INITIATION AND EARLY MANAGEMENT OF ACQUISITION PROGRAMS

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The Problem

Unresolved problems in the early stages of Major Defense Acquisition Programs (MDAPs) frequently lead to negative program outcomes.

History tells us that problems in the initiation and early management of Major Defense Acquisition Programs (MDAPs) lead frequently to even greater problems in the later stages of these programs. Addressing issues in the early stages of acquisition can forestall such problems and significant cost growth.

Defining Requirements for Acquisition Programs

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Few topics in the Department of Defense (DoD) have generated as much controversy over the years as the process for defining requirements for acquisition programs. Our military forces should be designed to perform a set of military missions that are broadly defined by civilian authorities. Given those missions, one job of military commanders is to state what capabilities are needed—force size and mix and the manning and equipping of forces—to perform the missions assigned to them within an acceptable level of risk. Those capabilities are what we loosely call "requirements."

However, determining such requirements is fraught with difficulties. The projected future national security environment is at best uncertain and, indeed (as history shows), is likely to change. Yet another layer of uncertainty is the future military capabilities of both friends and enemies in a future scenario involving threats to U.S. national security. Thus, Pentagon decision makers must both appropriately discern requirements and determine the best ways to meet them within resource constraints and with an acceptable level of risk. Military commanders have a natural tendency to err on the high side when it comes to specifying requirements for mission success, since no commander wants to fail, and the region of uncertainty in defining capabilities needed in order to be successful in performing a complex military mission is generally large. These are some of the reasons that independent civilian oversight is necessary in establishing requirements for acquisition programs in order to strike an appropriate balance between a requirement, its technical feasibility, and the resources required to obtain it. (By "civilian oversight" we mean the staff in the Office of the Secretary of Defense (OSD)—the members of

that staff comprise both civilians and military personnel, but the leadership is, with few exceptions, civilian.)

For an acquisition program, these factors translate into a proposed weapon system's required performance, the technology available to attain that performance, and the cost to acquire it (and thus its "affordability," i.e., is it reasonable to assume that funds can be made available to pay the projected costs?). Another important factor in the undertaking of a new acquisition program is *risk*. Risk in this sense can be defined as the probability that an acquisition program will not succeed—that is, required performance will not be achieved or will be achievable only at unacceptable cost. The fielding of systems that do not perform as needed (thus endangering mission success) is one potentially bad outcome. Another is the cancellation of a program after the expenditure of substantial resources, because of performance shortfalls and/or cost growth. The consequences are both waste and a failure to provide needed capabilities to the forces. While perhaps not as bad as those two outcomes, paying too much for the performance obtained is also undesirable. All these poor outcomes have "opportunity costs"—the other benefits that could have been obtained with the resources wasted or extra resources needed by a problem program.

These factors drive complexity into the requirements process for acquisition programs. There must be an effective interface between the process by which military commanders determine their requirements and the civilian oversight function to ensure that acquisition programs are affordable and that the value received will be worth the cost (i.e., cost-effectiveness).

A key component of the current process is the Joint Staff's Joint Capabilities Integration and Development System (JCIDS), which supports the Joint Requirements Oversight Council (JROC) in its statutory responsibility to support the Chairman of the Joint Staff in his role of advising the president and the Secretary of Defense regarding military requirements. Broadly speaking, JCIDS seeks to determine future capability needs through analytical processes that identify "capability gaps." The analytical results are presented in a Capabilities-Based Assessment (CBA). Currently, CBAs are normally performed by the Military Service that sponsors a proposed new acquisition program. Once gaps have been identified within a capability area, they are prioritized and assessed for potential solutions. If the best solution is deemed to be a new MDAP (i.e., a "new start"), the Service brings the proposal and the evidence supporting it to the JROC for approval. Upon obtaining JROC concurrence to start a new program, the sponsoring DoD Component presents the proposal to OSD for approval via what is known as a "Materiel Development Decision."

The JCIDS process has been the subject of much criticism, especially by the Government Accountability Office (GAO) and the Congress. As a result, the Congress has added provisions to the U.S. Code several times to strengthen JCIDS and the JROC.

A 2011 IDA paper recommended that an analytically based process, not overly dependent on Component analytical support, be used in conjunction with JCIDS. The recommended process would be:

- focused on the Secretary's priorities
- independent of sponsoring DoD Components
- focused on a clearly defined span of programs within capability/mission area (i.e., portfolio-based), and
- adequately resourced.

