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**Weapons Acquisition Reform: Reform Act Is
Helping DoD Acquisition Programs Reduce Risk,
but Implementation Challenges Remain**

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Preface & Acknowledgements

Welcome to our Tenth Annual Acquisition Research Symposium! We regret that this year it will be a “paper only” event. The double whammy of sequestration and a continuing resolution, with the attendant restrictions on travel and conferences, created too much uncertainty to properly stage the event. We will miss the dialogue with our acquisition colleagues and the opportunity for all our researchers to present their work. However, we intend to simulate the symposium as best we can, and these *Proceedings* present an opportunity for the papers to be published just as if they had been delivered. In any case, we will have a rich store of papers to draw from for next year’s event scheduled for May 14–15, 2014!

Despite these temporary setbacks, our Acquisition Research Program (ARP) here at the Naval Postgraduate School (NPS) continues at a normal pace. Since the ARP’s founding in 2003, over 1,200 original research reports have been added to the acquisition body of knowledge. We continue to add to that library, located online at www.acquisitionresearch.net, at a rate of roughly 140 reports per year. This activity has engaged researchers at over 70 universities and other institutions, greatly enhancing the diversity of thought brought to bear on the business activities of the DoD.

We generate this level of activity in three ways. First, we solicit research topics from academia and other institutions through an annual Broad Agency Announcement, sponsored by the USD(AT&L). Second, we issue an annual internal call for proposals to seek NPS faculty research supporting the interests of our program sponsors. Finally, we serve as a “broker” to market specific research topics identified by our sponsors to NPS graduate students. This three-pronged approach provides for a rich and broad diversity of scholarly rigor mixed with a good blend of practitioner experience in the field of acquisition. We are grateful to those of you who have contributed to our research program in the past and encourage your future participation.

Unfortunately, what will be missing this year is the active participation and networking that has been the hallmark of previous symposia. By purposely limiting attendance to 350 people, we encourage just that. This forum remains unique in its effort to bring scholars and practitioners together around acquisition research that is both relevant in application and rigorous in method. It provides the opportunity to interact with many top DoD acquisition officials and acquisition researchers. We encourage dialogue both in the formal panel sessions and in the many opportunities we make available at meals, breaks, and the day-ending socials. Many of our researchers use these occasions to establish new teaming arrangements for future research work. Despite the fact that we will not be gathered together to reap the above-listed benefits, the ARP will endeavor to stimulate this dialogue through various means throughout the year as we interact with our researchers and DoD officials.

Affordability remains a major focus in the DoD acquisition world and will no doubt get even more attention as the sequestration outcomes unfold. It is a central tenet of the DoD’s Better Buying Power initiatives, which continue to evolve as the DoD finds which of them work and which do not. This suggests that research with a focus on affordability will be of great interest to the DoD leadership in the year to come. Whether you’re a practitioner or scholar, we invite you to participate in that research.

We gratefully acknowledge the ongoing support and leadership of our sponsors, whose foresight and vision have assured the continuing success of the ARP:



- Office of the Under Secretary of Defense (Acquisition, Technology, & Logistics)
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- Program Executive Officer, SHIPS
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Acquisition Portfolio Trends

Weapons Acquisition Reform: Reform Act Is Helping DoD Acquisition Programs Reduce Risk, but Implementation Challenges Remain

Michael J. Sullivan
Government Accountability Office

Service-Oriented Architecture Afloat: A Capabilities-Based Prioritization Scheme

Matthew C. Horton, *United States Navy*
Diana I. Angelis, *Naval Postgraduate School*

The Impact of Computer-Based Training on Operating and Support Costs for the AN/SQQ-89(v) Sonar System

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William A. Gibson, *United States Navy*

The GAO's 11th Annual Assessment of Selected Weapon Programs

Michael J. Sullivan
Government Accountability Office



Weapons Acquisition Reform: Reform Act Is Helping DoD Acquisition Programs Reduce Risk, but Implementation Challenges Remain

