



EXCERPT FROM THE PROCEEDINGS

OF THE
SIXTH ANNUAL ACQUISITION
RESEARCH SYMPOSIUM

**WHEN INSTRUCTIONS PROVIDE TOO MUCH FLEXIBILITY,
ESTABLISH RULES DEFENSE ACQUISITION PERFORMANCE
ASSESSMENT REDUX:
UNPREDICTABILITY, UNCERTAINTY AND PROGRAM FAILURE:
IMPLEMENTING A RULE-SET CAN BE THE FIX**

Published: 22 April 2009

by

J. David Patterson, Michael A. Ott and Eileen Giglio

**6th Annual Acquisition Research Symposium
of the Naval Postgraduate School:**

**Volume II:
Defense Acquisition in Transition**

May 13-14, 2009

Approved for public release, distribution is unlimited.

Prepared for: Naval Postgraduate School, Monterey, California 93943



The research presented at the symposium was supported by the Acquisition Chair of the Graduate School of Business & Public Policy at the Naval Postgraduate School.

To request Defense Acquisition Research or to become a research sponsor, please contact:

NPS Acquisition Research Program
Attn: James B. Greene, RADM, USN, (Ret)
Acquisition Chair
Graduate School of Business and Public Policy
Naval Postgraduate School
555 Dyer Road, Room 332
Monterey, CA 93943-5103
Tel: (831) 656-2092
Fax: (831) 656-2253
E-mail: jbgreene@nps.edu

Copies of the Acquisition Sponsored Research Reports may be printed from our website www.acquisitionresearch.org

Conference Website:
www.researchsymposium.org



ACQUISITION RESEARCH PROGRAM
GRADUATE SCHOOL OF BUSINESS & PUBLIC POLICY
NAVAL POSTGRADUATE SCHOOL

Proceedings of the Annual Acquisition Research Program

The following article is taken as an excerpt from the proceedings of the annual Acquisition Research Program. This annual event showcases the research projects funded through the Acquisition Research Program at the Graduate School of Business and Public Policy at the Naval Postgraduate School. Featuring keynote speakers, plenary panels, multiple panel sessions, a student research poster show and social events, the Annual Acquisition Research Symposium offers a candid environment where high-ranking Department of Defense (DoD) officials, industry officials, accomplished faculty and military students are encouraged to collaborate on finding applicable solutions to the challenges facing acquisition policies and processes within the DoD today. By jointly and publicly questioning the norms of industry and academia, the resulting research benefits from myriad perspectives and collaborations which can identify better solutions and practices in acquisition, contract, financial, logistics and program management.

For further information regarding the Acquisition Research Program, electronic copies of additional research, or to learn more about becoming a sponsor, please visit our program website at:

www.acquisitionresearch.org

For further information on or to register for the next Acquisition Research Symposium during the third week of May, please visit our conference website at:

www.researchsymposium.org



THIS PAGE INTENTIONALLY LEFT BLANK



When Instructions Provide Too Much Flexibility, Establish Rules Defense Acquisition Performance Assessment Redux: Unpredictability, Uncertainty and Program Failure: Implementing a Rule-set Can Be the Fix

Presenter/Author: J. David Patterson is the executive director of the National Defense Business Institute (NDBI) at the College of Business Administration, University of Tennessee. He is the former Principal Deputy Under Secretary of Defense, Comptroller, and served as the executive director of the Department of Defense sponsored Defense Acquisition Performance Assessment study. Additionally, he has served as the Special Assistant to the Deputy Secretary of Defense. He has been an executive in the defense industry and is a retired Air Force officer with 25 years of service. NDBI was established to provide assistance and resources to both the Department of Defense and the Defense Industry to produce systems and equipment as well as provide services more effectively and efficiently.

J. David Patterson
Executive Director
National Defense Business Institute
College of Business Administration
University of Tennessee
Knoxville, Tennessee 37996
Email: dpatterson@utk.edu

Research Assistant: Michael A. Ott is a Graduate Assistant working for the National Defense Business Institute. He is currently a graduate student in the University of Tennessee's MBA program where he is studying Logistics. He received his BS in Business Administration from Carson-Newman College in 2002. He was commissioned in 2002 as an Infantry Officer in the United States Army and served with the 101st Airborne (AASLT) before joining the United States Army Reserves in 2007.

Michael A. Ott
National Defense Business Institute
College of Business Administration
University of Tennessee
mott2@utk.edu

Editing Assistant: Ms. Eileen Giglio is Vice President, Acquisition and Technology for the Loch Harbour Group and provided valuable assistance in the writing of this paper as a subject-matter expert on the Defense Acquisition Performance Assessment. She has served as the Assistant Deputy Under Secretary of Defense, Strategic Plans and Initiatives—Acquisition, Technology and Logistics, Business Transformation. Ms. Giglio also served as the Deputy Director for the Defense Acquisition Performance Assessment; she provided administrative direction and management throughout the duration of the study.

3936 Colonel Ellis Avenue
Alexandria, Virginia 22304

Abstract

More than three years have passed since the Defense Acquisition Performance Assessment (DAPA) project was completed and the results briefed to the study's sponsor, the Deputy Secretary of Defense. In that time, the Department of Defense has issued its fourteenth major change to the Department's Acquisition System management guidance. Combined with a



shortfall of experienced and skilled acquisition business professionals, the result is a pervasive and troubling level of uncertainty and unpredictability regarding defense acquisition programs. The resulting Acquisition System including Planning, Programming, Budgeting and Execution (PPBE), Requirements and the little “a” Acquisition process lacks structure and discipline. What follows is persistent failures to meet cost, schedule and performance objectives. This paper presents a case for a mandatory set of Acquisition System rules to address this problem. Though by no means exhaustive, the recommended rules fit categories in the acquisition process, the requirements process and the PPBE process—referred to here simply as the “Budget Rules.” The premise of this paper is that the right mandatory set of rules applied to Major Defense Acquisition Programs would result in weapon systems and equipment critical to warfighter success being fielded more rapidly on cost, on schedule and performing as expected.

