (Metzger, 2011, p. 2).

It is unclear if the intentional ambiguity contained in the final rule provides flexibility to both the DoD and to contractors so that they can efficiently pursue cost-effective systems or if business planners are unable to determine whether or not certain contracts violate OCI rules, making it difficult for them to align their practices to meet government needs. Rather than take a wait-and-see approach, some firms that provide SETA functions have been proactive in making significant changes to their organizational structures.

In 2007, President Obama campaigned to "reform federal contracting and reduce the number of contractors" (Obama, 2007, p. 1). In 2009, Obama issued a memorandum directing federal agencies to reform the contracting process, stating that contracting is "plagued by massive cost overruns, outright fraud, and the absence of oversight and accountability" (Obama, 2009, p. 1). Alhough some of this criticism may be warranted, it serves to further the negative perception of defense contractors, the vast majority of which operate in strict accordance with the law and provide products and services to the DoD at competitive prices. The fact is that without government contractors, the U.S. military would be unable to carry out many of its functions that are vital to national security.

The rapid growth in the number of contractors over the last two decades, in and of itself, does not justify the assertion that there are too many of them. By failing to define the problem in more specific terms, recent policy efforts have often proven misguided. For example, the Obama administration sought to bolster the government workforce by converting contractor positions into government jobs, a process known as *insourcing*, and estimated that this would save up to $44 billion annually (Department of Defense Appropriations Act, 2010). This prediction was echoed across the DoD, which, in assembling its 2011 budget, calculated a 30–40% savings for each insourced position (Soloway, 2009). This estimate was likely based on a comparison of the cost of the contractors versus the basic salary of the government employees, which overstates the savings (Gansler, Lucyshyn, & Rigilano, 2012). A year after President Obama launched this initiative, Defense Secretary Robert Gates concluded that insourcing was not producing the anticipated cost savings (Brodsky, 2010b). Regardless of the rationale behind insourcing, there is, indeed, no doubt that some functions (e.g., decision-making, management, budgeting, contracting, oversight, etc.) are inherently governmental and that contractors, therefore, should be limited with regard to the services that they are permitted to provide.

However, the point at which a function ceases to approach—and actually becomes—inherently governmental has been open to subjective interpretation, as has the decision regarding whether a particular function would be provided by the government or by contractors. In 2011, in an effort to bring some clarity to the definition of *inherently governmental*, the Office of Management and Budget (OMB) issued a letter that included a lengthy list of functions that are "clearly inherently governmental" and a separate list of "functions closely associated with the performance of inherently governmental functions" (p.1). Examples of "closely associated" functions include supporting budget preparation activities; providing support for development of policies, regulations or legislative proposals; and conducting market research or drafting statements of work in support of an acquisition (OMB, 2011). In addition, the memo defined a new category, "critical functions." These functions were defined to help government agencies "identify and build sufficient internal capacity to effectively perform and maintain control over functions that are core to the agency's mission and operations" (OMB, 2011, p.1).

The OMB made it clear that these additions and clarifications were not intended to discourage the appropriate use of contractors. The OMB wrote, "Contractors can provide expertise, innovation, and cost-effective support to Federal agencies for a wide range of services. Reliance on contractors is not, by itself, a cause for concern, provided that the work that they perform is not work that should be reserved for Federal employees and that Federal officials are appropriately managing and overseeing contractor performance" (OMB, 2011, p.1). Although this memo was intended to add clarity, it has only added to the ambiguity surrounding the identification of work that should be reserved for government employees with the creation of two more categories, each of which can be interpreted broadly. In addition, given the current administration's perception that there are too many contractors, it seems likely that officials may adopt an overly cautious stance, hiring and using organic resources for the performance of non-inherently governmental functions, which will reduce the efficiency with which competitive, independent SETA services might otherwise be acquired.

In light of these challenges, we examine possible strategies for acquiring SETA services. These include (1) augmenting the DoD's organic capability, (2) incentivizing the development of independent SETA firms, and (3) transitioning the provision of SETA functions to federally funded research and development centers (FFRDCs). Below we provide the advantages and disadvantages of each strategy.

1. Augment the DoD's Organic Capability

Advantages

- *Increases objectivity and reduces the potential for OCIs*
  OCIs would be less problematic if the provision of SETA functions is transitioned to the DoD's internal capability.
- *Allows the DoD to leverage existing infrastructure*
  By adding capacity to perform SETA functions, existing resources may be able to "absorb" the newly added functions (i.e., add functions without a proportional increase in support costs).
- *Facilitates clearer delineation of inherently and non-inherently governmental functions*
  In-house provision of SETA functions helps to obviate risks and challenges of identifying inherently governmental functions.
- *Reduces the challenges that result from inadequate requirements specification*
  With regard to systems engineering, the government may not only fail to specify what it wants but also may not know what it wants—at least not initially. It stands to reason, then, that given the many systems in various phases of development across the DoD at any one time, the DoD organic workforce may be in the best position to coordinate and perform ongoing systems engineering through the efficient allocation of its internal resources.
- *Reduces SETA acquisition transaction costs*
  There is a cost associated with participating in the market (i.e., making an economic exchange) beyond that which is reflected in the price of a good or service. In-house provision would eliminate the transaction costs associated with SETA contracting.

Disadvantages

- *Increases the size of the government workforce in an era of significantly constrained resources*
  Congress has not yet developed a strategy to manage growing entitlement spending. Accordingly, the DoD, which consumes the second largest portion of government revenue after entitlements, will likely see significant cuts in coming years. In-house provision of SETA functions entails significant overhead costs, some of which are often unaccounted for in comparisons of government and contractor costs.

- *Requires DoD agencies to increase compensation for high-skill positions*

  It is likely that the best-qualified and highly educated tend to gravitate toward the private sector because the compensation for high-skill positions is higher. Accordingly, the DoD might have to offer higher compensation if it wishes to dramatically increase its number of highly educated, -experienced, and -skilled workers capable of performing SETA functions.

- *Reduces the DoD's ability to allocate costs*

  At present, most government agencies do not keep extensive cost-based accounting records that include overhead costs. On the other hand, the cost of service provision via a private-sector firm is decidedly easier to calculate because all of the government's costs are reflected in the agreed-upon contract award—there are no overhead, hidden, or legacy costs.

- *Reduces agility*

  Contractors can be mobilized and terminated quickly, without the commitment or expense of sustaining a large, long-term staff.

- *Will not provide the required technical capability*

  At present, the organic workforce does not have the technical capability (e.g., labor or simulation tools) to oversee the integration of complex systems-of-systems, which makes the effective in-house provision of SETA functions difficult to rationalize.

- *Reduces program stability*

  Unfortunately, within the DoD, policies are not properly implemented and progress is lost because of rapid turnover of individuals at the senior levels. Undertaking the provision of all SETA functions would present many known and unknown challenges to the DoD, and without strong, consistent leadership, it is difficult to justify.

- *Requires a change in official U.S. policy*

  The OMB Circular A-76, entitled *Performance of Commercial Activities*, states that "longstanding policy of the federal government has been to rely on the private sector for needed commercial services, where a commercial service is defined as one that is a result of a requirement, or need, that the federal government has that could be obtained from a private sector source" (Congressional Research Service [CRS], 2005). Transitioning SETA functions in-house would cause concern among private firms and the professional

organizations of which they are a part. They would likely cite this policy in raising their objections.

2. Encourage the Development of Independent SETA Firms

Advantages

- *Balances private-sector advantages with OCI concerns*
  Firms with hardware exclusion contracts are only concerned about ensuring proper selection and integration of systems. In such an environment, the success of an independent firm is dependent only on the ability of the total package to function optimally, and at the lowest cost.
- *Increases competition and reduces costs*
  It is well known that increased competition results in greater efficiency, more innovation, higher quality, and better performance. In terms of cost savings, relying on competition has allowed the DoD to realize savings greater than 30% over what it would have otherwise paid, regardless of which sector wins (*Statement*, 2000). By increasing the number of objective, independent SETA firms, it may be possible to achieve higher savings.
- *Increases potential for best-value solutions*
  Independent SETA firms may be uniquely suited to provide the DoD with best-value solutions. When traditional defense industry firms design, develop, and produce systems, there is less incentive to use high-performance, lower-cost components or features. In addition, traditional firms tend to expand the scope of programs by implementing constant design changes, which bolster revenues but delay fielding while increasing costs to the DoD.

Disadvantages

- *Requires firms to constrain their growth*
  Large defense firms can leverage their experience and lessons learned from the R&D, development, and manufacturing phases to improve the efficiency with which they provide ongoing SETA support, which, at least in theory, could lead to lower costs for the customer.

3. Transition SETA Functions to Federally Funded Research and Development Centers

Advantages

- *Balances private-sector advantages with concern over inherently governmental functions*
  Because FFRDCs are non-profit, government-associated organizations, they are often provided with information that is sensitive in nature. Relying on FFRDCs for SETA functions may reduce the need to provide private-sector firms with this information.
- *Enables the government to attract and retain young engineers*
  FFRDCs familiarize young professionals with their sponsoring government agency, which may facilitate the rotation of personnel between the government and contractor workforces.
- *Provides program stability*
  Because FFRDCs have long-term relationships with government agencies, they are in a better position to understand the agency's culture, expectations, and operating environment.

Disadvantages

- *Does not eliminate organizational self-interest*
  FFRDCs, like private-sector firms, have an incentive to attract government business. Because the centers generally have full-time staffs, it is in FFRDCs' interest to ensure that there is sufficient work.
- *Discourages competition*
  Per their charters, FFRDCs do not compete, so all their work is done on a sole-source basis. Industry has long accused government agencies of forgoing the normal, competitive procurement process; instead, industry advocates assert, agencies direct work to FFRDCs out of convenience, even though they may not offer the most cost-effective solution.
- *Reduces cost effectiveness*
  There is a long-standing contention that the DoD's relationship with FFRDCs is one of convenience and that rather than take the necessary efforts to formally compete work,

DoD agencies go straight to FFRDCs even though it may not be in keeping with official guidelines governing the use of FFRDCs or encouraging competiton.

- *Requires a change in statute*
  The FAR mandates that FFRDCs "meet a special long-term R&D need that cannot be met as effectively by the government or the private sector." Transitioning the provision of SETA functions to FFRDCs is, then, problematic.

We have described three possible strategies for acquiring SETA services, as well as their advantages and disadvantages. We contend that each strategy has its merits and that a one-size-fits-all solution is inappropriate. Rather, the strategy that is applied must depend on the specific nature of the program in question, including its scope, duration, and purpose. To that end, we propose the following recommendations.

- *Build the DoD's capacity to effectively manage, guide, and oversee SETA contractors*
  The DoD must be able to manage and oversee SETA providers. Accordingly, the DoD must recruit highly qualified systems engineers who have relevant domain experience. As mentioned in the previous section, those with professional degrees (e.g., certified engineers) or doctorates are the only segment of the government workforce that, in terms of total compensation, earns less than their private-sector counterparts. Thus, increasing this segment's pay is critical, especially for those in program management positions.
- *Ensure that the DoD has the capacity to perform inherently governmental functions*
  Inherently governmental functions must be clearly defined. The current guidance makes use of two new categories (i.e., functions that are "closely associated" with inherently governmental and functions that are "critical"). Moreover, the new guidance was drafted largely in response to the notion that there are too many contractors working for the DoD, a meaningless assertion that detracts from the issue at hand. The DoD must ensure that it has the capacity to perform inherently governmental functions (e.g., oversight, management, and decision-making) by increasing the size of its acquisition and technical workforces. Doing so will minimize concerns over the number of contractors and obviate the need for the OMB's recurrent guidance.

- *Incentivize the formation of independent SETA firms*
  It is unclear whether firms specializing in the provision of SETA services outperform traditional defense contractors (in terms of cost and quality). However, they are free of the reality, and even the perception, of conflicts of interest. Thus, the DoD should encourage the expansion of independent SETA firms.
- *Rely on FFRDCs for those functions for which they are intended*
  When FFRDCs are selected, OCIs are minimized and inherently governmental status is less of a concern. In addition, FFRDCs are particularly well suited to long-term projects that require in-depth understanding of the sponsoring agency's culture and operational environment. However, many of the DoD's programs do not have the kind of long-term stability envisioned for FFRDCs. Also, many of the skills are clearly available in the private sector, which enjoys the benefits of competition, agility, and continuing access to cutting-edge commercial technologies.
- *Do not impose additional legislative constraints on SETA contractors*
  The WSARA legislation, designed to avoid or mitigate OCIs, is adequate in its current form. Imposing further restrictions (e.g., requiring all systems development firms to divest of their SETA subsidiaries) would unnecessarily constrain technical innovation.

The government has the responsibility to minimize the occurrence of OCIs by structuring its relationship with private firms in such a way that competition is fair and robust. We recognize that in order to meet this responsibility, the DoD cannot turn to the private sector exclusively. Some work, including the management and oversight of SETA providers, is inherently governmental in nature and must be performed by DoD personnel. In addition,FFRDCs, for their part, may be able to play an important role in the provision of SETA services—but only in those instances prescribed. Above all, we argue that the "right mix" must not be based on theoretical deduction or political considerations but rather on observation and facts. For every program, the DoD must ask which provider can offer the most objective and cost-efficient as well as highest quality service.

I. Introduction

The Department of Defense (DoD) relies heavily upon systems engineering and technical assistance (SETA) contractors to provide specialized technical advice in order to facilitate the acquisition of many of their systems, including complex systems-of-systems (SoS). SETA contractors are experts who provide analysis and engineering services to the government and often work hand in hand with government engineering staff. These contractors are used to supplement the DoD's own organic engineering expertise and are managed by knowledgeable and experienced DoD personnel. This arrangement provides numerous benefits to the DoD. For example, SETA contractors are able to provide the flexibility and quick availability of experts in a variety of areas to DoD programs, without the commitment—or expense—of sustaining a large, long-term staff.