Acquisition Program Risks

Risks in acquisition programs are usually characterized as encompassing three aspects—cost risk, schedule risk, and performance risk. All three are closely related. Another important risk less frequently cited is affordability risk—closely related but distinct from cost risk. We will discuss these areas of risk in greater detail, keeping in mind that each area being discussed applies (in varying degrees) to the other areas of risk. Because of the close linkage, we discuss affordability risk immediately after cost risk.

Cost Risk

Cost risk is perhaps the most widely appreciated of these concerns. Cost overruns in DoD acquisition programs have not been uncommon.[1]

Continuing concerns about cost overruns helped motivate the Weapon Systems Acquisition Reform Act (WSARA) in 2009, which, among a number of provisions, required the establishment in DoD of an office dedicated solely to determining the "root causes" of acquisition program cost overruns—the office of the Director, Performance Assessments and Root Cause Analyses (PARCA). PARCA is required by law to perform root cause analyses for any program experiencing a "Nunn-McCurdy breach" (roughly speaking, a cost overrun exceeding a 15 percent increase in projected unit cost).

A recent assessment[2] of root causes of cost overruns by the director of PARCA, covering twelve programs, found the two most prominent causes were (1) unrealistic initial cost or schedule estimates (five programs), and (2) poor program execution performance (six programs). A less prevalent cause was changes in procurement quantities (three programs).

These causes are consistent with the findings of a 2009 IDA analysis—*The Major Causes of Cost Growth in Defense Acquisition*—of the causes of cost growth in eleven selected DoD acquisition programs, from the late 1990s through 2008. Figure 1 displays the cost growth documented by IDA researchers, and Table 1 summarizes the causes identified for the cost growth. The causes are highly interrelated—in fact, having the characteristics of a "Russian doll," because one must drill down even deeper to determine why DoD did not get the requirements right; why the programs proceeded into Engineering and Manufacturing Development before the technologies were proven, even though

[1] It may be small comfort, but cost overruns in DoD acquisition programs are, on average, no worse than other large-scale development and acquisition programs in non-defense areas.

[2] Available at http://www.acq.osd.mil/asda/docs/briefings/PARCA_General_Briefing.pdf.