Introduction

More than three years have passed since the Defense Acquisition Performance Assessment (DAPA) project chaired by Lieutenant General Ronald Kadish, USAF (Ret.) was completed in November 2006 and the results briefed to the Deputy Secretary of Defense, the study’s sponsor. Since that time, there have been several more attempts to describe the root cause of the flaws in the Department’s Acquisition System. Most studies cover the same ground plowed by the DAPA project and previous studies, dating back to the 1985 *Packard Commission Report*. Despite these numerous evaluations of the Defense Acquisition System, none have advanced the discourse beyond what has been clear from the beginning. There is a fundamental lack of a budget process and requirements discipline that leads inexorably to programs that are over cost, behind schedule and not performing. Additionally, there is one factor that is common to serious analyses of the Department of Defense (DoD) Acquisition System.

The general discussion of reforming the Acquisition System with its many subsystems, procedures, and methodologies reveals that there is a basic failure to drive predictability regarding what the DoD can expect as a product (fielded weapon system) emerging from its acquisition process. In fact there is seldom any effort to make “predictable outcome” a program management priority. All program managers try to stay within budget or cost limits, meet schedule guidelines, and produce a weapon system or piece of equipment that performs to the level of stated requirements. But, is there any real certainty that the program manager’s efforts, no matter how diligent, or adherence to the acquisition process will produce the desired result? The case presented here would answer, no. The DAPA study raised the issue of the government’s inability to predict cost, schedule, and performance as a self-induced symptom of “instability” (Kadish, 2006, January). It is that instability in acquisition programs that defeats efforts to meet cost, schedule, and performance objectives.

The Problem Explained

Recent analyses of the troubles experienced in the DoD acquisition of weapons systems identify instability as a significant factor in program cost growth. A 2008 RAND Corporation study on cost growth of fixed-wing military aircraft identified the “practice of rotating officers through jobs every three to four years” as creating an unstable program management workforce (Arena, Younossi, Brancato, Blickstein & Grammich, 2008). This results in a management situation where experience gained in solving management problems is not effectively used over the term of the program and not available to those entering new to the program. The Aerospace Industries Association, in its November 2008 *Special Report, U.S. Defense Acquisition: An*



Agenda for Positive Reform, raised instability as an area where the Defense Department should focus management attention.

Two elements combine to create instability in the acquisition of weapon systems. First, there seems to be no lasting agreement on what should be the DoD Acquisition System policy directions. Since Deputy Secretary of Defense Packard issued the first *DoD Directive 5000.1* in 1971, the regulations documents have been revised significantly about every three years: 14 times in 38 years. As Charles Cochran (2009, January 1) so masterfully revealed in his presentation *Acquisition Management System from 1971 to 2008*, the *DoD 5000* series documents have provided direction varying from 8 pages to 840 pages of recommendations, suggestions, regulations, policy, procedures and definitions. No single Acquisition System approach has survived for more than five years, while the length of time for Major Defense Acquisition Programs to reach full operational capability is generally three times this Acquisition System regulation change cycle. For the purposes of this paper, reference to the most recent *Department of Defense Instruction 5000.02* (2008, December 8) shown in Figure 1,¹ will be used.

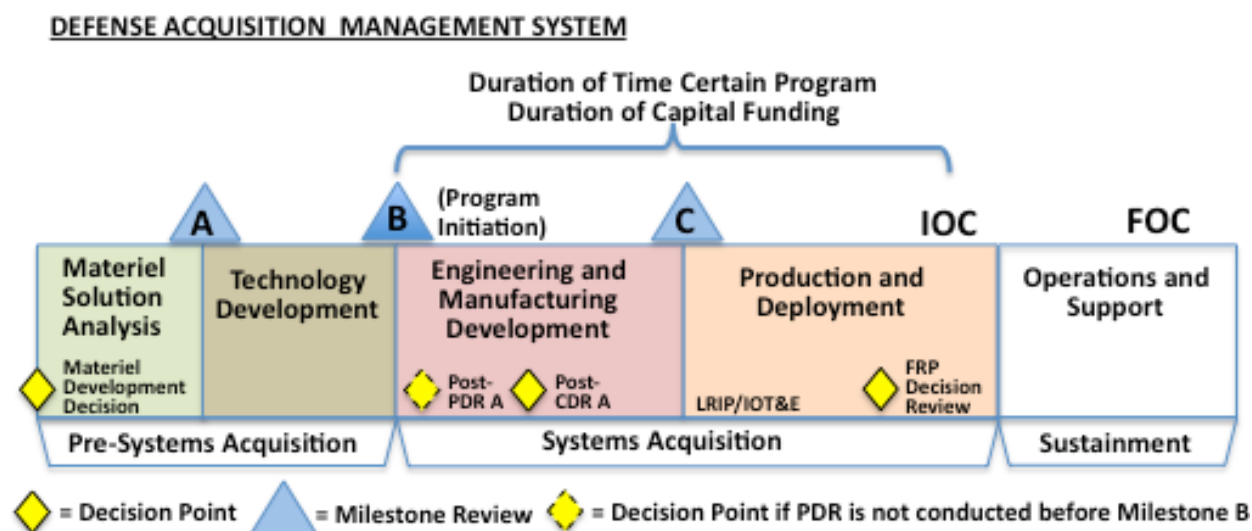


Figure 1. Defense Acquisition Management System
(used to identify where rules described later in the paper will apply)

Second, while the acquisition playing field is persistently changing, the workforce challenged with making the system successful has been reduced in numbers and experience. In the past, even though there were frequent modifications to the *5000* series Department guidance, there was also a cadre of experienced acquisition executives in the career ranks that could adjust with a modicum of disruption. The United States Senate and House Armed Services Committees, in their respective committee reports supporting the FY 2008 National Defense Authorization Act, were very concerned that the numbers, years of experience and skill levels of the professional acquisition workforce had reached unacceptably low levels (US Congress, 2008). Particularly troublesome was the major reduction in the acquisition workforce within the Department of Defense during the 1990s, the workforce on whom the Department counted to make sense of the constantly changing *5000* series Department guidance.