The use of SETA contractors is not a recent phenomenon; the military has relied upon SETA contractors for decades. Since the end of the Cold War, however, two trends have increased the DoD's reliance upon SETA contractors: the growing complexity of modern military systems coupled with the inadequacy of the DoD's acquisition and technical workforces.

However, the extent of contract support has come under increasing criticism. A 2006 Senate Armed Services Committee report concluded that "It is questionable whether the Department of Defense can effectively manage major programs as long as senior officials are changing every 18 months and the department continues to rely almost exclusively on contractors for technical expertise" (Barr, 2005, p. 1). This perspective, held by many within government, has prompted a series of initiatives to reduce the extent of SETA support.

These initiatives may be warranted. As reliance on contractors has increased, so has vertical and horizontal consolidation within the defense industry, which has led to the significant reduction in the number of independent firms capable of providing the DoD with objective SETA services. Indeed, firms selected to develop and produce military systems have, on occasion, also provided advisory services via one or multiple SETA contracts. This trend has led to the growing concern that firms may be considering their own long-term interests (or the interests of their affiliates) in designing a system, which disadvantages both the government and other firms. A related concern is that a firm contracted to provide a technical assessment of its "own" system—one that it designed, developed, or manufactured— may provide a biased assessment. Organizational conflicts of interest (OCIs) of this sort present a serious impediment to the successful execution of DoD programs.

Beginning in 2009, as part of its wider efforts to reform government contracting, reduce the governments reliance on contractors, and correct the shortfall in the government's acquisition workforce, the Obama administration began an initiative to insource some functions (i.e., convert to civil service positions) that had been provided through SETA contracting with private firms. In addition to reducing reliance on contractors, the Obama administration believed that the initiative would produce significant savings (National Defense Appropriations Act, 2010). However, in 2010, Defense Secretary Robert Gates acknowledged that insourcing was not producing the anticipated cost savings.

Report Road Map

Our military's diminished internal capability, in combination with defense industry consolidation, have made it increasingly difficult to obtain quality, objective SETA. This report addresses the policy changes that are necessary if the DoD is to reconcile its growing need for SETA services with the realities of today's defense environment. In Section II, we introduce SETA contracting within the context of today's military acquisition landscape. We then detail the trends that have enhanced the role of SETA

contracting within DoD programs; these include rapidly changing technology, the growing complexity of systems, and reductions to the government acquisition workforce. Against this backdrop, we describe the consolidation that has taken place within the defense industry, which has led to an increase in the incidence of OCIs. In Section III, we identify specific challenges, both real and perceived, that further constrain the DoD's ability to obtain SETA services. These challenges include both the occurrence of OCIs and the legislation designed to mitigate them. Additional challenges include the ambiguity surrounding "inherently governmental functions," and the perception, shared by government and the public, that there are too many contractors working for the DoD. Next, in Section IV, we examine possible strategies for acquiring SETA services. These strategies include (1) augmenting the DoD's organic capability, (2) incentivizing the development of independent SETA firms, and (3) increasing the DoD's reliance on Federally Funded Research and Development Centers (FFRDCs). To strengthen our analysis, we take into account the experiences of firms that are familiar with SETA contracting. In particular, we examine The Analytic Sciences Corporation (TASC), a private-sector firm that has undergone several organizational transformations in an effort to minimize the impact of OCIs on its operations. In Section V, we offer our recommendations and provide our concluding remarks.

II. Background

SETA contracts are one of several types of contracted advisory and assistance services (CAAS) recognized by the DoD. CAAS contracts are used to acquire services needed to meet mission objectives. These contracts refer to the non-governmental provisioning of services and may include the design of organizational policy, the development of system parameters, the creation of work statements, and the identification and resolution of interface problems (Aerospace Industries Association, 2009). CAAS contracts may also be used to improve organizational efficiency, measure performance, provide technical training, or perform research and development. CAAS contracts are used to bridge the gap between the DoD's needs and its organic capabilities and resources, but even when the DoD possesses the necessary capabilities, it may turn to contractors to achieve greater efficiency, improve performance, or gain an outside perspective in order to avoid limitations in judgment. However, some functions, including oversight, management, and decision-making, are inherently governmental and must be performed by government employees.

SETA contracts, which provide technical direction and support for the acquisition of systems, are one of four CAAS categories. SETA contractors are private-sector employees that the DoD hires to supplement its own systems expertise and capabilities. This external expertise includes, but is not limited to, systems engineering, assessments of technology maturity, technical assistance with platform requirements, and objective verification that system designs meet operational needs.

The technical assistance component of SETA contracting complements systems engineering by providing "acquisition support, program management support, analyses, and other activities involved in the management and execution of an acquisition program" (Defense Federal Acquisition Regulation Supplement [DFARS], 2010, subpart

209.5). SETA contracts may require the provision of systems engineering work, technical assistance work, or elements of both. These contracts may require the selected firm to derive requirements, perform technology assessments, develop acquisition strategies, conduct risk assessments, develop cost estimates, determine system specifications, assist in the direction of contractor and subcontractor operations, or develop test requirements and evaluate test data.

In order to encourage the use and exchange of prior knowledge, rules are in place to protect proprietary information. The performance of a contract may require the disclosure of intellectual property to the government or to another private firm. Unregulated, this exchange can provide a firm with an unfair competitive advantage. Accordingly, the divulgence of proprietary information is often accompanied by a non-disclosure agreement between parties. The chief requirement of these agreements is that the information released cannot be used for anything other than that for which it was furnished (Federal Acquisition Regulation [FAR], 2005, subpart 9.5).

CAAS Categories

Systems Engineering and Technical Assistance (SETA)

- Provides maintenance and support for weapons systems to program offices
- Involves providing technical direction, systems engineering, research, and even production of weapons systems

Management and Professional Support Service (MPSS)

- Provides advice, training, and direct assistance in the operation of systems activities and organizations
- Improves program management, logistics management, project monitoring and reporting, data collection, budgeting, accounting, performance auditing, and training programs

Studies, Analysis and Evaluation (SAE)

- Measures performance through analytical assessment of decision-making, policy development, and management and administration strategies
- Involves studies that provide analysis for R&D and the construction of models and methodologies

Education and Training Service

- Provides training lectures, personnel testing, curriculum development, certifications and accreditations, and the general management of educational programs
- Involves education and training services focused on developing knowledge within the DoD.

While industry contractors are able to help develop work statements, the Defense Federal Acquisition Regulation Supplement (DFARS) prescribes explicit limitations on this type of assistance. For instance, measures are in place to restrict SETA contractors from preparing work statements and then bidding on the contracts containing those statements. SETA contracts also cannot be used to influence the enactment of legislation or to bypass pay limitations. These restrictions work to maintain political neutrality, prevent redundancy, protect competitive employment procedures, and reduce conflicts of interest.

SETA contractors provide advice and recommendations but leave the decision-making responsibility to DoD managers. The Federal Acquisition Regulation (FAR) recognizes the importance of SETA contracts, stating, "The acquisition of advisory and assistance services is a legitimate way to improve government services and operations. Accordingly, advisory and assistance services may be used at all organizational levels to help managers achieve maximum effectiveness or economy in their operations" (FAR, 2005, subpart 37.203). In sum, SETA contracts enable the DoD to bridge capability gaps and take advantage of private-sector efficiencies.

The DoD has come to rely increasingly on contractors to provide essential engineering and technical assistance services. Two factors in particular explain this growing use of SETA contracts: the increasing complexity of systems and the impracticality of maintaining the required number of properly educated and experienced employees in the DoD's limited acquisition workforce. An additional complication was the post–Cold War consolidation within the defense industry, which virtually eliminated the medium-sized independent firms operating as providers of objective systems engineering and technical assistance. These factors are described in detail in the following section.

Growing Complexity of Systems

After the Cold War, the DoD worked to develop an appropriate operating paradigm consistent with the new security environment. In 1999, then Secretary of Defense William S. Cohen believed that by leveraging the advances made during the information revolution of the 1980s and 1990s, the U.S. military could drastically improve its operations. In order to implement this vision, the DoD developed a complementary battlefield strategy referred to as network-centric warfare (NCW).

NCW is a combat strategy that relies upon the integration of battlespace information, through the full or partial use of networked forces, in order to create a warfighting advantage. Its objective is to reduce the "fog of war" by improving how information is collected, processed, and distributed. NCW operates on the notion that "information superiority, not military mass [is] the key to military success, [and that] overwhelming force would be less useful or effective than decisive force applied quickly and precisely" (Blaker, 2006, p. 136). To accomplish this objective, NCW emphasizes speed, agility, and the use of precise targeting to rapidly disrupt and disorient the enemies' ability and desire to fight.

NCW represents a significant departure from platform-centric warfare. Platform-centric strategy views actors as independent entities, whereas network-centric strategy views them as participants within a continuous system. According to Metcalfe's law—a phenomenon that is well known in computer science circles—the value of a communications network is proportional to the square of the number of connected users of the system. This law has often been illustrated using the example of fax machines: a single fax machine is useless, but the value of every fax machine increases with the total number of fax machines in the network because the total number of people with whom each user may send and receive documents increases (Tongia & Wilson, 2010). Metcalfe's law has been extended to military networks (Cebrowski & Garstka, 1998, p. 4). As a result, today's military assets are more powerful because they operate within a

networked environment rather than as components of individual platforms. Increasingly, weapons systems are designed as elements within SoS, which offer more functionality and performance than the sum of their constituent systems. Unlike traditional systems, SoS are never fully formed or complete. Different functions are added and removed over time to adapt to the dynamic battlespace.

Not only have DoD systems themselves become more complex but so has the environment in which they operate. Today's military systems host a large diversity of users, supporters, and administrators. The intricacy of these external interfaces contributes significantly to a system's overall complexity. In addition, today's systems are software-intensive, creating a special challenge on account of countless potential logic paths. Moreover, functionality that, in the past, was deeply embedded in the physical configuration of components "has begun to emerge as software, enabling synergies among components that would have been unimaginable only a few years ago" (National Research Council, 2008, p. 18).

Accordingly, the skills required to develop, manage, and engineer complex military programs differ significantly from those that were needed in the past. Moreover, in recent years, the DoD has undertaken the concurrent acquisition of multiple SoS. Their successful integration requires a keen understanding of the resulting technological interactions and interdependencies. Consequently, successful development of modern systems requires a disciplined engineering approach with the capability to assess and analyze all of the systems' components and their various relationships. Such an approach is referred to as systems engineering (National Research Council, 2008, p.3).

The DFARS defines systems engineering as "an interdisciplinary technical effort to evolve and verify an integrated and total life cycle balanced set of systems, people, and process solutions that satisfy customer needs" (DFARS, 2010, subpart 209.5). The goal of systems engineering is to provide a total system solution that

- withstands changing technical, production, and operating environments;
- adapts to the needs of the user; and
- balances design considerations, design constraints, and program budget among multiple requirements(DoD Inspector General, 2006). ,

As military systems and missions have grown in complexity, the DoD's acquisition and technical workforces have failed to keep pace. In fact, the past couple of decades have seen a continuing decline in the number of acquisition workforce employees and a pronounced inability to attract and retain systems engineers.

Inadequate Workforce

After the fall of the Soviet Union, the U.S. reevaluated its global security posture. The large military structure created in response to the Soviet threat was no longer needed. Accordingly, the DoD reduced the size of the acquisition workforce. Within the larger context of military downsizing, reduction of the acquisition workforce was considered a means of streamlining the acquisition process while, at the same time, reducing costs. Between 1990 and 2006, the acquisition workforce was cut by a total of 60%. Then, even as the DoD's budgets grew significantly during the first decade of the 21st century, the acquisition workforce failed to keep pace (see Figure 1).

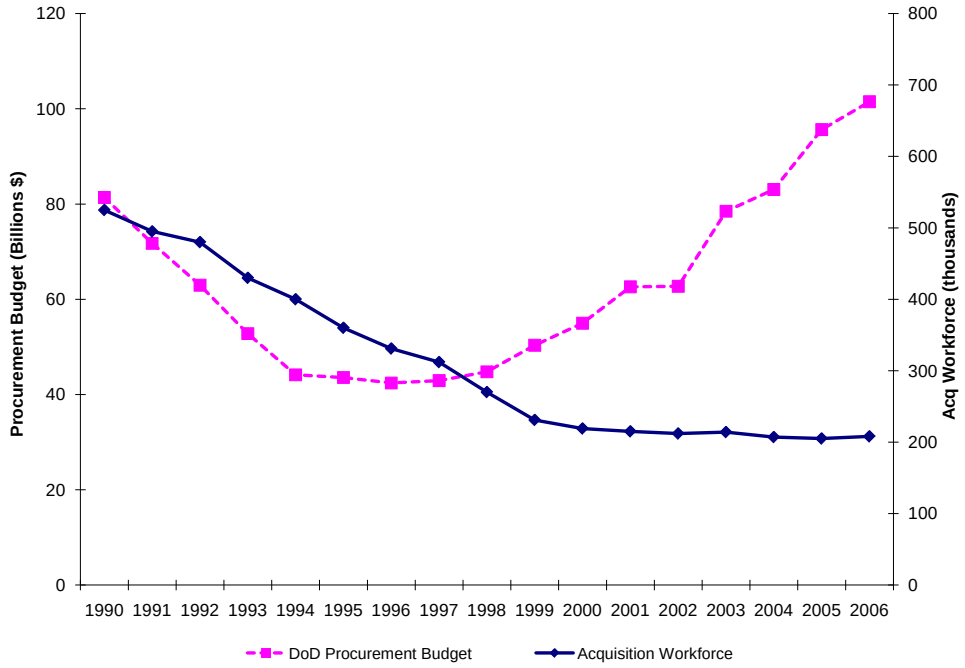

Figure 1. Decline in Acquisition Workforce and Increased Defense Spending
(Commission on Army Acquisition and Program Management in Expeditionary Operations, 2007)

Even as DoD acquisition budgets increased as a result of the attacks on September 11, 2001, there was little increase in the number of qualified acquisition personnel. Currently, the vast majority of the workforce is eligible to retire or will be eligible within the next five years. In the absence of efforts to recruit and train qualified personnel, the workforce will continue its decline.