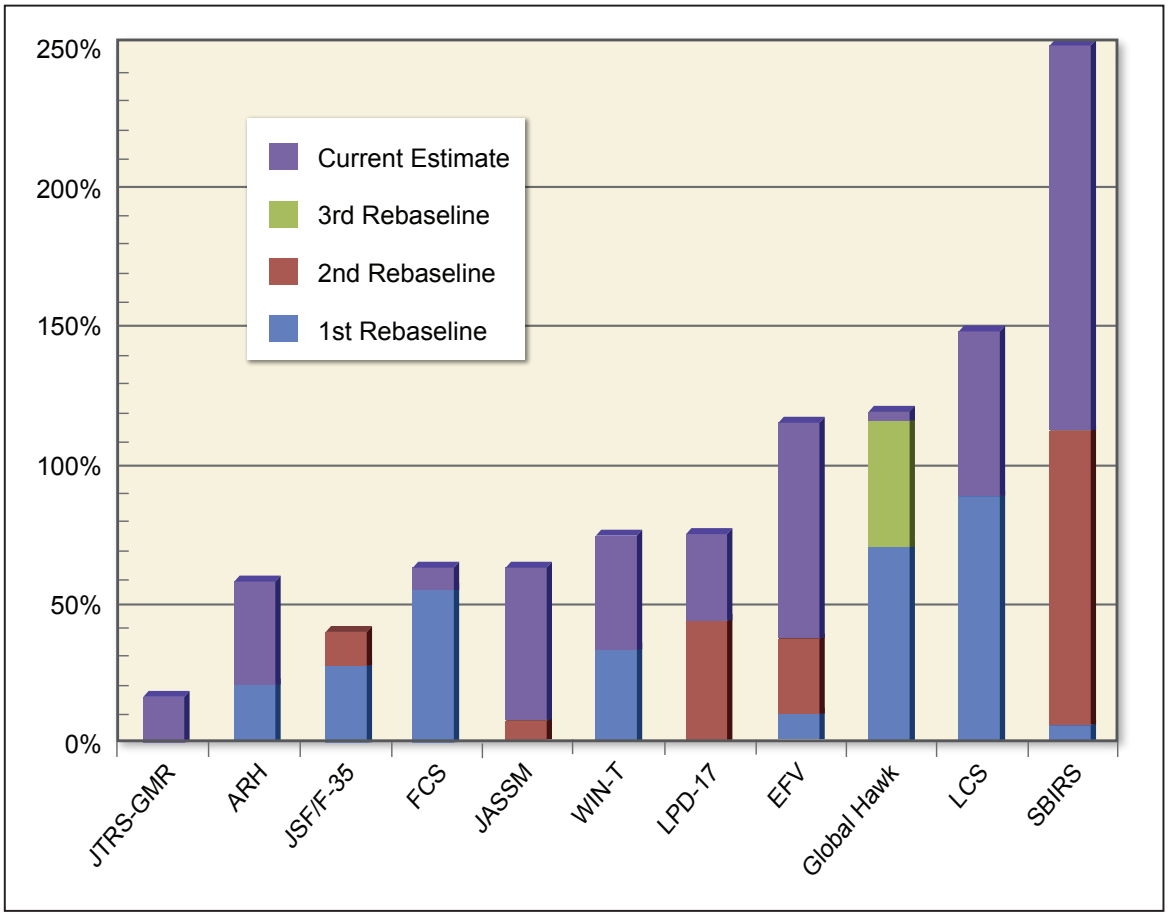

Figure 1. Growth in Program Acquisition Unit Cost (through 2009) in Selected Acquisition Programs

DoD policy explicitly prohibited it; why there was a lack of adequate early systems engineering; and why program schedules were accelerated or compressed unrealistically.

A "low ball" initial cost estimate is a sure way to cause a subsequent cost overrun. Thus a program can be a great success, but be subjected to much criticism simply because the initial cost estimate was faulty.

These problems occur for complicated reasons. First, as discussed earlier in this article, are the problems in the requirements definition process. Second, the problem of proceeding into full-scale development with immature technologies is, quite simply, management failure—a willingness to accept high risks that technologies would mature in time because of a perceived urgency in getting a capability fielded. (It is encouraging that the PARCA analysis cited above did not ascribe this cause to *any* of the twelve programs assessed.) Another article in this publication details technical issues with the Joint Tactical Radio System (JTRS). In June 2002, DoD approved JTRS for entry into full-scale development even though none of its critical technologies was at the required

Table 1. Areas of Weakness Causing Cost Growth in Programs Investigated by the 2009 IDA Analysis

	1. Top Management Activities			2. Initial Program Definition and Costing			
	a.	b.	c.	a.	b.	c.	d.
	Implementation of Policies	Implementation of Acquisition Reforms	Contractor Selection, Oversight, and Incentivization	Requirements Processes	Immature Technologies	Systems Engineering	Schedule Compression and Concurrency
ARH			●	●	●	●	●
EFV		●	●	●		●	●
FCS	●		●	●	●	●	
Global Hawk	●	●	●	●		●	●
JASSM		●	●	●		●	●
JSF				●		●	●
JTRS	●			●	●	●	
LCS		●	●	●		●	●
LPD-17		●	●		●	●	●
SBIRS	●	●	●	●	●	●	●
WIN-T	●				●	●	

readiness level. For the Future Combat System, only *three* of 44 critical technologies were mature; yet it also was allowed to move into full-scale development.

There is yet another, more subtle, reason for initially underestimating the cost of a new start. The program will more likely be approved if the cost estimate appears "reasonable and affordable." Thus, there is a natural tendency for proponents of new programs to err on the low side.

The 2009 IDA analysis noted that deficiencies in early systems engineering were due primarily to reductions in qualified systems engineers in government program management offices, requiring an excessive dependence on contractor-provided systems engineering. Shortcomings in early systems engineering have a direct impact on cost risks because the system being costed is not properly defined. The most salient case in point among the eleven programs considered in the 2009 IDA report is the Future Combat System, which was so poorly defined as to make cost estimation almost an exercise in speculation. However, the PARCA briefing, based on more recent analyses, cited only one of twelve systems as suffering from "unanticipated design, engineering, manufacturing or technology issues" (i.e., systems-engineering-related issues), indicating, perhaps, that greater attention is now being paid to more realistic front-end systems definition.