¹ Adapted for use in this paper from the graphic presented on page 12 of the *DoDI 5000.02*.

However well-intentioned and necessary the Department's changes to the 5000 series guidelines were thought to be, the consequence was instability in acquisition programs—an unfortunate result of a purposeful action by department management. Instability drives uncertainty, creating an Acquisition System environment where the program outcome is unpredictable. When the program outcome is unpredictable, program risk is increased. There is a corresponding drive to reduce risk by increasing the cost as a premium or hedge against uncertainty. When the workforce does not have the experience to deal with program risk, because every program event is being seen for the first time, there is very little chance of maintaining cost, schedule and performance. The underpinning experience necessary to work through a “tried-and-true” process does not exist.

These circumstances hold true for the Acquisition System as a whole, not just for the acquisition process—or little “a” (SECDEF, 2007, July) as it is generally understood within the acquisition community. The distinction between little “a” and big “A” is best summarized with the diagram in Figure 2. Program instability is reflective of a systemic problem inherent in the big “A” versus simply fixing a process problem in the little “a.” The mythology that attends the Venn diagram with the intersecting circles is that there is integration among the elements of the Acquisition System. The implication is that each of the elements contributes to and gains from being associated with the others. The intended result is a successful program defined by being on cost and on schedule and performing as expected. The reality is more accurately represented by Figure 3,² in which the three elements exist independently of one another by virtue of the fact that changing regulations and vague Acquisition System direction combined with an inexperienced workforce allows the independence to persist (Kadish, 2006, January).

² Both Figures 2 and 3 are adaptations of figures used in the DAPA Report, p. 4.



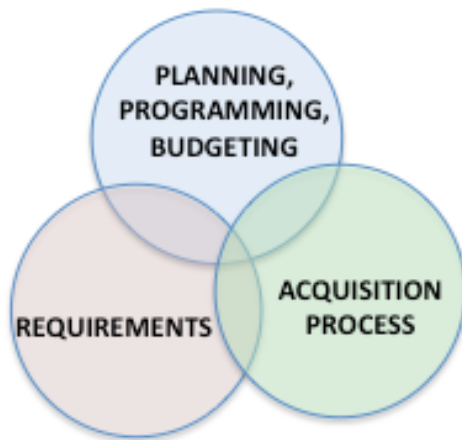


Figure 2. The Acquisition System

(This includes the Planning, Programming, Budgeting and Execution process and the Requirements process in addition to the little “a” Acquisition process.)



Figure 3. The Acquisition System

(In reality, the System is not cohesive, but more often three independent processes creating program instability resulting in cost increases schedule slips and uncertain performance.)

What results from the combination of changing acquisition regulations and a workforce that does not have a high enough number of acquisition professionals or the experience of seeing and working through a variety of program issues, is an inability to anticipate and prevent situations that put programs in jeopardy of failing the cost, schedule and performance standards. The DAPA study found that unstable programs did have a workforce component that contributed to the instability, and though there was also recognition during the subject-matter expert briefings that changing regulations and guidance might be troublesome in establishing stable programs, the combination of these two factors was not made prominent in the final report. Numerous studies have recommended solutions to the shortcomings of the Acquisition System, but for the most part, these fixes focus on the little “a” acquisition *process*, not on the larger systemic issues.

A focus on the acquisition process (“a”) fails to address the larger contextual issue of the system-driven program instability. Mandating a rule set is necessary to establish discipline and structure. “Following the rules” helps to create an acquisition program where uncertainty and the resulting program instability are reduced. The need for acquisition program discipline was emphasized by Dr. Ashton Carter, newly confirmed Under Secretary of Defense for Acquisition, Technology and Logistics. Quoted in DefenseNews.com from his written testimony presented at his confirmation hearing, Dr. Carter made clear his position: “Development, procurement and sustainment of major weapon systems require experience with the Department of Defense and the defense industry, systems engineering at every stage and iron discipline” (Bennett, 2009, March 26).

The following are a set of rules for defense acquisition programs that resulted from the DAPA panel discussions, interviews, and subject-matter expert surveys conducted during the

DAPA project. This paper diverges from the DAPA project in that what the 2006 study presented as “recommendations” for consideration by the Department of Defense are offered here as “rules” to be followed. Additionally, the DAPA recommendations focused on six categories affecting the Acquisition System: organization, industry, workforce, requirements, budget and acquisition. However, only the last three categories are addressed in this paper as particularly appropriate for establishing rules to abide by for the acquisition of defense weapon systems. The list of rules is by no means exhaustive, but, rather, the list is intended to establish a foundation upon which additional rules may be considered, developed and applied. Rules that all the participants in the Acquisition System play by and are accountable to adds a level of transparency and predictability that can provide for stable programs.