Michael J. Sullivan—Sullivan is the director, Acquisition and Sourcing Management, U.S. Government Accountability Office. This group has responsibility for examining the effectiveness of the DoD's acquisition and procurement practices in meeting its mission performance objectives and requirements. In addition to directing reviews of major weapon system acquisitions such as the Joint Strike Fighter, F-22, Global Hawk, and various other major weapon acquisition programs, Sullivan has developed and directs a body of work examining how the DoD can apply best practices to the nation's largest and most technically advanced weapon systems acquisition system. This work has spanned a broad range of issues critical to the successful delivery of systems, including technology development, product development, transition to production, software development, program management, requirement-setting, cost estimating, and strategic portfolio management. The findings and recommendations from this work have played a major role in the department's recent acquisition policy revisions. Most recently, he has directed the GAO's annual assessment of major weapon systems programs for the Congress and GAO's work with Congress in establishing acquisition policy reforms. His team also provides the Congress with early warning on technical and management challenges facing these investments. Sullivan has been with the GAO for 24 years. He received a bachelor's degree in political science from Indiana University and a master's degree in public administration from the School of Public and Environmental Affairs, Indiana University. [sullivanm@gao.gov]

Introduction

For several decades, the GAO has reported on poor outcomes encompassing cost and schedule growth on the Department of Defense's (DoD's) major weapon acquisition programs. Many problems can be traced to a culture where the military services begin programs with inflexible requirements, immature technologies, and overly optimistic cost and schedule estimates. Given pressures to reduce spending across the government, including the DoD, finding ways to prevent or mitigate cost growth is crucial to U.S. national security. A solid program foundation using good developmental testing and systems engineering, and reliable cost estimates is needed in order to help avoid cost overruns and promote better acquisition outcomes. There have been numerous attempts in the past to improve DoD acquisition outcomes, including the Packard Commission (President's Blue Ribbon Commission on Defense Management, 1986), the Goldwater–Nichols Act in the 1980s (1986), and the Federal Acquisition Streamlining Act of 1994. More recently, Congress passed the Weapon Systems Acquisition Reform Act of 2009 (Reform Act)¹ to improve the way weapon systems are acquired and avoid cost and schedule overruns.

In 2009, the Senate Armed Services Committee asked us to begin reporting on the DoD's implementation of Reform Act provisions and the impact the Reform Act has had on weapon acquisition programs. This is our third report addressing these topics. The first report focused on the DoD's initial efforts to implement Reform Act provisions for systems engineering and developmental testing, including the placement of new offices for these activities within the Office of the Secretary of Defense (OSD; GAO, 2010). Our second report examined the challenges the Services face as they try to strengthen systems engineering and developmental testing activities on weapon acquisition programs (GAO,

¹ As amended by the Ike Skelton National Defense Authorization Act for Fiscal Year 2011, Pub. L. No. 111-383 §§ 813 and 1075, and the National Defense Authorization Act for Fiscal Year 2012, Pub. L. No. 112-81 §§ 819 and 837.



2011b). This report examines (1) the DoD's progress in implementing Reform Act provisions; (2) the impact the Reform Act has had on specific acquisition programs; and (3) challenges remaining in improving the weapons acquisition process.

We conducted this performance audit from January 2012 to December 2012 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Background

In May 2009, Congress passed the Reform Act in an effort to improve the way weapon systems are acquired and avoid further cost overruns on such programs. When signing the Reform Act into law, the President stated that its purpose was to limit weapon system cost overruns and that it would strengthen oversight and accountability by appointing officials who will closely monitor the weapons systems acquisition process to ensure that costs are controlled.

Four offices were established as a result of the Reform Act: SE, DT&E, CAPE, and PARCA. The SE and CAPE offices existed under other organizational titles prior to the Reform Act. Staffing levels, following the Reform Act, remained relatively stable for both of these offices, but some reorganization was necessary to reflect new Reform Act responsibilities. The DT&E and PARCA offices were newly established. The key roles and responsibilities of these four offices as outlined in the Reform Act are explained in Table 1.