The remaining acquisition workforce continues to age. As of 2006, those born before 1946 (baby boomers and older) represented over 75% of the DoD's civilian acquisition workforce, while generation X and Y civilian personnel (1965–1989) represented a combined total of just 23.8% (Under Secretary of Defense for Acquisition, Technology, and Logistics [USD(AT&L)], 2007). This uneven distribution of personnel (see Figure 2)

has served to hasten the loss of institutional and cultural knowledge shared by retiring employees.

Generation	National (2005)		DoD (2006)		DoD AT&L Civilian Workforce (2006)	
	Workforce (millions)	% Workforce	Workforce	% Workforce	Workforce	% Workforce
Silent Generation (born before 1946)	**11.5**	**7.50%**	**45,625**	**6.70%**	**8,322**	**7.40%**
Baby Boomers (1946 to 1964)	**61.5**	**42.00%**	**438,971**	**64.50%**	**77,779**	**68.70%**
Generation X (1965 to 1976)	**43.5**	**29.50%**	**132,948**	**19.50%**	**17,581**	**15.50%**
Generation Y (1977 to 1989)	**31.5**	**21.00%**	**62,676**	**9.20%**	**9,394**	**8.30%**
Millennium (1990 to Present)	**51**	**0%**	**153**	**0%**	**0**	**0%**
		100%		**100%**		**100%**

Figure 2. Acquisition Workforce by Generation
(USD[AT&L], 2007)

Moreover, in the past, the DoD was at the cutting edge of technology, leading the innovation in jet engines, space, and microelectronics; however, during the last few decades, with the growing commercial importance of information technologies, the private sector has taken the lead. In addition, although the DoD's older employees may have extensive acquisition experience, their technical skills frequently have not kept up with the rapidly evolving information technology. Accordingly, these legacy employees are significantly less likely than their private-sector counterparts to have the requisite skills for the current complex requirements.

With regard to systems engineering, workforce shortages are of particular concern. For obvious reasons, the DoD can only rely on contractors up to a certain point; that is, the DoD cannot outsource program management, as well as management and oversight of

systems engineering, and expect to acquire efficient, affordable systems (National Research Council, 2008). Recruiting qualified, experienced systems engineers is a challenge not only for the DoD but for industry, too. The problem is twofold. First, the production of systems engineers by U.S. universities has increased very slowly over the past decade, despite increased demand, growing salaries, and other incentives. Second, formal knowledge of the systems engineering discipline only goes so far; to be successful within the discipline, one must also have specific domain experience (National Research Council, 2008, p. 9). In interviews conducted by the National Academy of Sciences, industry experts expressed the opinion that "subject matter and/or domain experience are more important than is a knowledge of tools" (National Research Council, 2008, p. 55). Today, colleges and universities offer both systems-engineering-centric programs and domain-centric programs that include aspects of systems engineering (National Research Council, 2008, p. 53).

Industry Consolidation

One of the most significant trends over the past 20 years with regard to SETA contracting is the consolidation of the defense industry, which has reduced the number of independent firms capable of providing quality, objective analysis to the DoD. Within two decades, beginning in the early 1990s, multiple defense industry mergers and acquisitions resulted in a dramatic reduction in the number of major defense firms—from more than 75 in 1991 to five by the year 2000 (See Figure 3). The remaining "Super Primes"— Lockheed Martin, Boeing, Raytheon, Northrop Grumman, and General Dynamics—exert significant influence within the defense industry. A recent government report acknowledged that in 2008, these five primes were "awarded discretion over 40% of the total acquisition budget" (Defense Science Board Task Force, 2008, p. 22).

Defense industry consolidation is, in large part, the product of DoD policy adopted in the early 1990s. As the primary buyer in the global defense market, the DoD acts as a monopsony and has the potential market power to influence and shape the industry. At

the end of the Cold War, the capacity needs and expenses of the DoD were reevaluated. In 1993, Secretary of Defense Les Aspin and Deputy Secretary William Perry launched a "bottom-up" review of the military force structure (Deutch, 2001, p. 137). The Perry-Aspin report cited a 40% drop (in real terms) in DoD investment expenditures since the end of the Cold War and concluded that without a commensurate reduction in both private- and public-sector capacity, the smaller defense budgets that were envisioned would lead to increased unit costs.

With regard to the private sector, the failure to reduce capacity would lead to a decrease in profit margins and, in turn, returns on capital. A weakened defense industry, it was reasoned, would jeopardize national security. Accordingly, the DoD encouraged consolidation through normal capital market mechanisms. To reduce its own costs and, at the same time, incentivize private-sector consolidation, the DoD also reduced its organic capacity. As the DoD closed bases and government-owned shipyards, depots, and laboratories, the private sector followed suit by reducing its defense industrial capacity primarily through mergers and buyouts.

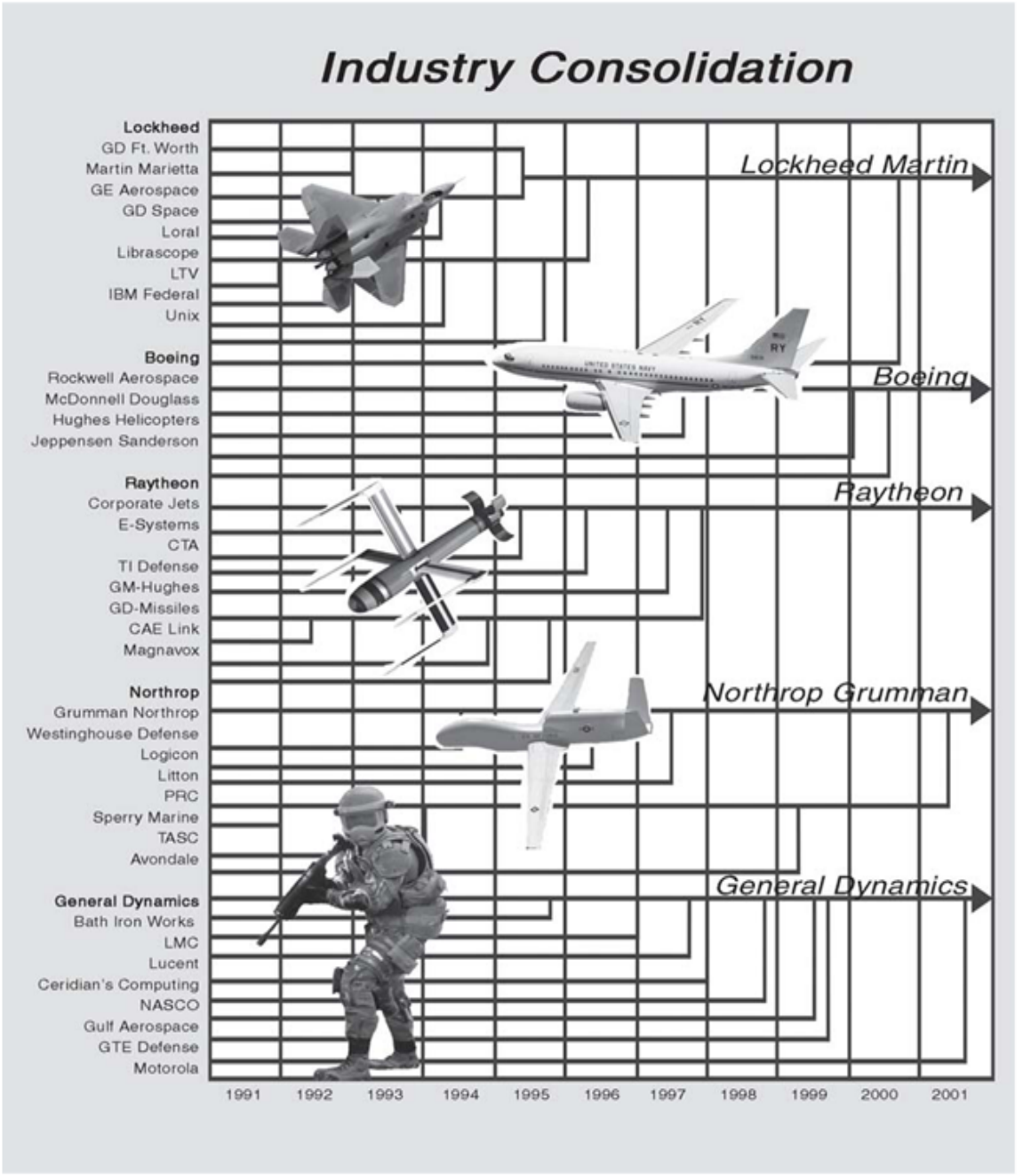

Figure 3. Defense Industry Consolidations
(Driessnack & King, 2004)

In 1998, concerned that the defense industry was becoming less competitive, Congress put an end to the pro-consolidation policy (Deutch, 1991), but as Figure 3 makes clear,

the policy had achieved its primary goal, dramatically reducing the number of defense contractors. However, the extent to which these firms were able to generate efficiencies of scale through this reduction is unclear. Indeed, by the late 1990s, many defense firms' profit margins had declined considerably. In an effort to improve their financial standing, firms began to reduce capital investment and cut discretionary R&D. In addition, some firms chose to expand into other markets while others abandoned the defense industry altogether.

III. Challenges

The environmental factors that have shaped today's defense industry—the growing complexity of weapons systems, an inadequate acquisition workforce, and industry consolidation—have given rise to specific challenges, both real and perceived, that further constrain the DoD's ability to acquire SETA services. These challenges include both the occurrence of OCIs and the legislation designed to mitigate them. Additional challenges include the ambiguity surrounding "inherently governmental functions" and the perception, shared by government and the public, that there are too many contractors working for the DoD. This perception has given way to concrete action; in 2007, the government began to insource (i.e., convert to civil service positions) a number of functions, many of them SETA services, that had been previously held by contractors. This move has further reduced the ability of the DoD to obtain SETA services in an efficient manner. These challenges are described in the following section.

Organizational Conflicts of Interest

The increasing complexity of acquisition systems coupled with the reduction of the government's acquisition workforce explain the military's reliance on SETA contracts. As a result of the defense industry consolidation, the potential for OCIs has also increased. OCIs occur when a real (or sometimes perceived) unfair advantage accrues to a firm.

The underlying assumption for the government's concern for OCIs is that every member of an organization—officers, employees, officials, or representatives—will "treat the organization's interests as…their own and want to further them" (Gordon, 2005, p. 4). Consequently, members of the organization in question may be unable or unwilling to recognize an OCI. This assumption may be extended to the affiliates of the organization, including subsidiaries and parent and sister organizations. Three factors contribute to the

presence of an unfair advantage: biased ground rules, unequal access to information, and impaired objectivity.

- *Biased ground rules*

The DoD contracts with the private sector because it lacks the capacity to do the work itself or because, in many cases, it is more efficient. Because the DoD program offices often lack the technical capacity (in terms of both quantity and quality), they contract for the necessary assistance to help write the statement of work, specifications, and other program support. However, relying on an outside firm can create an organizational conflict of interest. If an OCI exists, a firm with the responsibility of writing a statement of work, for example, may be able to influence the acquisition process—intentionally or inadvertently—in a way that favors certain contractors over others, skewing the competition to favor itself or an affiliate firm (Golden, 2005).

- *Unequal access to information*

When a firm has access to non-public information as a result of performing on a government contract, that firm may accrue an unfair competitive advantage in a subsequent competition. It is only practical to favor firms with a better understanding of the work in question, gained through the accumulation of direct experience. However, when a firm acquires special knowledge that is excluded from the public realm, an OCI is said to have occurred (FAR, 2005, subpart 9.505-4)

- *Impaired objectivity*

Just as the government needs to turn to the private sector to help manage the award of contracts, the government also turns to firms in order to measure and evaluate the performance of a contract; however, the evaluating firm may have a relationship with the firm being assessed. Such relationships can prevent the delivery of an objective measure of performance, which can negatively affect government programs and services (FAR, 2005, subparts 9.505-1–9.505-3).

Within the context of SETA contracting, OCIs often arise in instances where one firm is awarded one (or more) contracts to provide technical support to the program office while also participating in the development of a system. Indeed, the two types of service often coincide because it is difficult to demarcate their respective boundaries. As a result, OCIs can be difficult to account for and sometimes emerge after the fact.

To offer a recent example from the DoD, in 2009, the DoD Inspector General (DoDIG) initiated an audit in response to allegations that the Director, Operational Test and Evaluation (DOT&E), which oversees acquisition evaluations within the DoD, improperly awarded a contract for systems engineering and technical analysis to the Science Applications International Corporation (SAIC). However, at the time, SAIC and Boeing were contracted to serve as lead system integrators for the Army's Future Combat Systems (FCS) program. According to federal regulations, a firm cannot participate in the development of a system for which it is also providing the aforementioned ancillary services. The Inspector General substantiated the complainant's allegations and stated in its audit that the DOT&E and the Army needed to "discontinue obtaining advisory and assistance services from SAIC, a FCS developer, unless appropriate waivers are obtained" (DODIG, 2009, p. 5).