Requirements Rules

For the purposes of this paper, two basic types of requirements are considered: customer requirements and derived requirements. Customer requirements are very straightforward and defined at the macro-level by approved Key Performance Parameters (KPPs)³ and non-Key Performance Parameters.⁴ Derived requirements, on the other hand, are requirements that the customer has not specified directly as a requirement but that emerge or *derive* from the design decisions that are made (Brooksby, 2003).⁵

Derived requirements are not capabilities that the customer specifically has identified. Particularly troublesome is a subset of derived requirements that fall into the category of engineering changes—those changes that improve on “good enough” and that have a combined effect of driving up costs and missing schedule milestones. In the absence of rules that prevent pursuing this type of engineering change as a derived requirement, the guiding thought process follows this logic: “because we can, we should; because we should, we must; and because we must, we will no matter how much it costs or how long it takes.” According to a recent Under Secretary of Defense, Comptroller study, prepared by Monitor Company Group, L.P. and based on Selected Acquisition report data, engineering changes account for approximately 33% of the nearly \$265 billion in program cost growth from 2000 to 2007 (Monitor, 2007). No doubt, some of the engineering changes were to correct design problems. However, the engineering

³ “Those attributes or characteristics of a system that are considered critical or essential to the development of an effective military capability and those attributes that make a significant contribution to the characteristics of the future joint force as defined in the Capstone Concept for Joint Operations. KPPs must be testable to enable feedback from test and evaluation efforts to the requirements process. KPPs are validated by the Joint Requirement Oversight Council (JROC) for JROC Interest documents, and by the DOD component for Joint Integration, Joint Information, or Independent documents. Capability development and capability production document KPPs are included verbatim in the acquisition program baseline” (CJCS, 2007, May 1). Occasionally, (some would say all too often) KPPs cannot be achieved with the level of technology existing now or in the foreseeable future. Approval of this category of KPP suffers from collective bad judgment, and no rule set will be a remedy. Consequently, this article does not address the development of this type of requirement.

⁴ Non-Key Performance Parameters are requirements that are desired by the customer but not deemed critical or essential. Often, these requirements represent the trade-space in programs when budget constraints or program execution problems demand a de-scoping of the program.

⁵ Though this reference defines requirements as they apply to software development, the relevance to weapons system program development generally is very compelling and appropriate and, therefore, is used here.



changes that simply improve on an otherwise sufficient, specification-compliant design while driving up costs and impacting schedule need to be reduced or eliminated.

As a result, what follows are recommended rules with appropriate rationale that should apply when considering the addition of both new customer requirements and derived requirements.

Requirements Rule One: Weapon system requirements will be fixed prior to Engineering and Manufacturing Development (EMD) or achieving Milestone B phase (see Figure 1 on page 4).

The prohibition of additional system requirements beyond the KPPs and the specific capabilities that contribute directly to them after approval for the EMD phase at Milestone B helps to ensure that Initial Operating Capability (IOC) will be met. Fielding weapon systems on schedule simply must be a program priority. By allowing requirements to be adopted beyond those identified prior to EMD, ensures that IOC will be slipped and the weapon system will not be fielded on schedule.

Requirements Rule Two: From the start of EMD (Milestone B, program initiation) to IOC, only safety-of-flight or other safety-related engineering changes will be allowed. The only exceptions are those design changes that can be proven to produce a three-to-one savings to investment while not missing schedule.

This rule addresses the insidious nature of an ever-growing number of engineering changes that routinely skulk their way into systems development. Additionally, the rule provides a potential for incentives that produce beneficial engineering changes and cost savings. Though some will attempt to insert engineering changes using “safety” as justification, specious arguments for such justification at least will have increased scrutiny, prompted by the deviation from rule two.

Requirements Rule Three: Any and all additional system requirements that are deemed essential following the start of EMD will be developed as unique block-up grades that will be introduced as blocks or variations after Full Operational Capability (FOC) has been certified (see Figure 1 on page 4).

There is a persistent need for a disciplined and structured way of incorporating meritorious capabilities enhancements to a weapon system while not disrupting the established design, cost, schedule, or performance. By following this rule, there is the added benefit of having some level of operational experience that can inform the development and insertion of weapon system improvements.

Requirements Rule Four: Holding to an established Initial Operational Capability as a time-certain for fielding the weapon system will be a Key Performance Parameter.

Weapon systems development and fielding plans must have some consideration of time-to-need as integral to the requirement for the capability. This rule makes the time-to-need, or fielding, an essential consideration in program development and planning. If there is no fully understood and accepted time by which a weapon system must be fielded, the importance of the capability to meet a threat is called into question.



Budget Rules

According to the DAPA report (Kadish, 2006, January), budget instability is a major contributor to acquisition program instability and the failure of acquisition programs to meet cost expectations. Lack of funding discipline on the parts of Congress, the military, and the Defense Department produces acquisition programs that are targeted as bill payers for other funding priorities or that are under-funded because of poor cost estimating.

In his written confirmation statement submitted to the Senate Armed Forces Committee and reported in DefenseNews.Com, Dr. Ashton Carter emphasized the importance of having “stable funding” (Bennett, 2006, March 26). He considered stable funding a key factor in choosing whether a weapon system contract is a fixed-price type contract or cost-plus (2006, March 26).

The DAPA report offers the following solution: the establishment of a funding account for the duration of the acquisition program from the program initiation at the beginning of EMD to IOC, referred to as a “Stable Program Funding Account” (see Figure 1 on page 4). In this article, the term “Capital Funding” is used to describe a stable funding account during the period from Milestone B, EMD to IOC that is tied to specific programs and funded by the individual Services with a fixed budgeted amount. Capital funding will apply initially only to MDAPs, though other acquisition programs could be considered. The Office of the Secretary of Defense and the Services will guarantee that programs identified for capital funding will not be used to pay other bills.

Budget Rule One: All Major Defense Acquisition Programs (MDAPs) will be evaluated as candidates for capital funding.

Though not all acquisition programs are suitable for a capital funding approach, MDAPs should at least be considered since these programs—because of their size—offer the most potential for reduced cost growth based on a guaranteed stable funding profile.