Affordability Risk

Affordability risk is the prospect that an acquisition program will become "unaffordable" at some time after its initiation. What does "unaffordable" mean, considering that, given a DoD budget in the vicinity of $500 billion, virtually any individual program should be affordable? It

means that DoD resource allocators are not, or are no longer, willing to devote the resources needed to execute the rest of the program. That could happen because of program cost growth or because of changing priorities (driven by changes in threat or strategy), or—what is usually the case—a combination of both. In other words, a program becomes unaffordable if it no longer seems worth what it is projected to cost.

Affordability risk is also inherent at program initiation if no realistic affordability assessment is made, or if it is made and not acted on. For example, it was evident (based on briefing materials presented at the FCS Milestone B review to approve entry into full-scale development) that the Army would not be able to afford to complete the program as planned with the funds for investment projected to be available for the Army. Apparently, the decision makers either ignored that fact or believed that additional resources could be made available for Army investment. A problem in making affordability assessments for such programs is that usually most funding needs will occur beyond the five- to six-year fiscal planning horizon that DoD uses—i.e., the Future Years Defense Program (FYDP). Because no approved fiscal projections exist for the time period when the demand for funds will be the greatest, decision makers are not forced to confront the problem.

Affordability is usually a contributing, but seldom the only, factor leading to program cancellation. Affordability was cited as a concern for many of the acquisition programs that have been canceled over the past several years. These cancellations have resulted in significant inefficiencies—the sunk money on FCS alone at its cancellation has been estimated at $19 billion or more. (Some of that money was spent developing technologies that will find application elsewhere, so arguably it was not all wasted.)

Schedule Risk

As noted, cost and schedule risks go hand-in-glove. For the programs examined in the 2009 IDA report, schedule growth, measured by the estimates of the time required for full-scale development, averaged 80 percent for the eleven programs, while unit cost growth averaged 94 percent. Attempts to accelerate programs have frequently backfired, resulting in longer, rather than shorter, execution times. A prime example is Global Hawk, for which a perceived urgency to field the system rapidly for operations in Afghanistan led to concurrency in testing and production, and resulted in the need for expensive rework of systems post-production, which ultimately delayed fielding. Schedule risk also correlates strongly with the use of immature technologies. When the technologies fail to mature as anticipated, programs must either slow down development to await technology maturation, or seek alternative technologies—either way, the schedule will likely slip.

Performance Risk

Performance risk is the chance that key performance characteristics required of the system will not be obtained. Again, this risk is tightly intertwined with both cost and schedule risk. When performance shortfalls

become apparent, either remedial steps will be needed or the user will have to accept lesser capabilities (or both). Frequently the cause is ambitious initial requirements. An excellent example is the Marine Corps Expeditionary Fighting Vehicle (EFV), with a requirement to skim through modest waves at speeds up to 25 knots, and operate ashore as an armored fighting vehicle carrying a reinforced squad of 17 marines over land at speeds up to 45 miles per hour. These requirements ultimately proved to be unattainable in a vehicle that was sufficiently reliable and affordable. After two Nunn-McCurdy breaches, numerous test failures, and more than $7 billion spent, the program was canceled by Secretary Gates in 2011.

Similar stories can be told for the Future Combat System, Global Hawk, Joint Strike Fighter, Littoral Combat Ship, and Space-Based Infrared System, among those examined in the 2009 IDA analysis. However, of the twelve programs covered in the PARCA briefing cited above, only one was scored as having unrealistic performance expectations contributing to cost growth.

Conclusion

The 2009 IDA report concluded that, for the programs examined, cost growth could have been greatly reduced or eliminated if policies and procedures in place had been more rigorously followed.

The establishment of the PARCA office institutionalizes the type of analysis performed by IDA in 2009. In fact, since 2009, we have seen a significant decrease in acquisition program cost growth—annualized growth in the estimated Average Procurement Unit Costs for all MDAPs averaged 5.7 percent per year through December 2009, while such growth has averaged 3.3 percent per year since then. And this is before the full impact of cost control efforts such as PARCA and the Department's Better Buying Power initiatives can be felt. Because of the nature of the challenge (i.e., complex systems that must operate in stressful environments), there will always be risks of cost growth in many DoD acquisition programs. Nonetheless, there is cause for optimism that DoD is doing a better job today of addressing and managing cost growth and the associated risk of achieving needed defense capabilities within available resources.

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Sources:

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