Table 1. Key Responsibilities of Offices Established as a Result of the Reform Act

Office	Primary responsibilities
Systems Engineering	<ul style="list-style-type: none"> • serves as principal advisor to the Secretary of Defense and the Under Secretary of Defense for Acquisition, Technology, and Logistics on systems engineering activities in the department • develops systems engineering and development planning guidance for the DoD • reviews and approves major defense acquisition program systems engineering plans • monitors major defense acquisition program systems engineering activities • reports to Congress annually on systems engineering organization, capabilities, and activities
Developmental Test and Evaluation	<ul style="list-style-type: none"> • serves as principal advisor to the Secretary of Defense and the Under Secretary of Defense for Acquisition, Technology, and Logistics on developmental test and evaluation activities • develops developmental test and evaluation guidance for the DoD • reviews and approves major defense acquisition program developmental test and evaluation plans • monitors and reviews acquisition program developmental test and evaluation activities of major defense acquisition programs • reports to Congress annually on developmental test and evaluation organization, capabilities, and activities
Cost Assessment and Program Evaluation	<ul style="list-style-type: none"> • serves as principal advisor to the Secretary of Defense and other senior officials on matters related to cost analysis and the planning and programming phases of the planning, programming, budgeting, and execution system • develops independent cost estimates for major defense acquisition programs prior to major milestone decisions and updates independent cost estimates when programs have exceeded critical cost thresholds, known as Nunn–McCurdy breaches • reviews existing systems and methods for tracking and assessing operation and support costs on major defense acquisition programs • develops analysis of alternative study guidance for major defense acquisition programs • approves the analysis of alternatives study plan for each major defense acquisition program
Performance Assessments and Root Cause Analyses	<ul style="list-style-type: none"> • assesses major acquisition program performance through independent analyses and through the Defense Acquisition Executive Summary process • identifies the root causes of cost growth and other problems on programs that experience a critical Nunn–McCurdy cost breach

Note. This table was created using GAO analysis of the Weapon Systems Acquisition Reform Act of 2009.

In addition to the new organizational requirements, the Reform Act requires the DoD to ensure that the acquisition strategy for major defense acquisition programs includes measures to ensure competition or the option of competition throughout the program life cycle. This could include strategies such as maintaining two sources for a system (dual-sourcing) and breaking requirements for supplies or services previously provided or performed under a single contract into separate smaller contracts (unbundling of contracts; Weapon Systems Acquisition Reform Act of 2009, § 202). Major defense acquisition programs are also required to provide for competitive prototyping—where two or more competing teams produce prototypes before a design is selected for further development—prior to Milestone B unless a waiver is properly granted by the milestone decision authority



(Weapon Systems Acquisition Reform Act of 2009, § 202(a)),² and to meet the following Milestone B certification requirements, including:³

- Appropriate trade-offs among cost, schedule, and performance objectives have been made to ensure the program is affordable;
- A preliminary design review and formal post-preliminary design review assessment have been conducted and on the basis of such assessment the program demonstrates a high likelihood of accomplishing its intended mission;
- Technology has been demonstrated in a relevant environment on the basis of an independent review and assessment by the Assistant Secretary of Defense for Research and Engineering;
- Reasonable cost and schedule estimates have been developed to execute, with concurrence of the Director of CAPE, the program's product development and production plan;
- Funding is available to execute the program's product development and production plan;
- The DoD has completed an analysis of alternatives with respect to the program; and
- The Joint Requirements Oversight Council⁴ has approved program requirements, including an analysis of the operational requirements.

The Reform Act also requires the Joint Requirements Oversight Council to ensure trade-offs among cost, schedule, and performance objectives are considered for joint military requirements (Weapon Systems Acquisition Reform Act of 2009, § 201). The GAO previously reported that the Council considered trade-offs made by the military services before validating requirements, but the military services did not consistently provide high-quality resource estimates to the Council for proposed programs in fiscal year 2010. We also found that the Council did not prioritize requirements, consider redundancies across proposed programs, or prioritize and analyze capability gaps in a consistent manner (GAO, 2011a).

² Specifically, the Reform Act required the DoD to modify its guidance relating to the operation of its acquisition system to incorporate these competitive prototyping provisions. The DoD did so through Directive-Type Memorandum (DTM) 09-027, *Implementation of Weapon System Acquisition Reform Act of 2009* (Dec. 4, 2009, incorporating Change 3, Dec. 9, 2011). Major defense acquisition programs are those estimated by the DoD to require an eventual total expenditure for research, development, test, and evaluation, including all planned increments, of more than \$365 million, or for procurement, including all planned increments, of more than \$2.19 billion in fiscal year 2000 constant dollars or designated by the USD(AT&L). The Milestone Decision Authority for major defense acquisition programs is the USD(AT&L), the head of a DoD component, or if delegated the component acquisition executive.