Budget Rule Two: Capital funding programs will:

- a. *Have a fixed-funding profile from Milestone B (EMD) to Initial Operating Capability. Capital funding programs will not be used as bill payers during that timeframe.*

The timeframe for capital funding allows for follow-on increases in the unit quantity for the acquisition program after IOC while helping to ensure that fielding the program is on time. Put another way, this rule helps to ensure that funding is not the reason for not fielding a program on time.

- b. *Provide bi-annual reports to Congress on cost-schedule and performance progress.*

Congress’s responsibility and right for oversight of Defense spending must be addressed. By engaging with congressional staffs and principals to keep them informed of how effectively the Defense Department is spending taxpayer dollars for acquisition programs, the needs of Congress will be addressed. Frequent, statutorily mandated program reviews will provide Congress the opportunity to assess not only the program’s progress but also the effectiveness of capital funding. The program should be reviewed with Congress twice annually. This provides congressional staff and principals an early understanding of developing trends. Failure to have a successful review (over cost, behind schedule or failing to perform) is addressed later in this paper.



- c. *Have a Technology Readiness Level of at least 6 at Milestone B (EMD).*

Programs that move into EMD that do not have a Technology Readiness Level of 6 or better are destined to experience cost escalation, schedule slips, and unpredictable performance. Capital funding is predicated on the fact that costs can be controlled and schedule can be maintained. For capital funding to be effective, all aspects of an acquisition program must have as much stability as possible.

- d. *Be “time-certain” programs.*

Capital funding success depends on strict adherence to a fully-agreed-to timeframe (by the government and the contractor) from Milestone B approval for EMD to IOC. This provides predictability regarding what to expect in the program in general. It also drives the government and industry program managers to be realistic in what they promise for the program and in how they propose to meet the program milestones to stay within the timeframe for system fielding.

- e. *Be cancelled if the program fails to meet established cost, schedule, and performance.*

If a program fails to meet any one of the cost, schedule, and performance objectives established at program initiation after three consecutive congressional reviews, the program will be cancelled; not re-baselined or re-planned—cancelled. When government and industry program managers as well as the military departments and Defense Department program executives fully understand the consequences of program failure, the likely result will be greater management attention.

Acquisition Rules

Analysis of acquisition programs over time shows that programs generally grow about 50% in cost (Younossi et al., 2006). Larger Defense programs clearly are more prominent when analyzing program cost growth because the amounts of money are very large compared to programs managed by other Federal agencies. Though it may seem obvious, programs that have longer timeframes for EMD also experience greater cost growth (Younossi et al., 2006). Furthermore, missing from most, if not all, acquisition strategies is analysis that asks: “What does time, as an independent variable, do to the trade space defined by the minimum and optimum performance and cost?”

To address the importance of time as a consideration in developing acquisition strategies, the Special Assistant to the Deputy Secretary of Defense asked The Monitor Group (2003) to look at the value of establishing time as a boundary condition or driver in determining the desired timeframe between Milestone B and IOC. Time should be considered an independent variable, as should cost, especially when it is critical to field a capability in time to have a positive impact on a threat.

Time is not the only factor that works against well-run acquisition programs. We have developed an acquisition-workforce culture that has adopted “flexibility” as a means to acquiring more capable weapon systems, other equipment, and services. The consequence of this culture is that there is a deliberate attempt on the part of the acquisition community to establish the broadest interpretation of what constitutes best value, desired technology, and solicitation outcome. Unfortunately, “flexibility” often comes at the expense of discipline and structure as a means to achieve cost, schedule, and performance objectives.



Successful competitive solicitations, however, depend on discipline and structure in the way that the acquisition competition is managed. Competition management begins with development of and adherence to an acquisition management/master plan or strategy. That plan or strategy should inform the Request for Proposal and is the roadmap for the subsequent competition and program management.

Acquisition Rule One: No MDAP will be considered for Milestone B certification without a comprehensive Single Acquisition Management Plan/Strategy to include at a minimum total system procurement quantity, explanation and rationale for the contracting methodology selected (i.e., prime contractor choosing subcontractors, leader-follower prime contractors, etc.), sustainment plan and how the Prime Contractor or Lead Systems Integrator will select and manage subcontractors.

Most, if not all, programs that experience significant problems with cost, schedule, and performance have inadequate or flawed acquisition strategies or management plans. Often, the focus of the acquisition strategy is on what the weapon system should do, the plans of the Military Services to field the system, and the phasing of the number of units over time that are required. This approach, while important, does not comprise an acquisition strategy or management plan. The acquisition strategy should explain how the competition will be run; what management, technical, and cost elements are most important; and whether it will be a winner-take-all (and why that is the preferred choice), split-buy, leader/follower strategy, or some combination of each. These considerations in an acquisition strategy are important and will drive necessary program decisions in the follow-on program management.

Management and acquisition strategies should consider what must be fielded and when and how block upgrades will be completed, managed, and integrated after full operating capability is achieved. The acquisition strategy must describe how the winning contractor will manage subcontractor content. An annex to the acquisition strategy must be how the weapon system competition will be financed, and consideration must be given to any subsystem's commercial value in terms of design buy-back and production rights. In the past, the Department has either retained all of the design rights or retained none of the rights. Retaining substantial design rights while keeping open the opportunity for the contractor to benefit from any commercial markets that might emerge makes competing for the Department's business more appealing.

Acquisition Rule Two: All MDAPs will be evaluated as "time-certain" programs, where the timeframe between Milestone B and IOC (see Figure 1 on page 4) will be established with a thorough analysis, using Time as an Independent Variable (TAIV). Additionally, the criteria that describe what must be accomplished in the EMD phase of the program cannot significantly change.

