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From Marginal Adjustments to Meaningful Change

Rethinking Weapon System Acquisition

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Summary

Despite years of change and reform, the Department of Defense (DoD) continues to develop and acquire weapon systems that it cannot afford and cannot deliver on schedule. Consequently, defense acquisition is one of the most urgent issues that DoD has to address today—a point emphatically conveyed by Deputy Secretary of Defense William Lynn during his confirmation hearing: “[A]cquisition reform is not an option, it is an imperative” (2009, p. 10).

This monograph is designed to inform new initiatives for markedly improving the cost, timeliness, and innovativeness of weapon systems that DoD intends to acquire. It is the result of a RAND effort that led to six occasional papers on topics that are likely to be of critical importance to DoD leadership: competition, novel systems, prototyping, risk management, organizational and management issues, and the acquisition workforce. These papers build on RAND staff’s deep experience in acquisition management issues to provide innovative ideas and suggestions to revitalize defense acquisitions.

Findings

Savings from Competition Are Not Inevitable

The value of competition is so much taken for granted that defense officials are often criticized for not relying more frequently on competition in awarding contracts for major defense systems. However, a second production source does not guarantee savings in every procurement. Defense acquisitions differ from the typical business market

in terms of priorities, the number of buyers and producers, and the level of market uncertainty. Moreover, competition requires additional time, money, and management effort.

RAND researchers used historical data and a RAND-developed methodology to determine whether and when competition is a reasonable acquisition strategy during the production phase. The analysis indicates that competition is more reasonable in situations in which nonrecurring costs are low, cost improvement is minimal, and a greater number of units will be produced. In some cases—especially in the procurement of major systems whose nonrecurring costs are large—it may actually be less costly for the government to forgo competition.

DoD Must Accept More Risk to Meet Demand for Novel Systems

Today, there is a growing need to respond to asymmetrical threats using novel weapon systems that can be quickly developed and fielded. Novel systems—such as the F-117 Stealth Fighter and robotic ground vehicles—involve more uncertainty than conventional systems, not only with regard to design and technology but also in terms of how they will be used, how many units will be needed, and how much they will cost (see Table S.1).

Current acquisition policies and processes are too risk averse to enable the effective development and timely employment of novel systems. Consequently, DoD needs a separate acquisition strategy that

Table S.1
Comparison of Conventional and Novel Systems

Dimensions	Conventional Systems	Novel Systems
Design	Follow-on	New
Technology	Evolutionary	Disruptive
Operational employment	Established	In formulation
Outcomes	Predictable	Uncertain
Production run	Large	Uncertain
Operational life	Long	Uncertain

is less tied to achieving precise cost, schedule, and performance outcomes. The new strategy should include a focus on unique integrations of existing and emerging technologies, a willingness to accept risks, easy and quick termination of programs not yielding expected benefits, and early test and demonstration of military utility.

Oversight Is Based on Dollar Value, Irrespective of Risk

DoD assigns responsibility for decisions on major defense acquisition programs on the basis of the program's dollar value. The higher the value, the more senior the decisionmaker. This approach has been constantly refined over the years without having noticeably improved acquisition outcomes. A new paradigm in which the level of oversight and management would be based on the level of risk a program represents would help DoD more effectively manage weapon system programs. Some very costly projects might have significantly less risk than projects of similar cost and thus should require less oversight. Conversely, projects may cost little but have a lot of risk because they push the state of the art in technology; such programs require more-comprehensive oversight than dollar value alone would indicate.

Cost, schedule, and performance are the primary attributes by which programs are assessed, but more-discrete program attributes—such as technical, system, design, production, and business innovation risk—would better enable program managers to look ahead and act to avoid adverse outcomes. The Defense Acquisition Management System has sufficient tools and allows time for conducting proper assessment and management of technical risk and, to some extent, system integration risk. However, new approaches in design, production, and business areas of acquisition programs do not appear to receive the same level of skepticism and comprehensive oversight received by new technologies and systems. Descriptive levels of risk that could be used to assess new design approaches include the following:

- New, unproven processes. New design tools under development. New design organization.
- Large expansion of existing design organization. Many new designers and supervisors unfamiliar with design tools and processes.

- Existing design organization using radically changed design tools, processes, and/or technologies.
- Experienced design organization using new design tools with proven processes.
- Experienced design organization using existing, proven design tools and processes.

Organizational Schisms and Rigid Processes Contribute to Inefficiencies

Many of the problems that contribute to poor cost and schedule outcomes are systemic to the way that the acquisition process is organized and managed in DoD. Specifically, organizational schisms and overly prescribed management processes contribute both to inefficiencies in the acquisition system and to unrealistic expectations.

For example, service chiefs¹—who validate warfighting requirements—have become increasingly disconnected from the service acquisition executives who develop and acquire new weapon and information systems in conjunction with their program executive officers and program managers. Without sufficient dialogue between these entities, service chiefs may emphasize warfighting needs at the expense of reducing cost, and the acquisition process loses their operational insight, which is critical in analyzing trade-offs between cost, schedule, and performance. The service chiefs should have a central, but not controlling, voice in the acquisition process to enable the requirements, funding, and acquisition processes to function together well. Having the service vice chiefs serve as co-chairs of the military departments' acquisition boards would be a step in the right direction. However, increasing the role of the combatant commands in these decisionmaking processes would require them to spend too much time away from their warfighting responsibilities.² It is the job of those in the Pentagon to reach out to the combatant commands and demonstrate that their needs are being addressed.