Additionally, the consolidation within the defense industry has led to the significant reduction in the number of independent firms (firms not affiliated with weapons systems developers) capable of providing the DoD with objective systems engineering and technical assistance services, which, in turn, has led to an increase in the potential occurrence of OCIs. OCIs present a serious impediment to the successful execution of DoD programs. In the example provided previously, the potential existed for SAIC to help test and evaluate the Future Combat Systems, and to potentially put SAIC into a position to get the Army to approve and pay for more work on the FCS. The other side of the problem is that competing firms, which may have been more effective, lose out. This

is unfair and, in the end, firms that are favored become larger while other better-qualified firms lose business. This, in turn, can lead to greater industry consolidation and further decreases in competitiveness, resulting in higher costs to the DoD. Moreover, systems that have been developed under these circumstances may be less likely to use common standards and open architectures—enabling vendor lock-in.

Since the public, government watchdogs, and other stakeholders have little tolerance for government wrongdoing (intentional or accidental), the perception of an OCI can disrupt the contracting process and delay the development of a system. Indeed, it is possible, even probable, that in the previously mentioned example, SAIC was the most qualified firm with regard to both systems development and integration and the provision of technical assistance for the OT&E. Nevertheless, for the reasons already stated, the government has a vested interest in ensuring that competition among firms with which it contracts is fair, both in fact and in appearance, and that system evaluations are objective and free of OCIs.

The negative impacts of OCIs, described previously, are potentially far greater in the SoS environment that the DoD has begun to embrace. As discussed in Section II, the SoS environment will consist of various distributed data sources, or nodes, that are fused together in order to enhance battlefield awareness. In the event that one contractor is selected to support the program office and provide systems engineering support to develop the SoS architecture and then is later selected to also develop some of the systems, the architecture may have been developed to favor, or accommodate, that contractor's equipment or capabilities. The negative implications that arise in such a scenario can be significant. In the past, the potential for OCIs was constrained by the nature of the acquisition. The prime contractor oversaw the development of a system's components and subsystems to deliver a vertically integrated platform. In a SoS environment, horizontal system integration creates limitless points of entry for OCIs.

Federal regulations dating from the mid-1960s require the DoD and other government contracting agencies to take measures to resolve OCIs. However, as the SAIC example illustrates, at times that may be easier said than done. According to the DoDIG audit, neither the solicitation provisions nor the contract clauses themselves "prevented FCS development contractors from providing technical direction or supporting the operational test and evaluation of the system" (DODIG, 2009, p. 6). Clearly, the mechanisms upon which companies have relied in order to avoid OCIs (namely, subsidiaries, non-disclosure agreements, and firewalls) are often deemed inadequate. At the same time, it is important to realize that the FAR does not, in fact, proscribe OCIs. Indeed, in certain instances, OCI avoidance, neutralization, or mitigation may not serve the best interests of the government (FAR, 2005). At the same time, it is also true that the FAR may be inadequate in light of increased industry consolidation. The increase in SETA contracting has renewed discussions over OCIs and the extent to which they should be avoided.

Legislating Against OCIs

Prior to the 1960s, regulatory provisions regarding OCIs did not exist. Regulations were eventually introduced at the agency level. For example, in 1963, the DoD published Appendix G of the Armed Services Procurement Regulations (ASPR), which established rules designed to prevent OCIs in the awarding of contracts.

Later, Congress enacted federal guidelines to address OCIs and passed several pieces of legislation governing SETA contracting in particular. These laws were designed to create a contracting structure that is fair, efficient, competitive, and capable of providing the U.S. military with the services it requires. However, given the changes that took place within the acquisition workforce and the defense industrial base, these laws were not believed to be sufficient to create the desired environment. In the following paragraphs we highlight the recent regulatory and legislative changes related to OCI avoidance and mitigation, and discuss the impact of this legislation on the DoD's ability to obtain SETA services.

- *Federal Acquisition Regulation*

The FAR was initially released in 1967; the most recent version was issued in 2005. The FAR applies broadly to federal government contracting, providing guidance to contracting officers of both military and civilian agencies. The FAR explicitly seeks to protect the competitive process by preventing unfair advantage and impaired objectivity (FAR, 2005, subparts 9.505-1, 9.505-2). The FAR places the responsibility on federal agencies for determining the existence of potential or actual OCIs. According to the regulation, agencies should use "common sense, good judgment, and sound discretion" in determining how to respond to the occurrence of an OCI. More specifically, the individual agency in question is responsible for assessing whether or not it is in the government's best interest to avoid, neutralize, mitigate, or waive an OCI (FAR, 2005, subpart 9.504(a) (1)-(2). In short, rather than prescribe specific actions with regard to OCIs, the FAR creates a flexible framework that affords agencies significant discretion.

The FAR defines an OCI as "a person [that] is unable or potentially unable to render impartial assistance or advice to the Government, or the person's objectivity in performing the contract work is or might be otherwise impaired, or a person has an unfair competitive advantage" (FAR, 2005, subpart 2.101). This broad definitional criterion for OCIs recognizes that agencies and acquisition personnel are best situated to understand and evaluate the details of organizational structure and relationships within their field of practice; after all, it is possible that an organizational structure might generate an OCI in one environment but not in another.

The FAR does not offer specific guidance about what satisfies an agency's obligation to consider an OCI nor is there a standard set of considerations that must be weighed. The FAR also does not indicate which mitigation procedures are most appropriate. Indeed, one might argue that the FAR delegates the decision to the program office,

which may have the best perspective on the conflicts and how they should be addressed.

- *Weapons Systems Acquisition Reform Act of 2009*

In 2009, President Obama signed into law the Weapons Systems Acquisition Reform Act, asserting that "This law will enhance competition and end conflicts of interest in the weapons acquisition process so that American taxpayers and the American military can get the best weapons at the lowest cost" (Metzger, 2011, p. 11). The WSARA is intended to reform the acquisition of expensive, highly technical SoS and has significant implications for SETA contracting and OCI mitigation. Specifically, the WSARA orders a revision of the DFARS to "provide uniform guidance and tighten existing requirements for OCI by contractors in major defense acquisition programs" (Metzger, 2011, p. 2).

Section 201 of the WSARA requires the implementation of tighter regulations to minimize the occurrence of OCIs in four areas: (1) lead systems integrator contracting, (2) SETA contracting, (3) prime contractor awards to affiliate business units, and (4) technical evaluations performed by contractors on major defense acquisition programs. With regard to SETA, the WSARA prohibits contractors, or affiliates, from participating as a prime or major subcontractor in the development or construction of a weapons system under the program for which they are providing technical assistance or other support services. In addition, a firm cannot act as a hardware provider if another division of the firm is providing SETA services on the same project. However, "limited exceptions" are granted "as may be necessary" in order to ensure that highly qualified contractors with experience and expertise are able to provide continued advice on systems architecture and systems engineering.

Administrative policy greatly determines a law's impact. In the wake of the WSARA's passage, the Senate Armed Services Committee charged that the DoD's

implementation of the new law was not restrictive enough (Rutherford, 2010). Specifically, the committee indicated that the DoD's draft rule exhibited an "overall preference for mitigation over avoidance" (Rutherford, 2010, p. 1). The committee asserted that this preference was not in keeping with the bill, which, in its original form, altogether banned contractors from developing a system and providing SETA services for that system.

Defense contractors, for their part, claimed that the DoD draft rule was too restrictive and that it extended beyond what the law intended. Contractors pointed to the original bill, which specified that strict OCI avoidance and mitigation strategies need only apply to major defense acquisition programs (MDAPs). The draft rule, however, applied to all acquisition programs, with very few exceptions. The technology trade association, TechAmerica, argued that the "DoD's expansion of the rulemaking beyond MDAPs is unnecessary, inefficient, and counterproductive" (Rutherford, 2010).

In response to industry pressure, the DoD dropped the strong language with regard to "uniform guidance" and the "tightening of existing regulations," neither of which appear in the final rule that was adopted in 2011. Rather, the rule adopts language similar to that found in the original DFARS. The DoD describes the new rule in the following passage:

> Specifically, the rule now provides that it is DoD policy to promote competition and, to the extent possible, preserve DoD access to the expertise and experience of highly qualified contractors. To this end, the rule now emphasizes the importance of employing OCI resolution strategies that do not unnecessarily restrict the pool of potential offerors and do not impose per se restrictions on the use of particular resolution methods. (Project on Government Oversight, 2011)

In addition to relaxing the language contained in the draft rule, the new rule only applies to MDAPs and acquisition programs that require the provision of SETA services. Finally, it is worth noting that the final rule emphasizes OCI resolution as opposed to avoidance, or even mitigation. As with the original DFARS legislation, the final rule appears to indicate that OCIs are acceptable under certain circumstances. In any case, it is unclear if the intentional ambiguity contained in the final rule will provide flexibility to both the DoD and contractors to efficiently pursue cost-effective systems, or if business planners will be unable to determine whether certain contracts violate OCI rules, making it difficult for them to align their practices to meet government needs.

Rather than take a wait-and-see approach, some firms that provide SETA functions have been proactive in making significant changes to their organizational structures. In October 2010, Lockheed Martin announced the sale of its systems engineering service division, Enterprise Integration Group (EIG), to Veritas Capital for $815 million. Lockheed Martin also sold its other systems engineering division, Pacific Architects and Engineers, Inc. (PAE). Combined, PAE and EGI represented 3% of Lockheed Martin's annual revenue. Lockheed Martin determined that it was in its best interest to sell off 3% of its business rather than risk losing development and hardware production contracts. Lockheed Martin was not alone in this regard. In November 2009, Northrop Grumman sold its advisory services business, TASC, to private-equity investors (see the Appedix). In August 2010, CSC announced the sale of its Mission Solutions Engineering (MSE), which provides systems and software engineering services to the Navy's Missile Defense Agency. MSE was a standalone affiliate with a separate management team and an outside board of directors, a configuration similar to that of foreign-owned defense contractors. However, this arrangement did not create sufficient independence between the two, at least not according to CSC leadership. It should be noted that the sale of SETA contracting units by their parent firms was, in many cases, a lucrative decision that was only

partially informed by the new OCI regulations. In many cases, private equity firms found the firms' divestitures highly attractive and had billions of dollars to invest (Merced, 2009).

Insourcing

Since the fall of the Soviet Union, the size of the government workforce has been on the decline. Even after the events of September 11, 2001, the size of the workforce remained unchanged, despite significant increases in military spending. Over the last two decades, more and more contractors have stepped in to fill the voids and ensure that missions were accomplished.

Of some 50 major weapons system programs recently reviewed by the Government Accountability Office (GAO), it was found that only 19 (or 38%) were able to fill all authorized in-house staffing positions. As a result, many of the programs brought in SETA contractors to fill the voids and maintain program continuity (GAO, 2009). As of April 2009, the DoD estimated that some 52,000 contractor personnel were performing acquisition support functions. Based on these numbers, contractor personnel represent some 29% of the DoD's total acquisition workforce (GAO, 2009). Still, the presence of contractors within various acquisition offices varies significantly and can greatly exceed the 29% estimate. For example, based on one GAO review of 21 DoD program offices, 15 (or roughly 71%) of the offices had more contractor personnel than government employees. Within these 15 offices, contractor personnel comprised some 88% of the workforce (GAO, 2009). Such statistics demonstrate the extent to which DoD program offices partner with industry.

This increased reliance on contractors has facilitated the widespread perception that industry has too much influence on government decision-making. According to some government officials, there are simply too many contractors. President Obama

campaigned to “reform federal contracting and reduce the number of contractors” (Obama, 2007, p. 1). In 2009, he issued a memorandum directing federal agencies to reform the contracting process, stating that contracting is “plagued by massive cost overruns, outright fraud, and the absence of oversight and accountability” (Obama, 2009, p. 1). Although some of this criticism may be warranted, it serves to further the negative perception of defense contractors, the vast majority of which operate in strict accordance with the law and provide products and services to the DoD at competitive prices. The fact is that without government contractors, the U.S. military would be unable to carry out many of its functions that are vital to national security.

The rapid growth in the number of contractors over the last two decades, in and of itself, does not justify the assertion that there are too many contractors. By failing to define the problem in more specific terms, recent policy efforts have often proven misguided.

For example, the Obama administration sought to bolster the government workforce by converting contractor positions into government jobs, a process known as insourcing, and estimated that this would save up to $44 billion annually (Department of Defense Appropriations Act, 2010). This prediction was echoed across the DoD, which, in assembling its 2011 budget, calculated a 30–40% savings for each insourced position (Soloway, 2009). This estimate was likely based on a comparison of the cost of the contractors (overhead included) versus only the salary of the government employees, overstating the savings (Gansler, Lucyshyn, & Rigilano, 2012). Based on this calculation, the DoD made significant changes to its workforce composition. For instance, the Air Force assumed responsibility for C-17 program logistics integration, a service that was being provided by various contractors. It also decided to end its long-standing contract with Lockheed Martin for F-22 support services (Gouré, 2010). These actions were taken in spite of a 2005 Congressional Budget Office (CBO) analysis indicating that maintenance by competitive, private-sector contractors was 90% cheaper than organic maintenance (CBO, 2005). And in using “performance-based logistics” contracts, the

contractors were not only significantly lower in cost but also achieved greater responsiveness and readiness results.