When TAIV is applied to the development of an acquisition program, the importance of time in developing and defining the technology, as well as its design and production factors, are given prominence in the analysis of cost, schedule, and achieving the desired performance. Time-certain in this instance is not synonymous with schedule. Schedule is the sequential distribution of program events that, on completion, have a timeframe associated with them. We measure schedule with milestones accomplished. TAIV, on the other hand, is the analytic construct that identifies which out of a given list of performance capabilities are of marginal value when considering the amount of time necessary for a capability to be developed, incorporated into the weapon system, and fielded. The time-certain period is established with the results of the TAIV analysis. Schedule is, then, the sequence of events or program



milestones that fit within the time-certain period. Though a recent Government Accountability report (GAO, 2009) points out that the DAPA report (Kadish, 2006, January, p.49) recommended that schedule be a Key Performance Parameter, this rule departs from DAPA in that the time between Milestone B and IOC be a time-certain period and that specific length of time be a Key Performance Parameter. Urgency for fielding a particular desired capability, then, has a context that can be used to describe what needs to be fielded or deployed and when.

Acquisition Rule Three: Aircraft programs will take no longer than five years from Milestone B (EMD) to Initial Operational Capability, again using TAIV as an analytic tool to validate the optimum timeframe.

Successful aircraft programs have been fielded in five years or less. The fielding of both the F-15 and F-16 were achieved in approximately five years, with the F-15E (Woods, 2008) fielded in approximately five-and-one-half years. Had management and budget attention been constant and sufficient, the C-17 cargo aircraft could have achieved IOC in five years. But after several false starts, it took almost 10 years. The complexity of the aircraft's technology demands is clearly important, but other factors seem to play roles as well. The EA-18G is planned for five years and nine months from Milestone B to IOC while the F/A-18E/F was planned for nine years and four months. It is true, however, that the EA-18G is basically an F/A-18F airframe integrated with an Improved Capability III, Airborne Electronic Attack (AEA) avionics suite (employed on the EA-6B) and should take less time to field. The accelerated development schedule (over its F/A-18E/F predecessor) probably can be attributed to the coupling of that proven, in-production airframe with an existing AEA technology.

The B-2 took 18 years from Milestone B to IOC for a variety of reasons, only some of which had to do with available technology. Budget and congressional interest played big roles in the length of time that it took for the B-2 to reach IOC. At 14 years and four months, the F-22 has taken the longest of any of the fighters to reach IOC. If the rules are followed that require capital funding and not being certified for EMD without achieving a TRL of 6, it is not a stretch for a well-managed program with stable funding that follows all of the rules described in this paper to reach IOC in five years. However, when the program becomes a bill payer for other Service needs or derived requirements are inserted before or during the EMD phase, five years will, of course, be a difficult achievement. The criteria that describe what must be accomplished in the EMD phase of the program cannot significantly change.

Acquisition Rule Four: Ship-building programs will take no longer than seven years from Milestone B (EMD) to Initial Operational Capability, again using TAIV as an analytic tool to validate the optimum timeframe.

Currently, the average time from Milestone B to IOC for US Navy ships entering the fleet is eight years, nine-and-one-half months (Costello, 2008). Size and complexity, however, do not seem to be what determines the length of time to get combat ships into the fleet. The range is from CVN21 (Gerald R. Ford Class modern aircraft carrier) taking 12-and-one-half years to strategic sealift ships taking five years, nine months. But, again, complexity or size does not seem to be the driving factor since a Supply Class Fast Combat Support Ship (AOE6) took over eight-and-one-half years to go from Milestone B to IOC while the aircraft carrier CVN74, USS John C. Stennis, took a little over eight years, four months to achieve IOC. An LPD 17 San Antonio Class amphibious docking ship took 11 years and one month to reach IOC while the Arleigh Burke Class (DDG 51) destroyer took nine years, three months to go from Milestone B to IOC. Arguably, to establish seven years as the time-certain for naval shipbuilding programs from program initiation at Milestone B to IOC will be a challenge—but a challenge that can be



met if the time-certain constraint is one that both the contractor and the Department understand and capture in their Integrated Master Plan and Integrated Master Schedule. Also, the criteria that describe what must be accomplished in the EMD phase of the program cannot significantly change.

Acquisition Rule Five: Requests for Proposals (RFP) will include a competition element that asks how the competitors plan to select, manage, and evaluate their subcontractors. Subcontractor management will be an element of the Contractor Performance Assessment report and considered in determining award and incentive fees.

With regard to the issue of subcontractor management raised in Rule Four, how the winning prime contractor intends to select and manage its subcontractors and suppliers will be a prominent competition element in the Request for Proposal (RFP). The purpose of this rule is to discourage potential prime contractors from arbitrarily, and as the default position, choosing sister divisions as subcontractors. If a competitor must explain the rationale for selecting subcontractors' contributions and their cost and design advantages compared to sister divisions or other alternatives, sister divisions may not be as appealing of a choice as a program subcontractor. Knowing that the plan for selecting and managing subcontractors will be weighted in the management section of the RFP will provide more incentive to the potential prime contractor to give very careful consideration to subcontractor selection. Profit-on-profit should become more of a competitive liability.

Acquisition Rule Six: No MDAP will be considered for Milestone B certification without a Test and Evaluation Master Plan that has been agreed to and approved.

All too often, the test and evaluation process results in new requirements that exceed contract specifications. Ensuring that a fully agreed-to and approved Test and Evaluation Master Plan that clearly bounds the limits of what can be tested, including metrics for success that all understand, is essential. This will go a long way to precluding testing the driving engineering changes and requirements that exceed the contract defined design.

Acquisition Rule Seven: Where the competitors offerings are comparable and the competition will allow, competitors for EMD will submit cost-model data and Most Probable Cost will be determined prior to final Request for Proposal release and shared with competitors. Most Probable Cost will be contract cost. Competitions will be based on technical and management risk.

A long-held view in the defense industry is that any program vice president who loses a cost competition by not having the lowest cost is fired. What exactly drives the industry to hold this point of view? If you don't count their years of experience, a winning contractor believes that there is a better than 80% probability that the contract specifications that were bid will be changing as the ink is drying on the contract. The winning contractor can then charge full price on the updated program specifications, within the cost and pricing guidelines, and make up for any risk accepted in the original winning proposal.