¹ That is, the Chief of Staff of the U.S. Air Force, the Chief of Staff of the U.S. Army, the Chief of Naval Operations, and the Commandant of the Marine Corps.

² The military departments supply forces to the combatant commands, which conduct joint military operations.

Recent acquisition reforms have made management processes overly complex and rigid, leading to an environment in which “success” is measured by an ability to follow rules in a rote manner to move a program through an increasing number of wickets. DoD needs a more streamlined requirements and acquisition process, one that, unlike the current process that prescribes everything through an instruction or regulation, encourages workforce initiative and responsibility.

Evidence of the Benefits of Prototyping Is Mixed

Acquisition policy and practice reflect the recurring theme that prototyping as part of weapon system development can reduce cost and time; allow demonstration of novel system concepts; provide a basis for competition; validate cost estimates, design, and manufacturing processes; and reduce or mitigate technical risk. A review of four decades of RAND research on prototyping indicates that the available evidence on its benefits is somewhat mixed overall. Nevertheless, the historical record does reveal some of the conditions under which prototyping strategies seem most likely to yield benefits in a development program. These include ensuring that prototyping strategies and documentation are austere, not committing to production during the prototyping phase, making few significant design changes when moving to the final configuration, and maintaining strict funding limits.

Existing case studies and statistical analyses present the policymaker with mixed results, so, in essence, DoD’s new competitive prototyping mandate was incorporated into policy without a strong link between the new policy emphasis and its intended improvements to program cost, schedule, and performance outcomes. A carefully structured analysis of prototyping strategies emphasizing recent experiences with competitive prototyping (with, e.g., F-22 fighter aircraft, the Joint Strike Fighter, the Littoral Combat Ship) would help ensure a more successful implementation of the new policy.

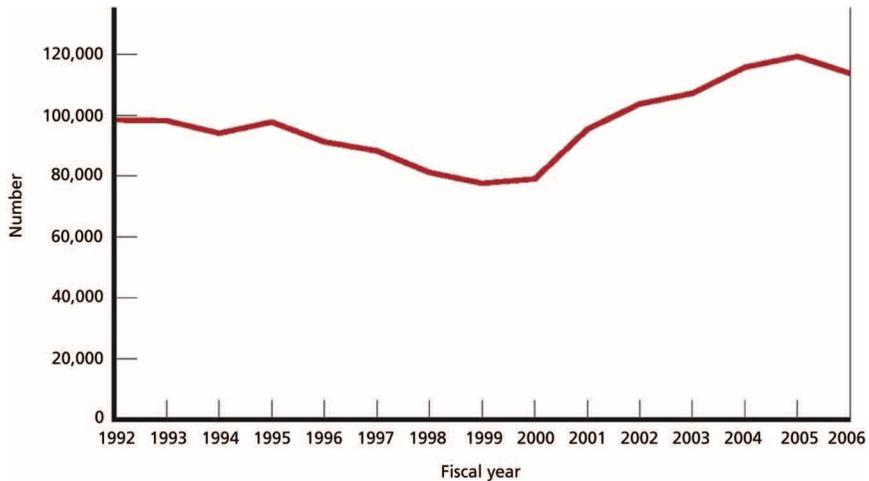
DoD Lacks Systematic Data on the Acquisition Workforce

Through the end of FY 2015, DoD plans to increase the defense acquisition workforce by 20,000 workers (16 percent), converting contractor positions to civil service positions and hiring new civil servants. This

step responds to three common claims: (1) The acquisition workforce is too small to meet current workload, (2) it lacks the necessary skills, and (3) contractors are overused or inappropriately used to perform acquisition functions. However, DoD does not have systematic data on workforce supply and demand, the adequacy of workforce skills, or the amount and nature of contractor support. Without such data, it is difficult to determine whether and to what extent workforce attributes affect acquisition outcomes.

To gain insight into DoD's acquisition workforce in terms of supply and demand, a RAND analysis drew upon data about the department's overall civilian workforce. These data indicate that the number of DoD civilians in acquisition-related occupations declined during the 1990s, reaching a low of 77,504 in 1999, and then climbed steadily to reach 119,251 in 2005. By 2006, it had been reduced slightly to 113,605 (see Figure S.1). The greatest declines occurred in contracting, quality assurance, and auditing—groups that were the most likely to have been affected by increased workload due to procurement reforms and increased use of contractors.

Figure S.1
Civilians in the Acquisition Workforce, September 30 Annual Snapshots



SOURCE: Gates et al., 2008, Figure 3.1.

DoD should acquire the evidence needed to make the case for workforce changes by gathering data on the total workforce, including contractors, mapping the workforce to acquisition activities for which performance may be measurable, and identifying and gathering information on processes and outcomes that the workforce can be expected to influence.

Conclusions

The following chapters contain more-detailed proposals to improve defense acquisition through initiatives focused on competition, novel systems, risk management, organizational factors, prototyping, and the acquisition workforce. The starting point for these proposals is the following list of overarching conclusions:

- Explicit evaluation of the pros and cons of production competition should be undertaken for each acquisition.
- The characteristics of novel systems are so different from those of the systems for which the present acquisition process was designed that they require a separate acquisition strategy.
- Managing defense acquisition programs by risk, rather than dollar amount, merits serious consideration.
- Some bold steps are needed to clear structural impediments to acquisition reform. Greater participation of the service chiefs in a more streamlined acquisition system would most closely align requirements with contracting for material and material support.
- The successful application of prototyping strategies in the future requires certain conditions, such as testing critical performance attributes in a realistic environment.
- DoD needs to invest more in understanding the strengths and weaknesses of the acquisition workforce, including contractors.