³ Pub. L. No. 111-23; various sections, codified at 10 U.S.C. § 2366b. The Reform Act revised the Milestone B certification requirements for trade-offs, preliminary design, technology demonstration, and reasonable cost and schedule estimates. The remaining Milestone B certification requirements bulleted here were unrevised by the Reform Act.

⁴ The Joint Requirements Oversight Council is an advisory council to the Chairman of the Joint Chiefs of Staff with the responsibility to: (1) identify, assess, and approve joint military requirements; (2) assist acquisition officials in identifying alternatives to acquisition programs; and (3) assist the Chairman of the Joint Chiefs of Staff in assigning priority for joint military requirements.



Findings

The GAO’s analysis of 11 weapon acquisition programs showed the Reform Act has reinforced early attention to requirements, cost and schedule estimates, testing, and reliability. For example, prior to starting development, an independent review team raised concerns about the Ground Combat Vehicle program’s many requirements and the risks associated with its seven-year schedule. Subsequently, the Army reduced the number of requirements by about 25% and prioritized them, giving contractors more flexibility in designing solutions. In addition, the developmental test and evaluation office—resulting from the Reform Act—used test results to help the Joint Light Tactical Vehicle program develop a more realistic reliability goal and a better approach to reach it. Shown in Table 2 are areas where the Reform Act influenced several programs in the GAO’s review.

Table 2. Reform Act Influence on Case Study Programs

Program	Requirements	Cost and schedule	Testing	Reliability
Before Milestone B				
Ground Combat Vehicle	✓	✓	✓	✓
Joint Light Tactical Vehicle ^a	✓	✓	✓	✓
Ohio Class Replacement	✓	✓	✓	✓
Ship to Shore Connector ^a			✓	✓
After Milestone B				
Joint Strike Fighter		✓		
Global Hawk		✓	✓	✓
Gray Eagle	✓	✓	✓	✓
KC-46 Tanker			✓	✓
Littoral Combat Ship Seaframe		✓		
Remote Minehunting System		✓	✓	✓
Small Diameter Bomb II		✓	✓	✓

Notes. This table was created using GAO analysis of DoD data.

^a During the course of our review, the Joint Light Tactical Vehicle and Ship to Shore Connector programs held a Milestone B review.

While the DoD has taken steps to implement most of the fundamental Reform Act provisions, some key efforts to date have been primarily focused on the DoD’s largest weapon acquisition programs. The DoD faces five challenges—organizational capability constraints, the need for additional guidance on cost estimating and Reform Act implementation, the uncertainty about the sufficiency of systems engineering and developmental testing resources, limited dissemination of lessons learned, and cultural barriers between the Office of the Secretary of Defense (OSD) and the military services—that limit its ability to broaden the Reform Act’s influence to more programs. Service officials believe additional guidance is needed to improve their cost estimates and other implementation efforts. They also believe that lessons learned from programs that experience significant cost and schedule increases should be shared more broadly within the acquisition community. These challenges seem straightforward to address, but they may require more resources, which have been difficult to obtain. Ensuring the services have key leaders and staff dedicated to systems engineering and developmental testing activities, such as chief engineers at the service level and technical leads on programs, as well as breaking down cultural barriers are more difficult to address. They will require continued



monitoring and attention by the USD(AT&L), service acquisition executives, and offices established as a result of the Reform Act to address.

Recommendations

The GAO recommends the DoD develop additional cost estimating and Reform Act implementation guidance; make lessons learned available to the acquisition community; and assess the adequacy of the military services' systems engineering and developmental testing workforce. The DoD generally concurred with the recommendations. The GAO clarified one recommendation to make it clear that the DoD needs to designate an office(s) within the Acquisition, Technology, and Logistics organization to provide practical Reform Act implementation guidance to program offices.

For a more detailed discussion of our findings, as well as our scope and methodology, see www.gao.gov/products/gao-13-103.

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