This approach to an acquisition program is most often prevalent when the contract is a cost-plus arrangement, though fixed-price contracts experience the same type of expanding-contract cost growth with the emergence of derived requirements and engineering changes. The problem that occurs with fixed-price contracts that have engineering changes or derived requirements is that unless the contract is amended, the cost of the changes often turns up as



claims against the government. Cost-plus contracts, on the other hand, only have the added costs show up as the “plus” in cost-plus.

The excuse often heard when costs rise is that the Department and the defense contractors do not have good cost estimates. This assertion does not generally prove to be true. When competing contractors reveal the output of their cost models and compare them with the Department’s estimates, there is often very little difference. As a general rule, then, all the participants in acquisition competitions have a very good estimate of what the costs will be. Why then are competitions based on cost when everyone knows what the most likely cost will be? Cost should be taken off the table and the competition should be about which competitor has the better solution for management and technical risk, with subcontractor selection and management being prominent in that evaluation. Most Probable Cost, or the cost that the competitors and government models agree is the cost, should become the contract cost.

Acquisition Rule Eight: Competitions will be based on the motto: “the design you bid is the design you build.”

A number of activities take place while the ink is drying on the contract. Not the least of these is that the government program manager and executive are saying to the winning contractor, “We know what we said we wanted, and what you proposed, but we have a few changes to the requirements we’d like you to adopt.” To which the winning contractor readily replies, “Not a problem; just a few design changes, another year on the program, and an increase in cost.” If both the winning contractor and the government program manager fully understand and believe that the design that was bid is the design that will be built, then their behavior will change to follow the rule.

Conclusion

The Department of Defense is now in a budget environment where it is directly competing with a formidable domestic agenda that will not be denied. In his January 2009 article *A Balanced Strategy: Reprogramming The Pentagon For A New Age*, published in *Foreign Affairs*, Secretary of Defense Robert Gates stated,

In recent years, these platforms have grown ever more baroque, have become ever more costly, are taking longer to build, and are being fielded in ever-dwindling quantities. Given that resources are not unlimited, the dynamic of exchanging numbers for capability is perhaps reaching a point of diminishing returns. A given ship or aircraft, no matter how capable or well equipped, can be in only one place at one time. (Gates, 2009)

If Secretary Gates’ message is going to be taken to heart by those charged with acquiring the “platforms” and those responsible for producing them, then far greater attention must be given to using the defense budget wisely, efficiently and effectively. Programs simply must be managed to cost, schedule and performance. A mandated set of rules that drive discipline into the Acquisition System is one answer.

This paper describes a few such rules that are worthy of implementing. They are by no means inclusive of all the rules that should be considered and established. Additionally, it should be clearly understood that for behaviors to change, all of the rules must be followed since no single rule or group of rules stands alone. For example, without a time-certain program, the discipline for capital funding will not be present and planning for funding over a



well-defined time period will not be possible. The rules are interrelated, and these rules are necessary in order to re-establish an acquisition culture that is disciplined with a clear understanding of how to bring predictability and stability to the Department of Defense Acquisition System.

The institution of rules that are clearly communicated and consistent must be enforced to reinvigorate and support the acquisition workforce's enthusiasm for meeting cost, schedule, and performance as well as establishing discipline and structure in the Acquisition System. The Department of Defense establishes and follows checklists for any number of activities from flying airplanes to mailing packages. Rules are just another form of a checklist. With 91 major Defense Acquisition Programs with a combined value of over \$1.6 trillion currently being managed, the result will be getting better weapon systems into the hands of the warfighter in time to make a difference on the battlefield.

List of References

- Aerospace Industries Association (AIA). (2008, November). *A special report, U.S. defense acquisition: An agenda for positive reform*. Arlington, VA: Author.
- Arena, M.V., Younossi, O., Brancato, K., Blickstein, I., & Grammich, C.A. (2008). *Why has the cost of fixed-wing aircraft risen?: A macroscopic examination of the trends in U.S. military aircraft costs over the past several decades*. Santa Monica, CA: RAND.
- Bennett, J.T. (2009, March 26). *Carter: DoD acquisitions need "iron discipline."* Retrieved March 28, 2009, from <http://www.defensenews.com/story.php?i=4008472>
- Brooksby, R. (2003, February 2). *Requirements and change*. Retrieved February 24, 2009, from <http://www.ravenbrook.com/doc/2003/02/24/requirements-and-change/>
- CJCS. (2007, May 1). *Joint capabilities integration and development system* (CJCSI 3170.01F). Washington, DC: Author.
- Cochrane, C.B. (2009, January 1). *Management systems 1971 to 2008 star wars* (Ver. 3). Unpublished PowerPoint presentation. Retrieved February 24, 2009, from <http://74.125.47.132/search?q=cache:fmGjddbqi4sJ:www.publicintegrity.org/assets/powerpoint/AQ%2520Mgmt%2520Sys%25201971%2520to%25202008%2520star%2520wars%2520ver%252003.pps+C.+B.+Mgmt+Sys+1971+to+2008+Star+Wars+ver+3&cd=1&hl=en&ct=clnk&gl=us&client=safari>
- Costello, D. (2008). Data referenced on time from EMD to IOC. Office of the Director, Acquisition Resources and Analysis, Under Secretary of Defense, Acquisition, Technology and Logistics, US Department of Defense.
- DoD. (2008, December). *Operation of the Defense Acquisition System* (DoD Instruction 5000.02). Washington, DC: Author.
- GAO. (2009). *Defense acquisitions: Perspectives on potential changes to DoD acquisition management framework* (GAO-09-295R) (p. 11). Washington, DC: Author.
- Gates, R.M. (2009). *A balanced strategy: Reprogramming the Pentagon for a new age*. Retrieved Mar 18, 2009, from <http://www.foreignaffairs.com/articles/63717/robert-m-gates/a-balanced-strategy>
- Kadish, R. (2006, January). *Defense acquisition performance assessment*. Retrieved February 24, 2009, from <http://www.acq.osd.mil/dapaproject/> 1, 4, 6, 32, 49
- Monitor Company Group, L.P. (2003, August). *Preliminary thoughts on time as an independent variable in support of the acquisition framework*. Briefing. Presented to the Office of the Deputy Secretary of Defense. Washington, DC: Author. (Available on request).