A year after President Obama launched this insourcing initiative, Defense Secretary Robert Gates concluded that insourcing was not producing the anticipated cost savings (Brodsky, 2010b). Apparently, the cost of replacing contracts failed to offset the cost of the government hires. He concluded that directly reducing the value of contractor awards—as opposed to increasing the government workforce—would be a more effective approach. Other leaders also began to reconsider the insourcing initiative. A provision in the 2011 Defense Authorization Bill, sponsored by Representative James Langevin, D-RI, prevented the DoD from establishing "any arbitrary goals or targets to implement the insourcing initiative" (Brodsky, 2010a, p. 1). In a February 2011 directive, Secretary of the Army John McHugh wrote that "in an era of significantly constrained resources, the Army must approach the insourcing of functions currently performed by contract in a well-reasoned, analytically based and systemic manner" (McHugh, 2011, p. 1). Despite these new directives, SETA contractors continue to face undue hostility and the government struggles to acquire SETA functions efficiently and affordably.

Insourcing continues, albeit at a slower rate. One senior Pentagon official asserted that insourcing remains the government's policy, even though it is not delivering the estimated savings (Erwin, 2010). He went on to say that reducing costs was never the primary purpose of insourcing; rather, he stated that it was to bring inherently governmental positions back into the government (Erwin, 2010).

Inherently Governmental Functions

Regardless of the rationale behind insourcing, there is no doubt that some functions are inherently governmental and that contractors, therefore, should be limited with regard to the services that they are permitted to provide. This notion is, in fact, codified in Subpart 7.5 of the FAR (2005), which states that "contracts shall not be used for the performance

of inherently governmental functions." According to the Federal Activities Inventory Reform (FAIR) Act (whose principal purpose was to provide a process for identifying the functions of the federal government that are not inherently governmental functions), an inherently governmental function "is so intimately related to the public interest as to require performance by Federal Government employee" and "involves, among other things, the interpretation and execution of the laws of the United States" (FAIR, 1998). FAR Subpart 7.5 goes on to identify some specific functions, which include the following:

- The command of military forces, especially the leadership of military personnel who are members of the combat, combat support, or combat service support role;
- The conduct of foreign relations and the determination of foreign policy;
- The determination of federal program priorities for budget requests;
- The direction and control of federal employees;
- Collection of fees, fines, penalties, costs, or other charges from visitors to or patrons of mess halls, post or base exchange concessions, national parks, and similar entities or activities, or from other persons, where the amount to be collected is easily calculated;
- Determining what supplies or services are to be acquired by the government; and
- Determining whether contract costs are reasonable, allocable, and allowable.

According to the FAR, functions that are not themselves inherently governmental nonetheless can "approach being [inherently governmental] because of the nature of the function, the manner in which the contractor performs the contract, or the manner in which the Government administers contract performance" (2005). There are 19 functions in this category, but the list is not all-inclusive. Some of these items are as follows:

- Services that involve or relate to budget preparation, including workload modeling, fact finding, efficiency studies, and should-cost analyses, etc.;

- Services that involve or relate to analyses, feasibility studies, and strategy options to be used by agency personnel in developing policy;
- Services that involve or relate to the development of regulations;
- Contractors providing assistance in the development of statements of work; and
- Contractors providing information regarding agency policies or regulations, such as attending conferences on behalf of an agency, conducting community relations campaigns, or conducting agency training courses.

This second list has long been a source of confusion. Given the ambiguity of the language, the point at which a function ceases to approach—and actually becomes—inherently governmental was open to subjective interpretation, as then was the decision regarding whether a particular function would be provided by the government or by contractors. The confusion was compounded by the fact that there was no agreed-upon definition of *inherently governmental* to begin with. In addition to the FAIR definition, provided previously, three other definitions of *inherently governmental* have been written into law over the years. Ironically, a fifth definition, and the only one to be included in a government-wide policy document (the OMB Circular A-76), lacked the force of law (CRS, 2010).

In 2011, in an effort to bring some clarity to the definition of *inherently governmental*, the OMB issued some much-needed guidance that would supersede the FAR. The OMB letter included a lengthy list of functions that are "clearly inherently governmental" and a separate list of "functions closely associated with the performance of inherently governmental functions" (p.1). Examples of "closely associated" functions include supporting budget preparation activities; providing support for development of policies, regulations or legislative proposals; and conducting market research or drafting statements of work in support of an acquisition (OMB, 2011). In addition, the memo defined a new category, "critical functions." These were defined to help government agencies "identify and build sufficient internal capacity to effectively perform and

maintain control over functions that are core to the agency's mission and operations" (OMB, 2011).

The OMB made it clear that these additions and clarifications were not intended to discourage the appropriate use of contractors. The OMB wrote,

> Contractors can provide expertise, innovation, and cost-effective support to Federal agencies for a wide range of services. Reliance on contractors is not, by itself, a cause for concern, provided that the work that they perform is not work that should be reserved for Federal employees and that Federal officials are appropriately managing and overseeing contractor performance. (OMB, 2011)

This memo, which was intended to add clarity, has only added to the ambiguity surrounding the identification of work that should be reserved for government employees, with the creation of yet another category.

It is important to note that, often, contractor "support" (via studies, analyses, simulation, etc.) provides critical insight as to whether a function should be categorized as inherently governmental. Accordingly, it is difficult to draw a hard line between inherently and non-inherently governmental functions, especially prior to a program's initiation. But given the current administration's perception that there are too many contractors, it seems likely that officials may adopt an overly cautious stance, using organic resources for the performance of non-inherently governmental functions, which will reduce the efficiency and effectiveness with which SETA services might otherwise be acquired.

IV. Possible Strategies

In this section, we examine possible strategies for acquiring SETA services. These strategies include (1) augmenting the DoD's organic capability, (2) incentivizing the development of independent SETA firms, and (3) transitioning the provision of SETA functions to FFRDCs. In the following sections we discuss the advantages and disadvantages of each strategy.

Option 1. Augment the DoD's Organic Capability

Many within government believe that there are too many contractors working for the DoD and that many of the services currently acquired through contracting should be provided in-house. Indeed, the DoD is the largest engineering organization in the world, with over 93,000 uniformed and civilian engineers, 38,000 of which are Acquisition Corps–certified systems engineers (Welby, 2011). It could be argued that by transitioning SETA functions to an already-large cadre of engineers, the DoD could promote economies of scale and increase efficiency. At the same time, it is important to realize that despite this seemingly large skill base, the DoD still relies extensively on outside engineering contractors to complete its missions. With this in mind, we examine the advantages and disadvantages of augmenting the DoD's organic capacity.

<u>Advantages</u>

- Improves objectivity and reduces the potential for OCIs

  The potential exists for improved objectivity if government employees perform required SETA support functions. At the same time, decision-making is never fully objective. Relationships with private-sector firms are shaped by various cultural biases within the military Services and agencies. Factors such as

convenience, familiarity, and tradition enter into acquisition decisions. It would be naïve to presume that transitioning SETA functions to the DoD's internal capability would ensure total objectivity with regard to systems acquisition.

OCIs would be less problematic if the provision of SETA functions were transitioned to the DoD's internal capability. However, it is unclear just how much of an advantage this is. Many firms (e.g., TASC) implemented company policies to manage OCI challenges of their own volition to prevent not only actual but also perceived conflicts. Nevertheless, under this strategy, any intentional or unintentional conflict that results from an OCI (at least as it pertains to SETA contracts), to the extent that it exists, would be minimized.

- Allows the DoD to leverage existing infrastructure

  Over the past decades, several activities that were performed by the DoD in-house have been contracted out. Often, these activities relied on resources, administrative or otherwise, that could not be proportionally reduced. By adding capacity to perform SETA functions, existing resources may, in some cases, be able to "absorb" the newly added personnel with less than a proportional increase in indirect costs. DoD agencies may wish to perform costing analyses prior to transitioning SETA functions in-house in order to gauge cost effectiveness. In general, however, it seems unlikely that this advantage would outweigh the cost increases, discussed later, that in-house provision entails.

- Facilitates clearer delineation of inherently and non-inherently governmental functions

  As a result of changing mission requirements and organic workforce shortages, the DoD has had to increasingly turn to contractors to fill roles that, in some cases, have been filled by government employees. As discussed previously, contractors perform many functions that support inherently governmental

functions. These roles include SETA support for program offices. The greater use of contractors has increased the potential risk of contractors influencing the government's control over and accountability for decisions that may be based on contractor work (GAO, 2008). As a result, the government has had to provide additional clarification, which, we have argued, often only adds to the confusion and has made management and oversight more challenging. In-house provision of SETA functions helps to obviate risks and challenges of this nature. At the same time, this change would have government employees performing what have been referred to as *commercial activities*, reducing the potential positive impacts that can be achieved from contracting.

- Reduces the challenges that result from inadequate requirements specification

  Common sense dictates that contractors should be used in instances in which a task can be precisely specified in advance. For example, entering data with a specified level of accuracy or providing 10,000 telephones of a certain make or model are tasks that can be unambiguously conveyed to contractors (Kelman, 2002). On the other hand, if a task cannot be precisely specified, there is a risk that the contractor will fail to meet the government's expectations. As Steven Kelman points out, "if the government poorly specifies what it wants, a contractor may 'shirk' by providing what appears to the government as poor performance but that literally meets the conditions of the contract" (Kelman, 2002, p. 306). With regard to systems engineering, the government may not only fail to specify what it wants but also may, in fact, not know what it wants—at least not initially. Ideally, a master plan should be developed prior to the development of any large-scale, complex system—it is not enough to assume that a general architecture description will be able to provide the requisite detail for contractors to develop systems capable of operating in a SoS environment. But this is often easier said than done. It is difficult to provide a functional decomposition of a system that adequately specifies the performance of its individual elements.

Moreover, one could argue that specifying the performance of individual elements so as to ensure system optimization is, in fact, part of the systems engineering process. And given the DoD's commitment to the incremental, evolutionary development of systems, whereby capabilities are not only added but defined over time, fixed specifications may be undesirable.

It stands to reason, then, that given the many systems in various phases of development across the DoD at any one time, the DoD organic workforce may be in the best position to coordinate and perform ongoing systems engineering through the efficient allocation of its internal resources. Indeed, it is perhaps unsurprising that systems engineering is often described as one of the DoD's core competencies (Sharma, 2009). However, the DoD can still use contractors and, at the same time, overcome the challenges associated with evolving requirements by relying on the quality program leadership, oversight, and guidance that is provided by the DoD's cadre of technical experts.

- Reduces SETA acquisition transaction costs

  Transaction cost theory (TCT) asserts that transactions between individuals (or organizations) are not cost-free. In other words, there is a cost associated with participating in the market (i.e., making an economic exchange) beyond that which is reflected in the price of a good or service. This could, for example, be in the form of paying a commission when buying or selling a stock.

  Within the context of contracting, these costs include the bargaining costs required to come to an agreement acceptable to both parties as well as enforcement costs, which the customer pays to ensure that the contractor is meeting its obligations.

TCT has been widely used to analyze organizational behaviors, including government acquisition and contracting arrangements. Organizations are growing increasingly aware of the importance of examining the transaction costs of certain activities in different contexts so that they can design governance mechanisms to minimize them. Because of the difference in organizational goals and interests, along with the inherent information asymmetry between contractor and buyer, contract negotiation and implementation are not cost-free. In fact, the transaction costs of managing the relationship between government buyers and contractors from the bidding process to contract termination are not negligible. Arranging the bidding process, initiating requests for proposals, negotiating with potential bidders, selecting potential contractors, and enforcing the terms of the contract all incur transaction costs. In-house provision would eliminate the transaction costs associated with SETA contracting.

Disadvantages

- Increases government workforce in an era of significantly constrained resources

  As the U.S. economy, still reeling from the recession of 2008, continues along the path to recovery, lawmakers are searching for ways to cut spending to reduce the country's $14.5 trillion debt. Congress has not yet developed a strategy to manage growing entitlement spending. Accordingly, the DoD, which consumes the second largest portion of government revenue after entitlements, will likely see significant cuts in coming years. Indeed, cuts are already being made. In August 2011, Congress reached a budget deal that will impact the DoD budget in two ways. The first was a $350 billion cut in defense spending over the next 10 years. The second was the threat of some $600 billion more in cuts, which would be automatically triggered in January 2013 if a special congressional committee fails to agree on future deficit reductions. Accordingly, additional emphasis has been placed on strengthening—but also on "right-sizing"—the DoD total workforce.

Determining the ideal size of the DoD's workforce requires an analysis of costs, including, among others, private- and government-sector salaries and compensation.

A recent *USA Today* analysis (Cauchon, 2010a) found that federal workers earned an average salary (excluding benefits) of $67,691 in 2008 versus $60,046 for their private-sector counterparts. Taking into account only those jobs that existed in both the public and private sectors, the study found that in 83% of the cross-sector comparisons, the federal employee earned more (Cauchon, 2010a). Similarly, the Heritage Foundation found that federal employees received, on average, a 12–22% wage premium over their comparably skilled private counterparts (Sherk & Richwine, 2010). In addition, using 2008 data, the Cato Institute (Edwards, 2009) identified a gap in excess of $29,000 between the average full-time federal worker ($79,197) and the average full-time private-sector worker ($50,028).

With regard to total compensation (salaries/wages and benefits), *USA Today* (Cauchon, 2010b) found that in 2009, federal civil servants earned pay and benefits worth an average of $123,049 compared to private-sector workers' $61,051. *USA Today* (Cauchon, 2010a) also found that in 2008, benefits averaged $40,785 per federal employee and $9,882 per private-sector counterpart. James Sherk and Jason Richwine (2010) of the Heritage Foundation argue that total compensation for federal employees is only 30–40% higher than that of private-sector workers, which is less than the estimates from *USA Today* and the Cato Institute, both of which indicate that total compensation for federal employees is about 50% higher than that of private-sector employees (Edwards, 2009; Long & Kalish, 2010). In addition, a recent analysis by the *Federal Times* (Losey, 2011) indicates that federal employees are being increasingly concentrated into higher pay grades without taking on greater responsibility, a practice that inflates their pay. On average, it appears that federal workers earn more than their private-

sector counterparts, which suggests that the in-house provision of SETA functions may be inefficient in relative terms.