- Monitor Company Group, L.P. (2007). *Selected acquisition reports analysis task*. Briefing. Presented to the Under Secretary of Defense, Comptroller. Washington, DC: Author.
- President's Blue Ribbon Commission on Defense Management (The Packard Commission). (1986, April). *A formula for action: A report to the President on defense acquisition*. Washington, DC: Author.
- SECDEF. (2007, July). *Defense acquisition transformation, report to Congress: John Warner National Defense Authorization Act Fiscal Year 2007*. Washington, DC: Author.
- US Congress. (2008). *National defense authorization act*, Title VIII—Acquisition policy, acquisition management, and related matters, Subtitle E—Acquisition workforce provisions, Section 852 (Senate and House Conference Report 110-447. Washington, DC: Author.
- Woods, R. (2008). Data referenced on time from EMD to IOC. Office of the Director, Acquisition Resources and Analysis, Under Secretary of Defense, Acquisition, Technology and Logistics, U.S. Department of Defense.
- Younossi, O., Arena, M., Leonard, R., Roll, C.R., Jr., Jain, A., & Sollinger, J. (2006). *Is weapon system cost growth increasing?: A quantitative assessment of completed and ongoing programs*. Santa Monica, CA: RAND.



THIS PAGE INTENTIONALLY LEFT BLANK



2003 - 2009 Sponsored Research Topics

Acquisition Management

- Acquiring Combat Capability via Public-Private Partnerships (PPPs)
- BCA: Contractor vs. Organic Growth
- Defense Industry Consolidation
- EU-US Defense Industrial Relationships
- Knowledge Value Added (KVA) + Real Options (RO) Applied to Shipyard Planning Processes
- Managing Services Supply Chain
- MOSA Contracting Implications
- Portfolio Optimization via KVA + RO
- Private Military Sector
- Software Requirements for OA
- Spiral Development
- Strategy for Defense Acquisition Research
- The Software, Hardware Asset Reuse Enterprise (SHARE) repository

Contract Management

- Commodity Sourcing Strategies
- Contracting Government Procurement Functions
- Contractors in 21st Century Combat Zone
- Joint Contingency Contracting
- Model for Optimizing Contingency Contracting Planning and Execution
- Navy Contract Writing Guide
- Past Performance in Source Selection
- Strategic Contingency Contracting
- Transforming DoD Contract Closeout
- USAF Energy Savings Performance Contracts
- USAF IT Commodity Council
- USMC Contingency Contracting

Financial Management

- Acquisitions via leasing: MPS case
- Budget Scoring
- Budgeting for Capabilities-based Planning
- Capital Budgeting for DoD



- Energy Saving Contracts/DoD Mobile Assets
- Financing DoD Budget via PPPs
- Lessons from Private Sector Capital Budgeting for DoD Acquisition Budgeting Reform
- PPPs and Government Financing
- ROI of Information Warfare Systems
- Special Termination Liability in MDAPs
- Strategic Sourcing
- Transaction Cost Economics (TCE) to Improve Cost Estimates

Human Resources

- Indefinite Reenlistment
- Individual Augmentation
- Learning Management Systems
- Moral Conduct Waivers and First-tem Attrition
- Retention
- The Navy's Selective Reenlistment Bonus (SRB) Management System
- Tuition Assistance

Logistics Management

- Analysis of LAV Depot Maintenance
- Army LOG MOD
- ASDS Product Support Analysis
- Cold-chain Logistics
- Contractors Supporting Military Operations
- Diffusion/Variability on Vendor Performance Evaluation
- Evolutionary Acquisition
- Lean Six Sigma to Reduce Costs and Improve Readiness
- Naval Aviation Maintenance and Process Improvement (2)
- Optimizing CIWS Lifecycle Support (LCS)
- Outsourcing the Pearl Harbor MK-48 Intermediate Maintenance Activity
- Pallet Management System
- PBL (4)
- Privatization-NOSL/NAWCI
- RFID (6)
- Risk Analysis for Performance-based Logistics
- R-TOC Aegis Microwave Power Tubes



- Sense-and-Respond Logistics Network
- Strategic Sourcing

Program Management

- Building Collaborative Capacity
- Business Process Reengineering (BPR) for LCS Mission Module Acquisition
- Collaborative IT Tools Leveraging Competence
- Contractor vs. Organic Support
- Knowledge, Responsibilities and Decision Rights in MDAPs
- KVA Applied to Aegis and SSDS
- Managing the Service Supply Chain
- Measuring Uncertainty in Earned Value
- Organizational Modeling and Simulation
- Public-Private Partnership
- Terminating Your Own Program
- Utilizing Collaborative and Three-dimensional Imaging Technology

A complete listing and electronic copies of published research are available on our website:
www.acquisitionresearch.org



THIS PAGE INTENTIONALLY LEFT BLANK





ACQUISITION RESEARCH PROGRAM
GRADUATE SCHOOL OF BUSINESS & PUBLIC POLICY
NAVAL POSTGRADUATE SCHOOL
555 DYER ROAD, INGERSOLL HALL
MONTEREY, CALIFORNIA 93943

www.acquisitionresearch.org