- Requires DoD agencies to increase compensation for high-skill positions

  Examining compensation by level of educational attainment leads to a slightly more nuanced picture. A 2012 comparison by the CBO found that among workers whose education culminated in a bachelor's degree, the cost of total compensation averaged 15% more for federal workers than for similar workers in the private sector. Similarly, for those workers with a high school diploma or less, total compensation was about 36% more for federal employees. Conversely, total compensation for those with a professional degree or doctorate were 18% lower for federal employees compared to their private-sector counterparts. The study concluded that, overall, the government paid 16% more than it would have if average compensation (based on education) had been comparable with private-sector compensation. From a pure cost point of view, the argument could be made that in deciding which SETA functions to perform in-house, the necessary education required to perform the function should be considered. In instances where only a bachelor's degree is required, the cost-effective solution is to contract out the SETA function in question; if more education is required, the function should be performed by the DoD.

  Unfortunately, the logic is not that simple. To begin with, it is likely that the best qualified and the highly educated tend to gravitate toward the private sector precisely because the compensation is higher. Moreover, some private-sector workers in high-power positions may, in fact, be "worth more" in terms of results achieved. Accordingly, the DoD might have to offer higher compensation if it wishes to dramatically increase its number of highly educated workers capable of skillfully performing difficult yet critical SETA functions.

- Reduces the DoD's ability to allocate costs

  Salaries and benefits notwithstanding, to determine the total cost of providing SETA functions, one must also account for the indirect costs that are incurred. Indirect costs, or overhead, are those expenses that cannot be directly associated with the cost object (i.e., the specific purpose for which the cost is being measured) but that are necessary for its accomplishment. Within the DoD, indirect costs are often shared across agencies, programs, and functions—and even across military Service branches. These include the costs of financial management, human resources management, legal services, grants management, agency management, information systems (and their security), budget formulation and execution, research and development, personnel security, senior management, and insurance—to name only some.

  Consequently, accounting for indirect costs can be especially challenging. Indeed, one of the benefits of hiring contractors is that the costs are far more visible (i.e., they are fully inclusive and reflected in the final price). Contractors must adhere to the Cost Accounting Standards (CAS) set forth by the government. These rules and standards promote cost visibility while ensuring that competition among contractors occurs on a level playing field. The costs associated with the use of government employees, by contrast, are often spread across multiple organizations and accounts, making it difficult to make rational management decisions.

  The DoD lacks an adequate accounting system with which one might capture and allocate all indirect costs. From an accounting perspective, one might visualize the DoD as a hierarchy of cost pools. The pools at the bottom perform services for which cost drivers can be easily identified. The cost pools at the top of the hierarchy, however, consist of shared costs that must be assigned to one or more

cost objects (e.g., products, services, customers, or other cost pools). The question, then, is how should these costs be assigned?

Although the government has a clear understanding of how much money an agency requests and subsequently spends, it has little information connecting the costs of an agency to its activities. On the other hand, the cost of service provision via a private-sector firm is decidedly easier to calculate because all of the government's costs are reflected in the agreed-upon contract award—there are no hidden or legacy costs.

- Reduces agility

Contractors can be mobilized quickly, without the commitment or expense of sustaining a large, long-term staff. They can be terminated when the work is completed or if their performance is deemed unacceptable. Military personnel and federal civil servants, however, occupy full-time, salaried positions. Moreover, contractors often specialize in a particular service and can provide it to multiple entities on a constant basis, increasing efficiency.

Hiring contractors allows the government to "shop" for specific skill sets. Contractors are often, although not always, better suited to the provision of certain services because they have acquired the skills that come with experience in a challenging, fast-moving, technical environment. For example, in the event that the DoD requires a computer programmer with experience using a certain programming language, it may make more sense, from a cost-efficiency perspective, to hire a contractor rather than to retrain a government employee who is experienced in another computer language.

Contracting also facilitates the rapid rationalization of the workforce once specific capabilities are no longer needed. If, for instance, the DoD needs to ramp up with

a specific skill set, such as a program to counter roadside bombs, it is more cost effective to obtain the required skills via contracting. Once the services are no longer needed (the threat no longer exits or the mission is complete), the support contract can be terminated. Reductions in force for government employees, on the other hand, are rare, challenging, and politically difficult. Often government employees are reassigned, sometimes to positions that may not be aligned with their skills and abilities.

- Will not provide the required technical capability

  At present, the DoD's organic workforce does not have the technical and managerial capability required to integrate complex SoS, which makes the effective in-house provision of SETA functions difficult to justify. Even if incentives are created to recruit highly trained managerial and technical personnel, the DoD does not provide an environment in which the new personnel could be as effective as their private-sector counterparts.

  Moreover, the rate of technical evolution continues to accelerate, and the DoD acquisition workforce finds it difficult to keep pace. When new personnel enter the DoD's acquisition workforce, there are no mechanisms currently in place to ensure that their skills remain current. Many members of the DoD's acquisition workforce have spent their entire professional careers serving the federal government; some of these employees have little or no experience in the private sector. And there is no indication that this is changing. According to the Acquisition Workforce Competencies Survey from 2008, the average federal government acquisition workforce employee has 21 or more years of federal acquisition service and is between 51 and 55 years old (Federal Acquisition Institute, 2009). Based on these statistics, it is fair to assume that, despite perhaps a handful of short-term jobs at the beginning of one's professional career, an overwhelming amount of the typical employee's acquisition experience has been

working for the government, with little or no outside experiences. Because most of today's technological innovation, particularly as it refers to information technology, takes place in the private sector, this isolation makes it difficult to maintain the appropriate skill level. Given these constraints, increasing the in-house provision of SETA functions would almost certainly lead to less-capable performance of these functions.

- Reduces program stability

  The sustained presence of experienced people within the leadership ranks can permit those functioning at the lower levels to be more successful and allow for more permanent changes in culture and attitude. Unfortunately, within the DoD, policies are not properly implemented and progress is lost due to rapid turnover of individuals at the senior levels. A 2008 GAO report revealed that for 39 major acquisition programs started since March 2001, "the average time in system development was about 37 months" but that "the average tenure for program managers on those programs during that time was about 17 months (GAO, 2011, p. 11). Frequent changes in leadership often lead to significant changes in an organization's priorities, goals, and strategy. These changes can significantly impact relationships with partnering organizations. Frequent leadership turnover can also reinforce any dysfunctional behaviors within the existing organizational culture. Also, long-term, or permanent, employees may be reluctant to participate in organizational change initiatives that significantly alter their day-to-day responsibilities when the leaders who initiated these changes are not present to see them through; this makes improving processes more difficult. The DoD has long recognized these challenges. The 1985 Defense Authorization Act mandated that program managers' assignments be lengthened to a minimum of four years or until the completion of a major program milestone. After a 1990 House Armed Services Committee found that only six of 94 major program managers had

remained in their positions for the mandated four years/milestone completion, the 1991 Defense Authorization Act reiterated the need for a minimum four-year assignment (Snider, 2011). As the GAO report cited previously reveals, however, the mandate has still not been widely adopted. Undertaking the provision of all SETA functions would present many challenges, known and unknown, to the DoD, and without strong, consistent leadership, it is difficult to justify.

- Requires a shift in official U.S. policy

  The OMB Circular A-76, entitled *Performance of Commercial Activities*, states that "longstanding policy of the federal government has been to rely on the private sector for needed commercial services, where a commercial service is defined as one that is a result of a requirement, or need, that the federal government has that could be obtained from a private sector source" (CRS, 2005). Transitioning SETA functions in-house would cause concern among private firms and the professional organizations of which they are part. They would likely cite this policy in raising their objections.

Option 2. Encourage the Development of Independent SETA firms

The DoD could encourage the formation of private-sector firms that focus exclusively on providing systems engineering and technical assistance to the government (or to the private sector, where there is no DoD conflict of interest). The DoD could provide incentives to these firms if, for instance, they were to sign hardware exclusion contracts that would prohibit them from designing systems or software from which they could later profit by producing the applicable deliverables. This approach would also promote open systems design and might create a new market for firms with engineering capabilities but which lack manufacturing facilities. In addition to decreased costs associated with using contractors (versus government employees), discussed in the previous section, some other advantages as well as disadvantages are presented in the following section.

Advantages

- Balances private-sector advantages with OCI concerns

  Firms with hardware exclusion contracts are only concerned about ensuring proper selection and integration of systems. In such an environment, the success of an independent firm is dependent only on the ability of the total package to function optimally, and at the lowest cost.

- Increases competition and reduces costs

  There are relatively few firms that focus solely on providing systems engineering and technical assistance. Incentivizing the formation of additional SETA firms will help drive down the DoD's costs through increased private-sector competition as well as competition between the private sector and the DoD's existing internal capability. It is well known that increased competition promotes greater efficiency, more innovation, higher quality, and better performance. In terms of cost savings, relying on competition has allowed the DoD to realize savings of 30–40% over what it would have otherwise paid, regardless of which sector wins (*Statement*, 2000). By increasing the number of objective, independent SETA firms, it may be possible to achieve higher savings.

- Increases potential for best-value solutions

  Independent SETA firms may be uniquely suited to provide the DoD with best-value solutions. When traditional defense industry firms design, develop, and produce systems, there is less incentive to use high-performance, lower-cost components or features. In addition, these firms tend to expand the scope of programs by implementing constant design changes, which bolster revenues but delay fielding while increasing costs to the DoD. Note that this holds true, at least

to some extent, even if the large firm is limited by government to providing SETA services; the firm in question may rely on internal business partners, subsidiaries, or affiliates rather than seek out the best-value technology. Moreover, a firm that is developing and/or manufacturing a system may have an eye towards the future. Although the firm may be prohibited from providing SETA functions to a system that it is developing, it is able to provide SETA functions in the future. With the current emphasis on horizontal integration, complex systems are often viewed as single components within a vast network of systems. In such an environment, a firm that develops one system and provides SETA functions on another may still have an unfair advantage. Thus, even when traditional OCIs are accounted for, large firms' incentives are not fully aligned with those of the DoD. Of course, even independent SETA firms have other interests in mind (most notably their own), but these interests are nonetheless better aligned with those of the DoD.

Disadvantages

- Requires firms to constrain their growth (through separating hardware from SETA business)

  The manufacture of large DoD systems is the primary enterprise of large defense firms. In 2009, Northrop Grumman's total revenue exceeded $34 billion, approximately $26 billion of which was generated by its aviation, information, and electronic systems sectors (Northrop Grumman, 2010). Northrop Grumman's technical services sector generated a mere $2.8 billion (with the firm's shipbuilding sector generating the remaining $5 billion; statistico.com, 2011). Technical services, then, account for the minority of the firm's revenue. Nevertheless, prior to the WSARA legislation, large government contractors such as Northrop Grumman sought to acquire smaller firms that provided SETA services in order to enhance their sales and profits, because as stated earlier,

systems development and engineering can overlap considerably. Thus, pairing development and manufacturing with ongoing engineering and technical assistance makes sense from a business perspective. Large firms can leverage their experience and lessons learned from the R&D, development, and manufacturing phases to improve the efficiency with which they provide ongoing SETA support, which, at least in theory, could lead to lower costs for the customer. More generally, requiring large firms to constrain their growth may lead to elevated costs with respect to all of its products and services. Of course, this is true with regard to smaller, independent SETA firms as well. In fact, these firms may find it difficult to remain profitable in an environment in which they are barred from competing in the more lucrative sectors, which, as suggested previously, generate significantly higher revenues. Curtailing firms' growth by firmly demarcating the boundary between systems development and engineering may lead to other unintended consequences. For instance, even if an open systems, technology-neutral approach is taken, imposing artificial boundaries may, in some instances, hinder continuity of design, thereby limiting a system's potential.

Option 3. Transition SETA Functions to Federally Funded Research and Development Centers

Federally Funded Research and Development Centers (FFRDCs) provide the government with an alternative to private-sector firms when it comes to acquiring systems engineering and technical assistance. FFRDCs were instituted in the 1940s to mobilize the country's scientific and engineering talent (Hruby, Manley, Stoltz, Webb, & Woodard, 2011). FFRDCs are government-owned, contractor-operated entities that combine the attributes of the government workforce with those of the private sector to meet the nation's long-term R&D needs. Creating and maintaining a body of top technical talent requires a degree of flexibility that simply does not exist within

government agencies. FFRDCS have the ability to make quick decisions, provide better incentives, and concentrate resources. In these respects, they are similar to private-sector R&D firms. But unlike private-sector firms, FFRDCs cannot engage, or compete, with companies that typically seek government contracts or manufacture goods. In addition, because FFRDCs are government-funded (current law requires that 70% of FFRDC funding be provided by government agencies) and subject to more restrictive terms and conditions, they are often provided with sensitive information to which private-sector firms do not have access.

The FAR requires that FFRDCs meet the following requirements:

- Meet a special long-term R&D need that cannot be met as effectively by the government or the private sector;
- Work in the public interest with objectivity and independence, and with full disclosure to the sponsoring agency;
- Operate as an autonomous organization or identifiable operating unit of a parent organization;
- Preserve familiarity with the needs of its sponsors(s) and retain a long-term relationship that attracts high-quality personnel; and
- Maintain currency in field(s) of expertise and provide a quick response capability.

Over the last couple of decades, FFRDCs have become more diverse (both individually and collectively) in response to the increasingly complex national security environment, leading government officials and industry executives to call into question their charter, mission, and even their very existence (Hruby et al., 2011). Recently, for example, Stan Soloway, president of the Professional Services Council, asserted that FFRDCs have expanded their business base "beyond the unique and narrow areas for which they have been created, including selling their services across government in areas as commercial as performance measurement and management; information technology and IT

architecture; and areas of systems and other engineering, which are entirely appropriate for private sector performance" (Weisgerber, 2011, p. 4). Soloway described this trend as "troubling" (Weisgerber, 2011, p. 4). Industry opinion notwithstanding, many of the factors discussed in this report—from budgetary constraints to government accountability initiatives and insourcing, not to mention the evolving definition of inherently governmental functions—have renewed the discussion on the proper role of FFRDCs. One possibility in this regard is the transition of SETA services to FFRDCs.

Advantages

- Balances some private-sector advantages with concern over inherently governmental functions

  Because FFRDCs are non-profit, government-associated organizations, they are often provided with information that is sensitive in nature. Relying on FFRDCs for SETA functions may reduce the need to provide private-sector firms with this information. Indeed, systems engineering is, in and of itself, a sensitive domain. Whereas systems developers often build discrete systems based on government requirements, systems engineers ensure the interconnectedness and interoperability of multiple systems within a SoS environment in which cybersecurity is of increasing concern. Relegating SETA functions to quasi-governmental FFRDCs may help balance security issues with some private-sector advantages.

- May enable the government to attract and retain young engineers

  Deputy Secretary of Defense Ashton Carter recently stated that making better use of FFRDCs could help the DoD to attract and retain young engineers (Weisgerber, 2011). FFRDCs offer many private-sector advantages (e.g., typically higher salaries, better benefits, more advancement opportunities, better access to

commercial practices, and a fast-paced work environment), which tend to attract young, career-minded professionals. FFRDCs may initially be able to recruit higher-quality engineers (since they would be able to offer higher salaries), but overtime, they would experience many of the same challenges as the organic DoD workforce (i.e., staying on the cutting edge).

- Provides program stability

  Because FFRDCs have long-term relationships with government agencies, they are in a better position to understand the agency's culture, expectations, and operating environment. Moreover, one of the enduring characteristics of successful FFRDCs is their ability to address long-term, large-scale problems that are highly technical in nature (Hruby et al., 2011). Commercial firms often lack the resources or facilities to engage in this sort of long-term problem solving. Because long-term problem solving relies on long-term systems engineering, transitioning SETA functions to FFRDCs in order to maintain program stability makes sense, especially for large, long-term programs.

<u>Disadvantages</u>

- Does not eliminate organizational self-interest

  FFRDCs, like private-sector firms, have an incentive to attract government business. For instance, because the centers generally have full-time staffs, it is in FFRDCs' interest to ensure that there is sufficient work. Additionally, a center's prestige is, in large part, dependent on the amount and type of work that is performed. Moreover, personal career benefits that may accrue as a result of this work act as additional incentives.

Further, individual centers are under some pressure to assert themselves by advertising their contributions in order to compete (informally, that is) with other centers, private-sector firms, and the government workforce in order to remain viable. This has become more true in light of the current federal budget crisis. While traditional OCI concerns are less of an issue, industry leaders have long eluded to a perceived lack of objectivity on the part of FFRDCs. For instance, critics assert that because FFRDCS depend on the DoD for the majority of its funds, their analysis and advice tend to confirm the policies of the military Services (Pearlstein, 1991). For instance, the national trade association of the government professional and technical services industry, the Professional Services Council, noted that a RAND Corporation study (RAND is a prominent FFRDC) strongly backed the Air Force on its controversial B-2 bomber program. But when the Reagan administration, independent of the military Services, proposed its Strategic Defense Initiative, a RAND study suggested that it be scaled back considerably. And like private-sector firms, FFRDCs feel pressure to defend their advice, which may bias their objectivity with regard to future projects. In fact, because FFRDCs tend to retain employees for long periods, critics say that some centers "are rife with individuals with old axes to grind and previous policies to defend" (Pearlstein, 1991). Of course, claims of this nature are anecdotal and, not coincidentally, serve the interests of industry. Nevertheless, it is clear that even with support from an FFRDC, objectivity is not necessarily assured.

- Discourages competition

  Industry has long accused government agencies of forgoing the normal, competitive procurement process; instead, as industry advocates assert, agencies direct work to FFRDCs out of convenience, even though they may not offer the most cost-effective solution (GAO, 1991; CRS, 2011). As previously mentioned,

FFRDCs are only justified in instances where the government or private sector are unable to provide the service in question effectively and affordably, since they are immune from competition. At the same time, providing SETA functions can be lucrative for FFRDCs looking to expand their repertoires and build their reputations. Thus, as a general rule, awarding SETA contracts to FFRDCs, whose incentives may not be fully aligned with those of their government agencies, on a monopoly basis, cannot be justified.

- Reduces cost effectiveness

  There is a long-standing contention that the DoD's relationship with FFRDCs is one of convenience and that rather than take the necessary efforts to formally compete work, DoD agencies go straight to FFRDCs even though it may not be in keeping with official guidelines governing the use of FFRDCs. This contention is strengthened by the fact that FFRDC funding is allocated through hundreds of different offices within the DoD, all of which act independently. Critics assert that this allows FFRDCs to skirt congressional oversight (Pearlstein, 1991) and acquire services more readily than they might otherwise. In 1997, the Defense Science Board (DSB) found that "much of the work currently being done in the FFRDCs, while of high quality, is not of a special R&D nature that demands FFRDCs" (DSB, 1997, p.2). This statement has been echoed regularly, and perhaps more forcefully, over the past few years. The report went on to say that the DoD's reliance on FFRDCs "is isolating it from sources of new technology, and will hinder the Department's ability to get the best technical advice in the future" (DSB, 1997, p.3).

- Requires a change in statute

  The FAR mandates that FFRDCs "meet a special long-term R&D need that cannot be met as effectively by the government or the private sector" (2005).

Transitioning the provision of SETA functions to FFRDCs is, then, problematic since there is no single way to measure effectiveness (although surely efficiency, cost, speed of delivery, and performance are key indicators), and clearly this need has been met in the private sector. Accordingly, altering the statute may be necessary to promote the transition of SETA services to FFRDCs, which, given industry objections to the growing role of FFRDCs on other fronts, would certainly be politically unpopular..

V. Recommendations and Conclusion

The issuance of SETA contracts raises legitimate questions about the role of government. Concerns emerge over why the government needs to turn to industry in the first place, especially given the increased potential for the occurrence of OCIs. Does the public sector lack the necessary skills or resources? Can private firms provide services more efficiently? Is an outside perspective needed to provide greater objectivity? As it turns out, the answer to these questions is, more often than not, "yes."

Accordingly, the DoD must not seek to minimize its connection with the private sector; in fact, in certain areas, including the acquisition of SETA services, it should work to strengthen it. The benefits that result from the private sector's agility, the technical competence of its experts, and, perhaps most important, competition are too great to be ignored. But in so doing, government has the responsibility to minimize the occurrence of OCIs by structuring its relationship with private firms in such a way that competition is fair and robust and that advice is untarnished by OCIs.

We recognize that in order to meet this responsibility, the DoD cannot turn to the private sector exclusively. Some work, including the management and oversight of SETA providers, is inherently governmental in nature and must be performed by DoD personnel. In addition, FFRDCs, for their part, should continue to play a role in the provision of SETA services but only in those instances prescribed under current statute.

In the preceding section, we described three possible strategies for acquiring SETA services, as well as their advantages and disadvantages. We contend that each strategy has its merits and that a one-size-fits-all solution is inappropriate. Rather, the strategy that is applied must depend on the specific nature of the program in question, including its scope, duration, and purpose. To that end, we propose the following recommendations.

- Build the DoD's capacity to effectively manage, guide, and oversee SETA contractors

  The DoD must be able to manage and oversee SETA providers. Accordingly, the DoD must recruit highly qualified systems engineers who have relevant domain experience. As mentioned in the previous section, those with professional degrees (e.g., certified engineers) or doctorates are the only segment of the government workforce who, in terms of total compensation, earns less than their private-sector counterparts. Thus, increasing this segment's pay is critical, especially for those in program management positions.

- Ensure that the DoD has the capacity to perform inherently governmental functions

  Inherently governmental functions must be clearly defined. The current guidance makes use of a new category (i.e., functions that are "closely associated" with inherently governmental). Moreover, the new guidance was drafted largely in response to the notion that there are too many contractors working for the DoD, a meaningless assertion that detracts from the issue at hand. The DoD must ensure that it has the capacity to perform inherently governmental functions by increasing the size of its senior acquisition and experienced technical management workforces. Doing so will minimize concerns over the number of contractors and obviate the need for the OMB's recurrent guidance.

- Incentivize the formation of independent SETA firms

  It is unclear whether firms specializing in the provision of SETA services outperform traditional defense contractors (in terms of cost and quality). Although

common sense dictates that specialists in the everyday sense should be preferred to generalists, it is also true that in some instances, large, multifaceted firms may be better at providing SETA functions precisely because they have experience designing, building, and manufacturing large systems. However, these large firms cannot always prevent the occurrence of OCIs, and even when effective mechanisms are in place, the perception among stakeholders, both in the public and private sectors, is still problematic. The DoD should encourage the expansion of independent SETA firms. If such firms are able to consistently meet performance expectations then they may be the best choice in terms of affordability, objectivity, and quality.

- Rely on FFRDCs for those functions for which they are intended

  When FFRDCs are selected, OCIs are minimized and inherently governmental status is less of a concern. In addition, FFRDCs are particularly well suited to long-term projects that require in-depth understanding of the sponsoring agency's culture and operational environment. However, many of the DoD's programs do not have the kind of long-term stability envisioned for FFRDCs. In addition, many of the skills are clearly available in the private sector, which enjoys the benefits of competition, agility, and continuing access to cutting-edge commercial technologies.

- Do not impose additional legislative constraints on SETA contractors

  The WSARA legislation, designed to avoid or mitigate OCIs, is adequate in its current form. Imposing further restrictions (e.g., requiring all systems development firms to divest of their SETA subsidiaries) would unnecessarily constrain technical innovation.

Conclusion

In the second decade of the 21st century, the United States will face a diverse set of trials that include economic stagnation, significant budget deficits, escalating healthcare costs, and continuing threats to America's security. Given these circumstances, it is imperative that the "right mix" of SETA providers be based on facts derived from careful observation and honest reasoning—and not on theoretical deduction or political considerations. Too often, for instance, the emergence of an OCI is used to impugn private-firm contracting as a practice. Predictably, this results in political rhetoric that has a real influence on government policy. But in reality, there is no one-size-fits-all solution. Rather, for every program, the DoD must ask which provider can offer the most objective and cost-efficient as well as highest quality service.

Appendix

TASC Navigates the OCI Landscape

The Analytic Sciences Corporation (TASC) is a prominent systems engineering and technical assistance (SETA) contractor. Since its founding in 1966, TASC has undergone several organizational transformations, which have created different implications for organizational conflict of interest (OCI) management. Following the dramatic increase in the nation's defense budget in the 1980s, TASC's revenues grew rapidly from around $20 million in 1980 to more than $100 million in 1987. In 1991, revenues reached $228 million, 90% of which were derived from government contracts. TASC continues to play a leading role in providing the federal government, and the Department of Defense (DoD) in particular, with high-tech strategic planning, analysis, and technical support.

Because so much of its business entailed government work, TASC adopted robust OCI management policies. For example, TASC had a long-standing policy of not supporting defense prime contractors or other hardware. Such a policy was critical because TASC was often contracted to provide support to program offices and to support system acquisitions (e.g., help write statements of work) for the military Services and other government agencies. If TASC had subcontracted to support a firm such as Lockheed Martin or Northrop Grumman, an OCI could occur if the firm in question bid on a statement of work that had been prepared by TASC.

In 1991 TASC was bought by the Primark Corporation, which managed TASC as a stand-alone subsidiary, insulated from Primark's other business functions, which were primarily in financial, economic, and market research. Much of TASC's work during this period consisted of building systems architectures for other Primark subsidiaries. Eventually, Primark began to acquire overseas industries, which prompted concerns

among TASC's government customers, especially those performing intelligence functions. As a result, Primark sold TASC to Litton Industries, a large government contractor, in 1998.

After acquiring TASC, Litton Industries maintained its shipbuilding, navigation, electronics, and defense businesses. Litton TASC, for its part, continued to provide professional advisory services to its government customers. Although one company, Litton, now provided both hardware and advisory services, the actual occurrence of OCI was minimal since TASC did not normally support the Navy, the main recipient of Litton hardware. In fact, TASC's robust OCI policy was strengthened under Litton, the objective of which was to maintain TASC as a stand-alone organization. To combat any perception of OCIs, a firewall was built into day-to-day operations between TASC and other Litton business functions. In addition, TASC refrained from participating in evaluations comparing Litton hardware with competitor hardware. Moreover, there was minimal overlap among top executives, with both Litton and Litton TASC maintaining separate management structures. Litton TASC worked to maintain its own branding and viewed its independence as a distinguishing feature of its business—a feature that TASC leadership believed continued to provide it with a competitive advantage, as it competed for contracts against more entangled firms that were attempting to play both sides.

In 2001 Northrop Grumman acquired Litton Industries, and TASC became part of the Northrop Grumman information technology sector. Northrop Grumman's decision to sell TASC eight years later to a private equity firm was precipitated by the controversial award of the Air Force tanker contract to Northrop Grumman in 2008. Responding to a protest by Boeing, which had submitted its own bid, the Government Accountability Office (GAO) concluded that the Air Force had made significant errors in reviewing the two firms' proposals (Censer, 2010). Although TASC was not directly involved and OCIs were not the basis of the protest, Northrop Grumman and TASC leadership began to view their relationship with an increasing liability; had TASC supported the Air Force in the tanker program, Boeing might have alleged the existence of an OCI to strengthen its

protest. Bruce Phillips, Vice President of the Global Security Operating Unit at TASC, remarked that it was "luck of the draw" that TASC had not supported the tanker program, especially given the number of other Air Force projects in which it participated. Otherwise, Phillips noted, it is likely that Boeing would have subpoenaed "every email between Northrop Grumman and TASC" (personal communication, August 2, 2011). Boeing, for its part, did not have an advisory services subsidiary, a fact that the company could leverage in formulating future protests. In an effort to avoid the potential for such situations in the future, executives at Northrop Grumman and TASC began to reconsider the implications that their partnership might have on future business opportunities. Soon thereafter, under pressure from Boeing, the National Reconnaissance Office (NRO) chief contracting officer announced that traditional mitigation (e.g., firewalls) for OCIs were no longer adequate (i.e., firms working on its programs could not both provide SETA services and develop systems). To retain its systems development contracts with the NRO, and in anticipation of the soon-to-be-enacted WSARA legislation, Northrop Grumman decided to divest TASC. Northrop Grumman CEO Ronald Sugar stated that the deal "reflects Northrop Grumman's desire to align quickly with the government's new organizational conflict of interest standards, while preserving TASC's unique organizational culture and its status as the advisory services employer of choice" (Merced, 2009).

Reference List

Aerospace Industries Association. (2009, September 10). Subject: Section 207 of the Weapons System Acquisition Reform Act of 2009 [Memorandum]. Retrieved from http://www.aia-aerospace.org/assets/letter_091009_assad.pdf

Barr, S. (2005, May 30). Defense bills push for stricter contract procedures. *The Washington Post*. Retrieved from http://www.washingtonpost.com

Blaker, J. (2006, Spring). Arthur K. Cebrowski: A retrospective. *Naval War College Review, 59*(2), 129–145.

Brodsky, R. (2010a, March). Administration puts stamp on 'inherently governmental.' *Government Executive*. Retrieved from http://www.govexec.com/welcome/?zone=welcome&rf=http%3A%2F%2Fwww.govexec.com%2Fdailyfed%2F0310%2F033110rb1.htm

Brodsky, R. (2010b, August). Pentagon abandons insourcing effort. *Government Executive.* Retrieved from http://www.govexec.com/defense/2010/08/pentagon-abandons- insourcing-effort/32111/

Cauchon, D. (2010a, March). Federal pay ahead of private industry. *USA Today*. Retrieved from http://www.usatoday.com/money/economy/employment/2010-03-04-federal-pay_N.htm

Cauchon, D. (2010b, August). Federal workers earning double their private counterparts. *USA Today*. Retrived from http://www.usatoday.com/money/economy/income/2010-08-10-1Afedpay10_ST_N.htm

Cebrowski, A. K., & Garstka, J. (1998). *Network-centric warfare: Its origin and future.* Retrieved from http://www.kinection.com/ncoic/ncw_origin_future.pdf

Censer, M. (2010, October 7). GAO clears Air Force in tanker case. *The Washington Post*. Retrieved from http://www.washingtonpost.com

Commission on Army Acquisition and Program Management in Expeditionary Operations. (2007). Retrieved from http://www.army.mil/docs/Gansler_Commission_Report_Final_071031.pdf

Congressional Budget Office (CBO). (2005). *Logistics support for deployed military forces*. Washington, DC: Author.

Congressional Budget Office. (2012). *Comparing the compensation of federal and private-sector employees.* Washington, DC: Author.

Congressional Research Service (CRS). (2005). *Defense outsourcing: The OMB Circular A-76 policy*. Washington, DC: Author.

Congressional Research Service (CRS). (2010). *Inherently governmental functions and Department of Defense operations: Background, issues, and options for Congress*. Washington, DC: Author.

Congressional Research Service (CRS). (2011). *The quasi government: Hybrid organizations with both government and private sector legal characteristics*. Washington, DC: Author.

Defense Federal Acquisition Regulation Supplement (DFARS), 48 C.F.R. subpart 209.5 (2010).

Defense Science Board Task Force. (1997, Jan.) *Federally Funded Research and Development Centers (FFRDC) and University Affiliated Research Centers (UARC) Independent Advisory Task Force.* Retrieved from http://www.hawaii.edu/uhmfs/uarc/ffrdcanduarc.pdf

Defense Science Board Task Force. (2008, July). *Creating an effective national security industrial base for the 21st century: An action plan to address the coming crisis*. Retrieved from http://www.acq.osd.mil/dsb/reports/ADA485198.pdf

Department of Defense Appropriations Act for Fiscal Year 2010, H.R. 3326, 11 Cong. (December 19, 2009).

Department of Defense Inspector General (DoD-IG). (2006). *Systems Engineering Planning for the Ballistic Missile Defense System.* Washington, DC: Author.

Deutch, J. (2001, Fall). Consolidation of the US defense industrial base. *Acquisition Review Quarterly*. Retrieved from http://www.dau.mil/pubscats/PubsCats/AR%20Journal/arq2001/Deutch.pdf

Driessnack, J. D., & King, D. R. (2004). *An initial look at technology and the institutions on defense industry consolidation*. Retrieved from Marquette University, College of Business Administration website: http://epublications.marquette.edu/cgi/viewcontent.cgi?article=1019&context=mg

mt_fac&seiredir=1#search=%22%E2%80%9CAn%20Initial%20look%20Technology%20Institutions%20Defense%20Industry%20Consolidation.%E2%80%9D22

Edwards, C. (2009, August). Federal pay continues rapid ascent. Retrieved from http://www.cato-at-liberty.org/federal-pay-continues-rapid-ascent/

Erwin, S. (2010, October). Insourcing of government jobs: Confusion rules. *Defense Insider, 95*(683), 8.

Federal Acquisition Institute. (2009). *FY2008 Annual Report on the Federal Acquisition Workforce*, Federal Acquisition Institute, Fort Belvoir, VA.

Federal Activities Inventory Reform Act (FAIR), Pub. L. No. 105–270, 112 Stat. 2382 (1998).

Federal Acquisition Regulation (FAR), 48 C.F.R. ch. 1 (2005).

Gansler, J., Lucyshyn, W., & Rigilano, J. (2012). *Toward a valid comparison of government and contractor costs.* Monterey, CA: Naval Postgraduate School.

General Accounting Office (GAO). (1991). *Are service contractors performing inherently governmental functions?* (GAO-92-11). Washington, DC: Author.

Golden, M. (2005). *Organizational conflicts of interests* [Presentation slides]. Retrieved from http://www.ndia.org/Divisions/Divisions/Procurement/.../6pc3_golden.PPT

Gordon, D. (2005). *Organizational conflicts of interest: A growing integrity challenge* (Public Law and Legal Theory Working Paper No. 127). Washington, DC: The George Washington University Law School.

Gordon, L. (2000). *Managerial accounting* (5th ed.). New York, NY: McGraw Hill.

Gouré, D. (2010, October). Insourcing vs. efficiency: Conflicting initiatives could disrupt DoD's work. *Defense News*. Retrieved from http://www.defensenews.com/

Government Accountability Office (GAO). (2008). *DOD's increased reliance on service contractors exacerbates long-standing challenges* (GAO-08-621T). Washington, DC: Author.

Government Accountability Office (GAO). (2009). *DOD Can Improve its management and oversight by tracking data on contractor personnel and taking additional actions* (GAO-09-616T). Washington. DC: Author.

Government Accountability Office (GAO). (2011). *Defense acquisitions: Results of annual assessment of DOD weapon programs: Statement of Michael J. Sullivan, director acquisition and sourcing management* (GAO-08-674T). Washington, DC: Author.

Hepp, C. (2010). Lockheed Martin sells Valley Forge-based Enterprise Integration Group. *Philadelphia Inquirer*. Retrieved from http://articles.philly.com/2010-10-14/business/24982843_1_eig-contractors-veritas-capital#ixzz137GZHER9

Hruby, J., Manley, D., Stoltz, R., Webb, E., & Woodard, J. (2011). The evolution of federally funded research & development centers [Public interest report]. Retrieved from http://www.fas.org/pubs/pir/2011spring/FFRDCs.pdf

Kelman, S. (2001). Contracting. In L. Salamon (Ed.), The tools of government: A guide to the new governance (282-318). New York: Oxford University Press.Long, E., & Kalish, B. (2010, September). Federal pay called into question—Again. *Government Executive*. Retrieved from http://www.govexec.com/dailyfed/0910/092110l1.htm

Losey, S. (2011, October). Job duties increasingly not linked to grade, pay. *Federal Times*. Retrieved from http://www.federaltimes.com/article/20111010/BENEFITS01/110100301/

McHugh, J. (2011, February). *Memorandum for Army agencies: Reservation of in-sourcing approval authority*. Washington, DC: Secretary of the Army.

Merced, M. (2009, November 8). Northrop agrees to sell TASC consulting unit. *The New York Times.* Retrieved from http://www.nytimes.com/2009/11/09/business/09deal.html

Metzger, R. (2011). *Final DFARS OCI rules*. Retrieved from Pillsbury Winthrop Shaw Pittman LLP website: http://www.pillsburylaw.com

National Defense Authorization Act for Fiscal Year 2006, Pub. L. No. 109–163, 119 Stat. 3136 (2006).

National Research Council. (2008). *Pre-Milestone A and early-phase systems engineering: A retrospective review and benefits for future Air Force systems.* Retrieved from http://www.incose.org/chesapek/Docs/2010/Presentations/Early-Phase_Sys_Engr-AirForceStudy-NRC_2008.pdf

Northrop Grumman. (2009). Northrop Grumman to sell its advisory services division, TASC, Inc. for $1.65 billion; Net cash proceeds to fund additional $1.1 billion share repurchase. Retrieved from

http://investor.northropgrumman.com/phoenix.zhtml?c=112386&p=irol-newsArticle&ID=1352518&highlight=

Northrop Grumman. (2010). Annual Income Statement. Retrieved from http://investor.northropgrumman.com/phoenix.zhtml?c=112386&p=irol-fundIncomeA

Obama, B. (2007). *The change we need in Washington*. Retrived from http://obama.3cdn.net/0080cc578614b42284_2a0mvyxpz.pdf

Obama, B. (2009, March 4). Remarks by the President on procurement. Retrieved from http://www.whitehouse.gov/the-press-office/remarks-president-procurement-3409

Office of Management and Budget (OMB). (2011). Work reserved for performance by federal government employees. Retrieved from http://www.whitehouse.gov/omb/procurement_work_performance

Pearlstein, S. (1991). Reigning in Pentagon's Think Tanks. *Washington Post*, July 28, HI.

Project on Government Oversight. (2011). 2010 ends with contracting ethics defeat. Retrieved from http://pogoblog.typepad.com/pogo/2011/01/2010-ends-with-contracting-ethics-defeat.html

Rutherford, E. (2010). Senators criticize DoD's conflict of interest mitigation plan. Rockville, MD: Access Intelligence.

Sage, A., & Cuppan, C. D. (2001). On the systems engineering and management of systems of systems and federations of systems. *Information Knowledge Systems Management*, 2(4).

Sharma, R. (2009, June). The move to insourcing…Proceed with caution. Washington, DC: FAIR Institute.

Sherk, J., & Richwine, J. (2010, September 14). *Federal pay still inflated after accounting for skills*. Retrieved from Heritage Foundation website: http://www.heritage.org

Snider, K. (2011) *An analysis of the relationship between the professionalism of defense acquisition program managers and program outcomes.* Monterey, CA: Naval Postgraduate School.

Soloway, S. (2009). Insourcing benefits are all smoke and mirrors. *Washington Technology*. Retrieved from http://washingtontechnology.com/articles/2009/11/02/insights-soloway.aspx

Statement before the House Armed Services Committee Readiness Subcommittee, 106th Cong. (2000, June 27) (Statement by Jacques S. Gansler).

Tongia, R., & Wilson, E., III (2010, March). *The dark side of Metcalfe's law: Multiple and growing costs of network exclusion.* Paper presented at Beyond Broadband Access Workshop.

Under Secretary of Defense for Acquisition, Technology, and Logistics (USD[AT&L]). (2007). *Human capital strategic plan*. Washington, DC: Department of Defense.

Weisgerber, M. (2011). OSD: Use non-profit labs for R&D. *Defense News.* Retrieved from http://www.defensenews.com/article/20110509/DEFFEAT04/105090314/OSD-Use-Nonprofit-Labs-R-D

Welby, S. (2011). *DoD challenges and opportunities for systems engineers.* Retrieved from http://www.incose-la.org/documents/events/speakers/2011_08_09_INCOSE-LA%20Chapter-Welby-Final-2.pdf

Acknowledgements

This research was sponsored by the Naval Postgraduate School, and we are especially grateful for the support and encouragement provided by Rear Admiral Jim Greene (USN, Ret.) and Keith Snider. In addition, we would like to thank Bruce Phillips, Vice President of the Global Security Operating Unit at TASC, for his insightful comments, many of which are reflected within the report. We would like to acknowledge Tim Natriello and Mike Garber, graduate students in the School of Public Policy at the University of Maryland, whose research contributed to this report. Finally, we would like to thank our co-worker Caroline Dawn Pulliam for her assistance with the planning and coordination of this study.

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